COURSES FOCUSING ON EMPLOYABILITY SYLLABUS

M.Sc. Biochemistry syllabus

(With effect from Academic year 2018-19 for first semesters)

Structure of M.Sc. Biochemistry course

A two years M.Sc. programme is formulated for developing competent Biochemists. The course is based on choice based credit system (CBCS) and interdisciplinary nature of Biochemistry, Chemistry, Quantitative Biology, Genetics and Microbiology. The programme obliges students to read original publications and envisages significant inputs in Laboratory work, communication skills, creativity, planning, execution and critical evaluation of the scientific data. The course titles have been carefully chosen to represent the core courses and the specialization introduced in the two years course of Biochemistry are :- Enzymology, Molecular Biology, Biotechnology, Clinical Biochemistry, Nutritional Biochemistry and Immunology inconsonance with the objectives of the University. The courses formulated have a biochemical slant than biological and are up to date. The course is fine tuned in order to enhance the job opportunities of the students.

M.Sc. BIOCHEMISTRY

I Semester

S.No	Course	Marks		Total Marks	Credits
		Internal	External		
BCH 1	Chemistry of Biomolecules	25	75	100	4
BCH 2	Analytical Biochemistry	25	75	100	4
BCH 3	Intermediary Metabolism - I	25	75	100	4
BCH 4	Cell Biology and Physiology	25	75	100	4
BCH 5	Qualitative and quantitative Biochemical Analysis (Practical-1)	--	--	100	4
BCH 6	Biochemical Techniques and Biochemical Preparations (Practical-2)	--	--	100	4

II Semester

S.No	Course	Marks		Total Marks	Credits
		Internal	External		
BCH 7	Intermediary Metabolism II	25	75	100	4
BCH 8	Enzymology	25	75	100	4
BCH 9	Microbiology & Genetics	25	75	100	4
BCH 10	Molecular Biology	25	75	100	4
BCH 11	Enzymology (Practical-1)	--	--	100	4
BCH 12	Microbiology (Practical – 2)	--	--	100	4

III Semester

S.No	Course	Marks		Total Marks	Credits
		Internal	External		
BCH 13	Endocrine Biochemistry	25	75	100	4
BCH 14	Nutritional Biochemistry	25	75	100	4
BCH 15	Nerve, Vision and Muscle Biochemistry	25	75	100	4
BCH 16	Genetic Engineering	25	75	100	4
BCH 17	Molecular Biology and Genetic Engineering (Practical-1)	--	--	100	4
BCH 18II	Nutrition Biochemistry (Practical-2)	--	--	100	4

IV Semester

S.No	Course	Marks		Total Marks	Credits
		Internal	External		
BCH 19	Clinical Biochemistry	25	75	100	4
BCH 20	Immunology	25	75	100	4
BCH 21	Biotechnology	25	75	100	4
BCH 22	Technical writing, Biostatistics, Computers and Bioinformatics	25	75	100	4
BCH 23	Clinical Biochemistry (Practical-1)	--	--	100	4
BCH 24	Immunology and Hematology (Practical-2)	--	--	100	4

S.No	Course	Marks		Total Marks	Credits
		Internal	External		
Non-Core I	**Fundamentals of Biochemistry (I Semester)**	**25**	**75**	**100**	**4**
Non-Core II	**Nutrition and Clinical Biochemistry (III Semester)**	**25**	**75**	**100**	**4**

REGISTRAR
YOGI VEMANA UNIVERSITY
KADAPA-516 005.

Evaluation

Evaluation is done by continuous assessment and semester- end examinations. Theory, practical (Lab work) will be carried out under the supervision of faculty.

I Semester

1. Four theory papers	4X100	=	400
2. Quantitative and qualitative Biochemical Analysis practical			100
3. Biochemical Techniques and Biochemical Preparations practical			100

	Total	=	600

II Semester

1. Four theory papers	4X100	=	400
2. Enzymology practical			100
3. Microbiology practical			100

	Total	=	600

III Semester

1. Four theory papers	4X100	=	400
2. Molecular Biology practical			100
3. Nutrition Biochemistry practical			100

	Total	=	600

IV Semester

1. Four theory papers	4X100	=	400
2. Clinical Biochemistry practical			100
3. Immunology and Hematology practical			100

	Total	=	600

Grand total Marks = 600+600+600+600= **2400**

1. Non-core I of student choice from other departments			100
2. Non-core II of student choice from other departments			100

	Total	=	200

Non-core 200 marks will not be considered for division / percentage. The total marks will be 2400 only.

M.Sc. BIOCHEMISTRY COURSE (CBCS)
(With effect from the academic year 2018-19 for first semester)

SEMESTER -I

BCH 1: Chemistry of Biomolecules

Unit I

Molecular logic of Life – Major constituents of cells, Biomolecules, Carbohydrates: Classification, structure, Chemical properties of carbohydrates, reactions of monosaccharides, formation of glycosidic bond, oligosaccharides, chemistry and biological role of homo and heteropolysaccharides; Structural polysaccharides (Cellulose and Chitin), storage polysaccharides (Starch, Glycogen and Inulin), Mucopolysaccharides, Blood group substances, Peptidoglycons.

Unit II

Amino acids and Proteins: Classification, structure and physico chemical properties of amino acids, Essential and non-essential amino acids, Acid base properties and general reactions of amino acids, Non-protein or unusual amino acids, Peptide bond formation and stability, Classification of proteins, Purification and isolation of proteins, criteria of purity, structural organization of proteins-Primary, Secondary, Tertiary and Quaternary structure, confirmation of proteins-Ramachandran plot, Denaturation of proteins.

Unit III

Lipids and Porphyrins: Classfication and Structure, properties and classification of lipids, fatty acids, waxes, phospholipids, cerebrosides and gangliosides, lipoproteins, prostaglandins, leukotrienes, thromboxanes, steroids and bile acids.
Structure of Porphyrins, Structure and function of Heme, Cytochromes and Chlorophyll.

Unit IV

Nucleic acids: Purine and Pyrimidine Bases, Nucleosides, Nucleotides, Formation of phosphodiester bond and its stability, Structure of DNA-Watson and Crick model, different forms of DNA, types of RNA, Structure of t-RNA, Denaturation and Renaturation of DNA, melting curves.

Recommended Books:

1. Glycoproteins by Hughes R.C., Chapman & Holl.
2. Biochemistry – Mechanisms of metabolism Cunningham, E.B.., Mc Grew – Hill.
3. Nucleic acid – Chargaff & Davidson Vol. II
4. The Biochemistry of Nucleic acids; Adams et al., Chapman and Hall.
5. Proteins: A guide to study by Physical & Chemical
6. Proteins: Structure, function and evolution. Dickerson Geis,2nd Edn, Benjamin/ Cummings, Menlo Park, California.
7. The proteins: Neurath and Hill, 3rd Ed. Academic New York.
8. Biochemistry – Zubay C, Addison – Wesley.
9. Biochemistry, A Problem Approach, 2nd Ed. Wood, W.B. Addison Wesley.
10. Biochemistry of Lipids and Membranes – Vance D, Addison – Wesley.
11. Biochemistry, Lehninger A.H.
12. Textbook of Biochemistry West, E.S., Todd, Manson & Vanbruggen, Macmillian &co.
13. Principles of Biochemistry white- A. Handler and Smith E.L. Mc Graw Hill.
14. The carbohydrates: Pigman & Hartman Vol. II – A & II- B.
15. Comprehensive Biochemistry – Florkin & stotz, Academic Press.
16. Organic chemistry, I.L. Finar, ELBS.
17. Organic chemistry by J.P. Cohen. Vol. 3 Edward Arnold.
18. Basic Principles of Organic Chemistry by Roberts & Cashino (Benjamin)
19. Fundamentals of Biochemistry by Voet and Voet.
20. Organic chemistry by Morrison and Boyd Prentice Hall.

BCH 2: Analytical Biochemistry

Unit I

Safety and good lab practices, Solutions –Percentage, Molarity, Molality, Normality, pH, Measurement of pH, pKa of functional group in biopolymers such as proteins and nucleic acids. Microscopy: basic principles of light microscopy, phase contrast microscopy, electron microscopy and fluorescence microscopy.

Sedimentation methods: principles of centrifugation, analytical and Ultra-centrifugation/Gradient centrifugation.

Unit II

Concept of half – life and decay constant, units of radioactivity, Radioactivity measuring techniques and correction factors. Application of isotopes in biochemical analysis, isotope dilution techniques and autoradiography. Radioisotopes in biochemistry and medicine. Measurement of radioactivity - GM counter, Liquid Scintillation Counter, γ-Counter, Radioactive disposal, RIA, Chemiluminescence.

Unit III

Separation methods: principle, methodology and application of counter current distribution, paper, thin layer, ion-exchange, gas chromatography, affinity chromatography, gel filtration, HPLC, electrophoresis - paper, agar, high voltage electrophoresis, iso - electrophoresis, iso - tachophoresis, Northern blot, southern blot, western blot analyses. *in situ* hybridization.

Unit IV

Spectroscopy methods – Concepts of spectroscopy, electromagnetic spectrum, Beer – Lamberts law, principles and applications of colorimetry, UV-VIS spectrophotometry. Concepts of fluorimetry, flame photometry, AAS, AES, Infrared, ESR, NMR, CD & ORD and X – ray Diffraction. Flowcytometry and cell sorting and their applications.

Recommended Books:

1. Principles and Techniques of Practical Biochemistry, Ed. Williams and Wilson.
2. Techniques in Molecular Biology Ed. Walker & Gastra, Croom Helm.
3. Principles of Instrumental Analysis, 2nd Ed. Holt-Sanders.
4. An Introduction to Spectroscopy for Biochemistry, Ed. Brown Sn., Academic Press.
5. Analytical Biochemistry, Holmes and Hazel Peck, Longman.
6. An Introduction to Practical Biochemistry. David t. Plummer, Tata Mac grew – Hill.
7. Biophysical Chemistry, Ed. Shall & Wyman, Academic Press Vol II & I.
8. A text book of quantitative inorganic analysis including elementary instrumental analysis, Vogel ELBS.
9. Biochemical Calculations Seigel, IH, 2nd Ed. John Wiley & Sons Inc.
10. Analytical Biochemistry by David Friefelder.

BCH 3: Intermediary Metabolism-I

Unit I

Outline of intermediary metabolism, methods of studying metabolism. Glycolysis – Reactions, energy yield and regulation. Entry of other carbohydrates into glycolytic sequence, fermentation, TCA cycle – Reactions, Energetics and Regulation. Organization of electron carriers and enzymes in mitochondria, mitochondrial respiratory chain, Classes of electron transferring enzyme, inhibitors of electron transport, oxidative phosphorylation, Mechanism of oxidative phosphorylation.

Unit II

Glyoxylate cycle, pentose phosphate pathway-regulation and significance. Glucuronic acid cycle, Breakdown of glycogen, starch and disaccharides, glycogenolysis and its regulation, Biosynthesis of glucose (gluconeogenesis), Futile cycle, glycogen synthesis and its regulation, Regulation of blood glucose homeostasis

Unit III

Bioenergetics - Thermodynamic principles: free energy, enthalpy (H), entropy (S), Free energy change in biological transformations in living systems; high energy compounds, exergonic and endergonic reaction, oxidation – reduction reactions. Microsomal electron transport – utilization of oxygen by oxygenases, superoxide dismutase, and catalase. photosynthesis – dark and light reaction Photophosphorylation, and Photorespiration, cyclic and non – cyclic reactions; photochemical events associated with photo system – I and II. C3 and C4 plants.

Unit IV

Nucleic acid metabolism. Synthesis of nucleotides and its regulation, Biosynthesis and degradation of purines and pyrimidines and its regulation. Salvage pathway, Lesch-Nyhan Syndrome, Synthesis of ribonucleotides, deoxy-ribonucleotides and its regulation. Inter conversion of nucleotides. Nucleotides as metabolic regulators.

Recommended Books:

1. Principles of Biochemistry, white. A, Handler, P and Smith
2. Biochemistry, Lehninger A.L.
3. Biochemistry, David E. Metzler.
4. Biochemistry, Lubert Stryer.
5. Review of Physiological chemistry, Harold A. Harper.
6. Text of Biochemistry, West and Tood.
7. Outlines of Biochemistry, Conn and Stump
8. Metabolic pathways – Greenberg.
9. Mitochondria, Munn.
10. Biochemistry, 2nd Edition, G. Zubay.

BCH 4: Cell Biology & Physiology

Unit I

Structural organization of prokaryotic and eukaryotic cells, Plant and animal cells – variation in structure and function, Types of tissues – Epithelial tissues, basement membrane, extracellular matrix, Chromatin organization, telomere, centromere, Ultrastructure and functions of nucleus, mitochondria, plastids, endoplasmic reticulum, Golgi complex, lysosomes, microbodies, ribosomes. Cytoskeleton – microtubules and microfilaments.

Unit II

Cell division by mitosis and meiosis, cell cycle and its regulation, cell receptors, endocytosis and exocytosis. Bio-membranes - composition of Membranes. Membrane lipids, proteins and carbohydrates. Molecular structure of membranes, fluid mosaic model of biological membranes. Membrane transport: Active transport, Active transport of Na+ K+(sodium potassium ATPase) Ca^{2+} (Ca^{2+} - ATPase).

Unit III

Basic concepts of cell signaling and transduction, different signaling molecules, second messengers, calcium, calmodulin, inositol phosphate, cAMP, cGMP, NO. Signal cascades. Introduction to physiology. Homeostasis. Excretory System: Kidneys – Glomerular filtration, tubular function, formation of urine, regulation of water and mineral balance.

Unit IV

Digestive system: Various regions of digestive system. Gastrointestinal secretions-composition, function of saliva, gastric, pancreatic, intestinal and bile secretions. Regulation of gastrointestinal function.

Circulatory System: Blood composition, Heart-Structure. Electrical activity, Heartbeat, Arterial system, micro circulation and lymphatics, cardiac cycle and cardiac output, control of circulation.

Respiratory system: Mechanics of respiration, gas exchange in the lungs, control of breathing.

Recommended Books:

1. Molecular Biology of the cell by Alberts *et al*.
2. Cell and Molecular Biology by EDP de Robertis and EMF de Robertis.
3. Cell and Molecular Biology 2nd Ed. By P.K. Gupta, Rastogi Publ.
4. Molecular Genetics by D Friefelder
5. Cell molecular biology, albert Bruce
6. Gene VII by Lewin
7. Molecular cloning by Maniatis and Co Vol I, II, III
8. Genetics by Gardner
9. Genetics by Suzuki
10. Molecular genetics by klug and Cummings
11. Cell and Molecular Biology 2nd Ed. by P.K. Gupta, Rastogi Publ.

PRACTICALS

BCH 5: Qualitative and Quantitative Biochemical Analysis

1. General tests of carbohydrates. Specific reactions of selected sugars – Osazones, sucrose, pentoses.
2. General reactions of amino acids and proteins. Precipitation of proteins.
3. Qualitative tests of lipids and steroids.
4. Titration curve of amino acid and calculation of pKa and pI value.
5. Estimation of amino acids by formal titration.
6. Estimation of tyrosine by Millons – reaction.
7. Estimation of amino acid by Ninhydrin method.
8. Effect of solvent system on the Rf value of two solutes.
9. Estimation of proteins by Lowry methods.
10. Estimation of proteins by Biuret methods.
11. Isolation of mitochondria from Rat liver by Density gradient centrifugation (Demonstration)

BCH 6: Biochemical Techniques and Biochemical Preparations

1. Preparation of buffers and pH measurement.
2. Separation of amino acids by paper chromatography
3. Separation of sugars by TLC
4. Separation of amino acids by paper electrophoresis (Demonstration)
5. Separation of proteins by SDS-PAGE.
6. Standardization of pH meter and measurement of pH of a biological fluid using pH meter
7. Absorption spectra of phenol red, amino acids and nucleic acid.
8. Isolation and Spectrophotometric characterization of plant pigments.
9. Verification of Beer's law and determination of molar extinction coefficient using p-nitro phenol.
10. Separation of plant pigments by paper chromatography.
11. Separation of amino acids by ion-exchange chromatography.
12. Isolation of starch from potatoes.
13. Isolation of cholesterol from brain.

Semester II

BCH-7: Intermediary Metabolism-II

Unit I

Lipid metabolism: lipids as energy reserves. Oxidation of fatty acids, Oxidation of odd chain fatty acids, Energy yield and regulation. Ketone bodies, Fatty acid biosynthesis- control of fatty acid synthesis. Formation of monoenoic and polyenoic acids.

Unit II

Biosynthesis of cholesterol, triacyl glycerols, phospholipids, bile acids. Formation of prostaglandins, leukotrienes, prostacyclins. Metabolism of lipoproteins. Disorders of lipid metabolism – Gauchers disease, Tay-Sachs disease, Hypo and Hyper lipoproteinemia.

Unit III

Nitrogen cycle, Biological Nitrogen fixation. Nitrate and ammonia utilization, ammonia excretion, synthesis of glutamine. Formation of nitrogenous excretion products. Urea cycle. Amino acids as precursors – formation of Polyamines, Creatine, Histamine.

Unit IV

Amino acid degradation, transamination, oxidative deamination, pathways of degradation of different amino acids, biosynthesis of essential and non-essential amino acids. Regulation of amino acid biosynthesis. Inborn errors of amino acid metabolism – Phenylketonuria, Alkaptonuria, Maple-Syrup urine disease. Biosynthesis and degradation of Heme, Glutathione, γ- glutamyl cycle, gramicidin.

Recommended Books:

1. Principles of Biochemistry, White. A, Handler, P and Smith
2. Biochemistry, Lehninger A.L.
3. Biochemistry, David E. Metzler.
4. Biochemistry, Lubert Stryer.
5. Review of Physiological chemistry, Harold A. Harper.
6. Text of Biochemistry, West and Todd.
7. Outlines of Biochemistry, Conn and Stump
8. Metabolic Pathways – Greenberg.
9. Mitochondria, Munn.
10. Biochemistry, 2nd Ed, G. Zubay.

BCH 8: Enzymology

Unit I

Classification of enzymes, protein confirmation, specificity and active site. Units of enzyme activity, enzyme coupled kinetic assay. Compartmentation of enzymes. Factors affecting velocity of enzyme catalyzed reactions – effect of pH, temperature, enzyme concentration and substrate concentration. Kinetics of enzyme catalyzed reactions. Enzyme kinetics of single substrate reactions, study state assumption, Michalis – Menten, Lineweaver Burk, Eadie Hofstee, Hanes plots.

Unit II

Enzyme inhibition: irreversible, reversible, competitive, non-competitive, un – competitive and partial inhibition. Determination of K_I values, substrate inhibition, feedback inhibition and allosteric inhibition. Kinetics of enzymatic reactions having two or more substrates – single displacement reactions, double displacement reactions (Ping-Pong).

Unit III

Types of enzyme catalysis mechanisms, acid-base catalysis, electrostatic catalysis, covalent catalysis, metal ion catalysis, proximity and orientation. Effects, preferential transition state binding.
Catalytic mechanisms of chymotrypsin, Trypsin, Carboxypeptidase, Ribonuclease and Lysozyme. Catalytic RNA (Ribozyme), abzymes, synzymes.
Mechanism of catalysis with coenzymes – Pyridoxal phosphate, flavin nucleotides, thiamine pyrophosphate, biotin, tetrahydrofolate, lipoic acid.

Unit IV

Enzyme Regulation: General mechanisms, allosteric enzymes – AT case, cooperativity phenomenon, Sigmoidal kinetics and their physiological significance, Symmetric and sequential models for action of allosteric enzymes and their significance. Feedback inhibition. Reversible and irreversible covalent modifications of enzymes, cyclic and cascade systems, Zymogens, Isoenzymes, multienzyme systems – pyruvate dehydrogenase, fatty acid synthase complex.

Recommended Books:

1. The enzymes Dixon & Webb, 3rd ed. Longman.
2. Understanding enzymes: Palmer T., Ellis Harwood Ltd.
3. Enzyme Kinetics: Roberts D.V., Cambridge Univ. Press.
4. Enzyme structure and mechanism. Alan Fersht, Freeman & Co.
5. Principles of Enzymology for Food Sciences: Whitaker Marc Dekker.
6. The enzyme Boyer 3rd Ed. Academic Press.
7. Methods in Enzymology Ed. Colowick and Kaplan, Academic Press (continuing series)
8. Text book of Biochemistry with Clinical Correlations (4th edition) – Thomas M. Devlin.
9. Fundamentals of enzymology 3rd edi. Nicholas C. Price and Lewis Stevens.
10. Biological chemistry; H.R. Mehler & E.H Cordes Harper & Rev.
11. Enzymes and Metabolic Inhibitors Vol. I & II J. Webb Acada. Press
12. Enzyme Kinetic Siegel Inter Science – Wiley.
13. Biochemistry Chemical reactions of living cells by David E. Matzler. Vol.I.
14. Enzyme Catalyzed Reactions by G.H. Gray.

BCH 9: Microbiology and Genetics

Unit I

Brief history of microbiology. Morphology and classification of bacteria. Staining methods (Grams staining, Acid fast and spore staining). Gram positive and Gram-negative bacteria. Isolation and cultivation of bacteria, bacterial growth curves, culture media and methods.

Unit II

Molds – characteristics, classification and reproduction. General characterization of actinomycetes, rickettsia, Spirochetes and mycoplasmas.

Control of microorganisms: Methods of sterilization, Antibiotics and other chemotherapeutic agents. Food borne diseases – Botulism, Salmonella, E. coli diarrhea, Staphylococcal food poisoning.

Unit III

Viruses: Structure and replication (TMV, T4, SV40 and M13). Methods of culturing of viruses, isolation, purification and characterization. Polio, Rabies Anti-viral agents, viral diseases- Dengue, hepatitis, SARS.

Airborne Diseases – Diphtheria, Pneumonia, Tuberculosis and Streptococcal diseases.

Direct Contact – Conjunctivitis, Gastritis, Syphilis, Tetanus, Leprosy, Candidiasis, Amoebiasis.

Unit IV

Basic concepts of Mendelian & non-Mendelian inheritance. Importance of heredity. Sex linked inheritance. Polygenic & maternal inheritance, linkage and crossing over.

Mutation – types of mutations, mutagens, mechanisms of mutation, Mutagenesis, induction and isolation of mutants.

Recommended Books:

1. Microbiology by Pelczar, Chan and Kreig 5th Ed. Mc Grew – Hill
2. General Microbiology: Boyd, R.F., Times Mirror / Mosby College.
3. Review of Medical Microbiology: Jawetz et al., 16th Ed. Maruzen Asian.
4. A text book of Microbiology, R.C. Dubey and D.K. Maheswari, S. Chand Co.
5. Pharmaceutical Microbiology, By Hugo and Russell, Blackwell Scientific
6. An Introduction to Viruses by S.B.Biswas,Vikas Publishing House.
7. Microbial world (5th Ed.) RY. Stainer, Hamshire – Macmillan Press.
8. Microbiology 4th Ed. Prescott, Harley, Klein (Mc Grew Hill)
9. Principles of Microorganisms – Brocks.
10. Diseases of Crop Plants – G. Rangaswamy.
11. Plant Pathology – J.C. Walker.
12. Fundamentals of Microbiology - M. Frebisher.
13. Text book of Microbiology – William Burrows
14. Biology of Microorganisms – Sandes T. Lyles
15. Instant notes in Microbiology – Nicklin et al
16. Microbial Ecology – Atlas
17. Biotechnology: Textbook of Industrial Microbiology 2nd Ed. By Wulf Crueger and Anneliese Crueger.
18. Genetics by Gardner
19. Genetics by Suzuki

BCH 10: Molecular Biology

Unit I

Central dogma in molecular biology and its verification. Conservative, semi conservative and dispersive mode of DNA replication, Uni and bidirectional DNA replication, discontinuous synthesis of DNA, DNA primers, DNA polymerase I, II & III, DNA ligase, AP endonuclease, Topoisomerases and telomerase. Inhibitors of DNA synthesis, fidelity of replication. Mechanism of replication of *E. coli* DNA. 'θ' and 'σ' replication, Replication of 'ʎ' Phage DNA, Phage T_7 and single stranded DNA. DNA repair and recombination. Bidirectional and unidirectional replication.

Unit II

Structure and functions of prokaryotic and eukaryotic RNA polymerase. Inhibitors of Transcription. DNA binding motifs. Biosynthesis of prokaryotic and Eukaryotic m-RNA, r-RNA, and t-RNA. Post transcriptional modifications of RNA- capping, adenylation and splicing. Role of *hn* RNA, *sn* RNA and *sn* RNP in processing of RNA.

Unit III

Gene expression models in prokaryotes: operon, operator, promoter, attenuator, repressor, co-repressor, inducer, apoinducer, gratuitous inducer, induction and repression. Lac operon, His- operon, Trp- operon of *E. coli*.

General features of the genetic code, Deciphering of the genetic code - Nirenberg and Khorana's work. Co-linearity of gene and protein. Wobble hypothesis and deviation from wobble hypothesis. Mitochondrial genetic code and evolution of genetic code.

Unit IV

Composition of Prokaryotic and eukaryotic ribosomes. Polysomes and organelles ribosomes.

Amino acid activation, protein chain initiation, elongation, and termination. Mechanism of protein synthesis in relation to gene action. Inhibitors of protein synthesis. Post translation modification of proteins. Synthesis of secretory and membrane proteins – signal sequence hypothesis. Mi and Si RNA mediated translation control.

Recommended Books:

1. Molecular Biology of the Gene by Watson
2. Genetics by G. Zubay
3. Molecular Biology of the Cell by Albert Bruce *et al*., 5th Ed.
4. Cell Molecular Biology by Baltimore
5. Molecular Biology by D Friefelder
6. Molecular Genetics by D Friefelder
7. Genes VIII by Benjamin Lewin. Oxford Univ. Press. London.
8. Cell and Molecular Biology 2nd Ed. By P.K. Gupta, Rastogi Publ.
9. Cell and Molecular biology by De Robertis and De Robertis. 8Th Ed.
10. Molecular Genetics by Sambamurty
11. Cell and Molecular Biology 2nd Ed. By S C. Rastogi.

PRACTICALS

BCH 11: Enzymology

1. Assay of Amylase from saliva
2. Assay of Urease from Horse – gram
3. Assay of Acid phosphatase from serum
4. Assay of serum alkaline phosphatase
5. Assay of SDH from Liver
6. Assay of Invertase from Yeast
7. Assay of Trypsin
8. Assay of LDH from serum (Isoenzymes)
9. Enzyme purification and Enzyme Kinetics (Determination of V-max, Km and Ki). Effect of pH, Temperature, Activators, Inhibitors, Immobilization of enzymes (demonstration only).
10. Assay of Cholinesterase from blood.

Recommended Books:

1. Hawk's Physiological Chemistry
2. Practical Biochemistry by T Plummer
3. Practical Biochemistry by J Jayaraman
4. Klemir and others: Practical Biological Chemistry
5. Practical Biochemistry - Koch and Hank Dunn and Drell
6. Practical Biochemistry - Sawheny.
7. Varley's Practical Clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London).

BCH 12: Microbiology

1. Structure, Handling and calibration of Microscope.
2. Methods of Sterilization: Autoclave (Moistened – heat sterilization), Oven (dry heat sterilization), UV.
3. Preparation of Media for Bacteria and fungi.
4. Methods for isolation and cultivation of pure cultures: serial dilution, pour plate, spread plate and streak plate.
5. Bacterial growth curve: *E. coli/Bacillus*.
6. Methods of staining: Gram, acid fast and bacterial spore, and yeast methylene blue.
7. Determination of antibiotic sensitivity with selected antibiotics.
8. Oligodynamic action of selected metals on bacteria.
9. Starch hydrolysis assay for the identification amylase – producing microorganisms.
10. Fermentation: preparation of wine from grapes, and production alcohol from molasses.
11. Estimation of alcohol by specific gravity method
12. Cultivation of oyster mushroom (*Pleurotus* sps) using the paddy straw.
13. Induction of mutation in bacteria using physical and chemical mutagens.
14. Isolation of DNA and RNA from bacteria.
15. Water analysis for bacteria and determination of B.O.D. of water.
16. Identification of Rhizobium from root nodules of ground nut plant.
17. Isolation and quantification of phages from sewage by plaque assay.

Books:

1. Microbiology laboratory Manual 4th Ed. By Cappuccino
2. Microbiology laboratory Manual (2001) by Aneja K.M.
3. Laboratory Manual in Microbiology by P. Gunasekaran (1996), New Age Publ.

SEMESTER - III

BCH 13: Endocrine Biochemistry

Unit I

Endocrine system – organization of the endocrine system. General features and classification of hormones, mechanism of action of hormones, hypothalamic hormones, chemistry, biosynthesis, Secretion, physiological functions, regulation and disorders of anterior and posterior pituitary hormones, LH, FSH, Growth hormone, prolactin, oxytocin, Vasopressin. Hormones of the pineal gland – Serotonin and melatonin.

Unit II

Thyroid hormones – chemistry, biosynthesis, secretion, physiological function, regulation and disorders, hypo and hyperthyroidism, tests for thyroid function.

Parathyroid hormones – Parathormone and calcitonin, their role in calcium and phosphate metabolism, disorders of parathyroid hormone.

Unit III

Pancreatic and gastrointestinal hormones – Biosynthesis, secretion, physiological functions and regulation of insulin and glucagon. Role of insulin and glucagon in carbohydrate, lipid and protein metabolism. Disorders of pancreas. Gastrin, secretin, Cholecystokinin.

Adrenal hormones – Chemistry, biosynthesis and functions of adrenal medullary and adrenal cortical hormones. cortisol, corticosterone, aldosterone, adrenaline, nor-adrenaline, Disorders of adrenal hormones, tests for the evaluation of adrenal function.

Unit IV

Hormones of reproduction – Gonadal hormones (testosterone), chemistry, biosynthesis and physiological functions of androgens, estrogens and progesterone, inhibin. Hormonal regulation of menstrual cycle, placental hormones, contraception, reproductive disorders.

Recommended Books:

1. Text book of Biochemistry and Human Biology by Talwar G.P., Prentice Hall India.
2. Human Physiology and Mechanism of distance. Guyton 3rd Ed. Igkushoen/Seunders.
3. Clinical Biochemistry, Vol. 1 and 2, Williams *et al*., Heinemann Medical, 1978.
4. Lynchs Medical Laboratory Technology by Raphael, S. S., 4th Ed. Igkushoen/Seunders.
5. Text Book of Endocrinology, William.
6. General Endocrinology – Turner.
7. Biochemical Endocrinology of the Vertebrates – E. Fruden and H. Lines.
8. Foundation of Modern Biochemical Series, Prentice Hall Inc., 1971.
9. Metabolic and Endocrine Physiology – Jay Teppermann.
10. Metabolic Pathways – Green Berg.
11. Intermediary Metabolism and its regulation – Larner
12. Principles of Biochemistry – White A., Handler P and Smith.
13. Receptors and Hormone action. Receptors and Recognition series. Text book of medical physiology by A.C. Guytom.

BCH 14: Nutritional Biochemistry

Unit I

Principle food components, Balanced diet, Nutritional Requirement, recommended daily requirements, Recommended dietary allowances (RDA), Body composition and energy requirements, Measurement of energy expenditure, direct and indirect calorimetry, BMR

Unit II

Nitrogen balance and muscle protein turnover, essential and non-essential amino acids, Protein requirement, Biological value of proteins, Protein calorie deficiency state, Kwashiorkor and Marasmus.

Essential fatty acids, energy value of fats, phospholipids in nutrition, Starvation, Obesity.

Unit III

Mineral Nutrients, Micro nutrients and Macro nutrients, dietary sources, deficiency symptoms and recommended dietary allowances of trace elements and macro minerals (Calcium, Phosphorus, Magnesium, Iron, Sodium, Potassium, Iodine, Zinc).

Nutrition for infants, children, pregnant and lactating women and in old age. Importance of nutrition under stress conditions.

Unit IV

Vitamins: Fat soluble vitamins- Structure, Biological sources, requirement, functions and deficiency symptoms of vitamins A, D, E and K

Water soluble vitamins- structure, classification, properties, dietary sources, requirement, chemistry and physiological significance of thiamine, riboflavin, niacin, pantothenic acid, vitamin B_6, folic acid, biotin, vitamin B_{12} and Vitamin C.

Recommended Books:

1. Harper's Biochemistry
2. Trace Elements by Underwood
3. The Book of Human Nutrition by MS. Bamji N. Prahlad Rao and V. Reddy.
4. Essentials of food and nutrition, Vol. 1 and 2, by M.S.Swaminathan
5. Nutritional Biochemistry by Truemen.
6. Casarett and Doull's Toxicology. The Basic Science of Prisons 5th Ed. By Klaasen.

BCH 15: Nerve, Vision and Muscle Biochemistry

Unit 1

Appearance of brain – Gross appearance, fluid compartments, blood brain barrier, Neuronal cell types – Neurons, Glial cells, synapses. Action potential generation and propagation, cerebro spinal fluid.
Presynaptic events at the neuromuscular junction: cholinergic and non-cholinergic synapses.
Chemical composition of brain, formation, structure and biochemistry of myelin, chemistry of major brain lipids, lipid composition, Special nervous system proteins.

Unit II

Neurotransmitter: Definition and classification of neurotransmitters.
Neurotransmitters - chemistry, synthesis, storage and release of neurotransmitters, transmitter action, chemical events at synapses, post synaptic events.
Various classes of neurotransmitters-Glutamate, GABA, catecholamines (Epinephrine, norepinephrine and dopamine), serotonin, acetyl choline.
Drugs acting on brain - antidepressants and benzodiazepines.

Unit III

Biochemistry of aging, Neurodegenerative disorders, Parkinsons disease, Alzheimers disease, stroke, epilepsy.
Biochemistry of vision: Structure, Composition, Metabolism and blood supply to the eye, lens and retina, rods and cones. Photochemistry of vision. Role of vitamin A in vision. Processing of visual information.

Unit IV

Structure and function of muscle – skeletal muscle structure, Biochemical characterization and extracellular matrix. Plasmalemma, sarcoplasmic reticulum and myofibrils, actin, myosin, streptomycin, troponin, muscular contraction, sliding filament mechanism, oxidative and anaerobic metabolism.

Recommended Books:

1. Basic Neurochemistry 5th Ed. By Siegel.
2. Essentials of Neural Science and Behavior by Kandel.
3. Neurobiology molecules, Cells and Systems by Mathews.

BCH 16: Genetic Engineering

Unit I

Introduction to genetic engineering, cloning, cloning vectors - plasmids, phage vectors, shuttle vectors and cosmids.

Enzymes in genetic engineering: Restriction endonucleases, types, property and applications, RNA and DNA polymerases, nucleases, kinases, phosphatases, ligases, topoisomerases, methylases and gyrases.

Linkers and adaptors.

Unit II

RNA isolation, preparation and use of cDNAs. Screening and determination of nucleotide sequences. Construction of cDNA and genomic library, site-directed mutagenesis.

Polymerase chain reaction (PCR) in recombinant DNA technology, Chromosome walking

Unit III

Maxim and Gilbert chemical degradation and Sanger's dideoxy chain termination methods of nucleotide sequencing, Restriction mapping, restriction fragment length polymorphisms (RFLP) linkage and recombination between molecular and phenotypic markers, Random amplified polymorphic DNA (RAPDs) Using PCR. Human genome project, Microarray.

Unit IV

Cloning of specific genes and their expression in bacteria and eukaryotic system. Genetic Engineering- Applications in Medicine, Agriculture and Industry, RNAi technology for gene knock out studies, Social and moral implications, national and international guidelines/regulations. RNA technology for gene knockout mechanism.

Recommended Books:

1. Genes and probes, A Practical Approach series (1995) by BD. Hames and SJ Higgins, Oxford Univ. Press.
2. Gel Electrophoresis of Nucleic acids, A Practical Approach (1990) by D Rickwood and BD Hames. Oxford Univ. Press. Refer the books already mentioned for other Molecular Biology course.
3. Recombinant DNA – James D Watson et al.
4. Gene Cloning – T. A. Brown.
5. From Genes to Genomes – J.W. Dala and Schantz
6. Gene Biotechnology – S.N. Jogdand
7. Medical Biotechnology - S.N. Jogdand
8. Principles of gene manipulations – R. W. Old and S.B. Primerose
9. Genes – Lewin B.
10. PCR-Technology: Principles and application of DNA amplification – H.A. Erlich.

PRACTICALS

BCH 17: Molecular Biology and Genetic Engineering

1. Isolation and determination of DNA from bacteria, plant and animal cells.
2. DNA estimation by Diphenylamine method.
3. Determination of DNA and purity by UV absorption method.
4. Isolation and determination of RNA content from yeast.
5. RNA estimation by Orcinol method
6. Determination and analysis of melting curve of DNA (Tm of DNA)
7. Isolation and concentration determination of plasmid DNA from *E. coli*
8. Agarose gel electrophoresis for isolation of various forms of plasmid.
9. Determination of restriction activity on DNA.
10. Amp^r plasmid transformation in *E. coli.*
11. Isolation of phage M_{13}.
12. Isolation of single and double standard M_{13} DNA.
13. Transfection of M_{13} DNA into *E. coli* JM 103.

BCH 18: Nutritional Biochemistry

1. Isolation of casein from milk and estimation.
2. Determination of moisture content of foods/food grains powders
3. Isolation of lactose from skimmed milk and its estimation.
4. Determination of reduced Ascorbic acid by DCPIP method.
5. Determination of calcium in food.
6. Determination of Iodine value of edible oil by Titrimetry.
7. Estimation of fructose in the fruit juice and honey.
8. Measurement of inversion of sucrose by polarimetry.
9. Determination of acid value by Titrimetry.
10. Determination of available lysine in food.
11. Estimation of copper in food.
12. Estimation of Iron content of apple juice.
13. Determination of ash content of foods.
14. Determination of free amino acids of germinating seedlings.
15. Determination of pyridoxine of fruits/leaves.
16. Estimation of magnesium in food.

SEMESTER – IV

BCH 19: Clinical Biochemistry

Unit I

The place of clinical Biochemistry in medicine, the use of Biochemical tests and the clinical biochemistry laboratory, Specimen collection, reference values, Automation and autoanalyzers, quality assurance in clinical laboratory – internal and external quality control.

Investigation of disorders of carbohydrate metabolism: Hypoglycemia, Hyperglycemia. Diabetes mellitus – classification, clinical and metabolic features and management. laboratory diagnosis of diabetes mellitus – glucose tolerance test (GTT), Random, Fasting, post prandial (PP) blood glucose levels, glycosuria, ketones, glycosylated hemoglobin (GHb), metabolic complications of diabetes – Diabetic keto acidosis (DKA), glycogen storage diseases,

Plasma proteins – functions and their alterations in disease, paraproteinemias.

Unit II

Kidney function: Formation of urine, Normal and abnormal constituents of urine, Glomerular and tubular function, renal function tests, nephrotic syndrome and CRF.

Liver function: structure and function of liver, liver function tests, Bilirubin metabolism and Jaundice, kernicterus, liver diseases - hepatitis, gall stones, cirrhosis.

Gastric and pancreatic function: Gastric function tests - Penta gastrin test, insulin stimulation test, hyper chlorhydria, achlorhydria, pancreatic diseases – acute pancreatitis, Malabsorption syndrome.

Unit III

Fluid and electrolyte balance – hyponatremia and hypernatremia, hyperkalemia, acid-base balance in the body fluids - Blood buffers, role of kidney and lungs, metabolic acidosis and alkalosis.

Plasma Lipids and lipoproteins and their functions – lipid profile, clinical disorder of lipid metabolism - hyperlipidemias and management, Atherosclerosis.

Molecular diagnosis – HIV, thalassemia, tumor markers. Cerebrospinal fluid analysis (CSF)

Unit IV

Plasma enzymes in diagnosis and prognosis: Transaminases (SGOT & SGPT), alkaline and acid phosphatase, lactate dehydrogenase (LDH), creatine kinase (CK), α-amylase, acid phosphatase, γ – glutamyl transferase, acetyl Cholinesterase, Isoenzymes of clinical importance, Plasma enzyme pattern in myocardial infarction, liver disease and muscle disease.

Inborn errors of amino acid metabolism - Phenylketonuria, alkaptonuria and Maple-Syrup urine disease.

Hemoglobinopathies.

Recommended Books

1. Text book of Biochemistry with Clinical Correlations. Thomas M. Devlin (John Wily).
2. Harper's Review of Biochemistry, Murray *et al* (Longman) Investigation of lipoproteinemias and lipidemias. Renal function: Glomerular and tubular functions.
3. Biochemical Aspects of Human Disease – R.S. Elkeles and A.S. Tavil. (Blackwell Scientific Publications, 1993)
4. Clinical Chemistry in Diagnosis and Treatment – Joan F. Zilva and P.R. Pannall (Lloyd – Luke medical Books, London, (1988).
5. Varley's Practical Clinical Biochemistry – Ed. Alan W. Gowen Lock (Heinemann Medical Books, London (1988)
6. Clinical diagnosis and management by Laboratory Methods (John Bernard Henry, W.B Saunders Company, 1984)
7. Clinical Biochemistry – S. Ramakrishnan and Rajiswami.
8. Chemical Biochemistry (Metabolic and Clinical Aspects) by W.J. Marshall & S.K. Bangert.
9. Text book of Clinical Biochemistry by Tietz et al.

BCH 20: Immunology

Unit I

Lymphoid organs (primary and secondary), organization of immune system, Types of immunity – Natural and acquired, specific and non-specific immune response. Cells and organs of immune system, antigenic determinants/Epitopes. Haptens, adjuvants, classification, structure and biological functions of immunoglobulins, Isotypes, allotypes and idiotypes. Theories of antibody formation.

Unit II

Active and passive immunity, Humoral and cell mediated immune response, T-Cell and B-Cell activation. Antigen processing and presentation. T-Cell and B-Cell receptors, Complement system, Alternate and classical pathways of complement activation. Complement fixation tests. Cytokines. Major histocompatibility complex (MHC).

Unit III

Antigen-antibody interactions, precipitation reactions – immune diffusion, radial immunodiffusion, immunoelectrophoresis, immunofluorescence, Western blotting, Hybridoma Technology, Production of polyclonal and monoclonal antibodies and their application, RIA and ELISA.

Unit IV

Disorders of immune response – Hypersensitivity, Basic concepts, types of hypersensitivity, Autoimmune diseases – Hashimoto's thyroiditis, RA, Immunodeficiencies – SCID, AIDS. Cancer immune therapy. Graft rejection, HLA typing, Immunosuppressive drugs (cyclosporine, methotrexate, steroids).

Recommended Books:

1. Essential immunology – Ivan M. Roitt.
2. Immunology – a short course elibezamini and Sidney Leskowitz, Alan R. Lisi Inc. New York, 1988.
3. Immunology III, Joseph A. Bellanti Igaku – Shein Saunders International Ed. 1985.
4. Immunology at a glance J.H. L. Playfeir 4th Ed. Blackwell Scientific Publication 1987.
5. Acids to Immunology D.M. Wier Churchill, Livingtons 1986.
6. Fundamentals of Immunology, Myrvik and Weiser, 1984.
7. Fundamentals of Immunology, Bier *et al*, Springer 1986
8. Textbook of Biochemistry and Human Biology, Talwar G.P. Prentice Hall, 1980.
9. Basic and Clinical Immunology – Stites et al., 4th Ed. Lange 1982.
10. The Immuno-system, Mc Connell et al., Blackwell Scientific 1981.
11. Fundamentals of Immunology – William C. Boyed (Wiley Toppan)
12. Introduction to Immunology – John W. Kinball.
13. Fundamentals of Immunology – Otto S. View and others.
14. Immunology – D.M. Weir.
15. Immunology – Janis Kuby,
16. Cellular and Molecular Immunology 3rd, Abul K. Abbas, Andrew K. Kich Amn Jordan S. Pober

BCH 21: Biotechnology

Unit I

Immobilized enzymes and their applications. Protein engineering. Production of glucose from starch, use of glucose isomerase in confectionary industry, use of lactase in diary industry, production of invert sugar from Glucose and sucrose, Use of protease in food, detergent and leather Industries, Biosensors (glucose oxidase in enzyme electrodes).

Unit II

Isolation, preservation and maintenance of industrial microorganisms, batch, continuous culture techniques, Types of fermenters. Industrial production of chemicals, alcohols, acids (citric and acetic), solvents (acetone and Butanol), antibiotics (penicillin, streptomycin, tetracycline), Vitamins (Riboflavin and Vitamin B 12), amino acids (lysine and glutamic acid and single cell protein (SCP)

Unit III

Therapeutic proteins (urokinase/ etheepidtes/Mabs/ plasminogen). Acting prozgi ADA gene activation. Vaccines-types, Subunit vaccines – against Herpes simplex virus, foot and Mouth disease, Live recombinant vaccines – attenuated (cholera, salmonella), Vector vaccines directed against viruses and bacteria.

Unit IV

Animal and plant cell /tissue culture techniques: Micro propagation, somatic cell culture, soma clonal variations, somatic cell hybridization, protoplast fusion, genetic transformation, methods of gene transfer, vector and vector less methods, production of transgenic plants and animals and their applications.

Recommended Books:

1. Fermentation Technology (2^{nd} Ed.) Standury (Pergman Press).
2. Biotechnology: Textbook of Industrial Microbiology 2^{nd} Ed. by Wulf Crueger and Anneliese Crueger (2000).
3. Molecular Biotechnology: Principles and Applications of Recombination DNA (1996) Bernard R. Glick and Jack. J. Pasternak (Panima Publishing Corporation)
4. Principles of Gene Manipulation: An Introduction to Genetic Engineering (5^{th} Ed.)
5. Principles of Biotechnology (1985) Alen Weisman (Surrey University Press)
6. Concepts in Biotechnology (1996) Ed. D. Balasubramanian, K. Dharmalingam, J. Green and K. Jayaraman (University Press)
7. Industrial Microbiology, Miller and Litsky, Mc Graw – Hill, 1976.
8. Industrial Microbiology, L.E. Casida, JR New Age International (1995)
9. Industrial Microbiology (Prescott & Dunn), Ed by G. Reed,CBS Publishers.
10. Immobilized Enzymes (1978) by Ichiro Chibata, Halsted Press Book.

BCH 22: Technical writing, Biostatistics, Computers and Bioinformatics

Unit I

Technical Writing: Sentence writing, paragraph writing, story writing, review writing, various types of letters writing.

Preparation of a research project proposal: Selection of appropriate funding agency, Informal proposal, formal proposal, submission of technical report (format: title page, introduction, aims of the proposal/research, methodology, results, interpretation of results, references, acknowledgments, budgetary allocations), execution of results, submission of progress report (year wise), scientific communications (Articles, papers, reviews etc.,) and critical comments writing.

Unit II

Scope of statistical methods in life sciences. Variables, Measure of central tendency: Mean, median and mode, Measuring Dispersion: Standard deviation, co-efficient of variation, probability, probability distributions, test of significance and estimation, Linear regression and correlation, the chi-square test, ANOVA, t-Test and F-Test.

Unit III

Organization of computers: components, storage devices, graphic devices, concepts of hardware and software, methods and types of networks, basics of operating systems and types. Intranet and Internet.

Unit IV

Bioinformatics: Branches of Bioinformatics, scope of bioinformatics, useful sites on the internet: Data bases and search tools: NCBI (http://www.ncbi.nlm.nih.gov/), EMBL serve: (http://www2.ebi.ac.uk/services.html), sequence alignment: gene bee multiple sequence alignment (http://www.genebee.msu.su.), Tree view (http://taxnomy.zoology.gla.ac.uk/rod/treeview.html), Gene doc (http://www.cris.com/ketchup/genedoc.shtml), Sequence analysis, repetitive elements, Image analysis, office applications, logic development. Introduction to Proteomics and genomics.

Recommended Books:

1. Bio-statistics, A foundation for analysis in the Health (7^{th} Ed. 1999) by WWW Daniel and Sons Inc., New York.
2. Introduction to Bio-statistics and Research Methods by P.S.S. Sundar Rao and Richard.
3. Bio-statistics by Sokal and Rolf.
4. Bioinformatics, Sequence, Structure and Databanks by Des Higgins Willie Taylor (2000).
5. Introduction to Bioinformatics by T.K. Altwood and D.J Parry- Smith (Oearson Education Asia 1999).
6. UGC-MRP gudelines and format, DST and DBT guidelines and formats for project praposals.
7. Authour guidelines of any UGC recognized journals.
8. English grammar books for formal and informal letter writing.

PRACTICALS
BCH 23: Clinical Biochemistry

1. Determination of glucose in plasma by GOD-POD.
2. Estimation of blood urea
3. Estimation of serum creatinine
4. Determination of creatinine clearance.
5. Estimation of serum uric acid.
6. Estimation of serum total proteins.
7. Estimation of serum albumin.
8. Estimation of total serum Cholesterol.
9. Determination of SGOT activity
10. Determination of SGPT activity
11. Estimation of serum calcium
12. Estimation of serum phosphate
13. Determination of serum bilirubin
14. Determination of thymol turbidity
15. Determination of urine ascorbic acid
16. Tests for abnormal constituents in urine.
17. Estimation of alcohol by specific gravity method.
18. Separation of serum proteins by Paper electrophoresis.

Recommended Books:

1. Hawk's Physiological chemistry
2. Practical Biochemistry by T Plummer
3. Practical Biochemistry by J Jayaraman
4. Klemir and others: Practical Biological chemistry
5. Practical Biochemistry – Koch and Hank Dunn and Drell
6. Practical Biochemistry – Sawhney
7. Varley's practical clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London, 1988.

BCH 24: Immunology and hematology

1. Determination of antigen and antibody reaction: Ouchterlony Technique.
2. Determination of human blood group antigens.
3. Raising of antibodies to specific antigen in rabbits.
4. Rocket Immunoelectrophoresis.
5. Detection of HCG by latex agglutination inhibition test.
6. ELISA: Antibody capture assay.
7. Complete blood picture: RBC count.
8. Complete blood picture: TLC.
9. WBC differential count.
10. Erythrocyte sedimentation Rate (ESR).
11. Packed cell volume (PCV)
12. Determination of Haemoglobin (Hb).
13. Mean cell Haemoglobin and Mean cell RBC volume.
14. Osmotic fragility of RBC.

Recommended Books:

1. Hawk's Physiological Chemistry
2. Practical Biochemistry by T Plummer
3. Practical Biochemistry by J Jayaraman
4. Klemir and others: Practical Biological Chemistry.
5. Practical Biochemistry – Koch and Hank Dunn and Drell
6. Practical Biochemistry - Sawhney(2000)
7. Varley's Practical Clinical Biochemistry – Ed. Alan W. Gowenlock (Heinemann Medical Books, London,1988).

Non-Core I: Fundamental Biochemistry

Unit I

Biomolecules: Molecular logic of life, major constituents of cells. Classification, structure and functions of carbohydrates (glucose, fructose, lactose, Maltose, sucrose, glycogen, starch). Lipids (fatty acids, phospholipids, triacylglycerol), proteins (hemoglobin, albumin, myoglobin, collagen and insulin) and nucleic acids (RNA and DNA).

Unit II

Enzymes- Classification, compartmentation of enzymes, enzyme inhibition, use of enzymes, endocrine glands. Hormones. Polypeptides and steroids. Immunoglobulins and immune action.

Unit III

Metabolism: outline of metabolism, anabolism, catabolism, oxidation of glucose to CO_2 and H_2O, synthesis of glucose. Protein synthesis, lipid biosynthesis. In born errors of metabolism.

Unit IV

Biochemical techniques in biochemistry: safety and good lab practices. Microscopy, centrifugation, chromatography, immunoassays (ELISA/RIA), UV-VIS spectroscopy.

Non-Core II: Nutrition and Clinical Biochemistry

Unit I

Diet, Balanced diet, calorific value of foods, nutritional requirements, RDA, BMR, biological value of proteins, energy value of fats, protein calorie deficiency (Kwashiorkor and Marasmus), malnutrition (under nutrition and over nutrition), Obesity, dietary guidelines for Indians.

Unit II

Micronutrients: water soluble and fat-soluble vitamins- structure, sources, requirements, functions and deficiency symptoms.
Microminerals – calcium, phosphorus, magnesium, sodium, potassium, chloride.
Micro Minerals – Iron, zinc, copper, selenium.

Unit III

Use of clinical biochemistry in Medicine. Use of biochemical tests, specimen collection and sample analysis. Tests for diabetes, thyroid, jaundice, lipid profile, anemia and tumor markers.

Unit IV

Organ function tests – Liver function tests, kidney function tests.
Plasma enzymes in diagnosis and prognosis – Transaminases, CK, LDH, Alkaline phosphatase, α-amylase, molecular diagnostics.

Papers for pre-Ph.D. Examination

S**. No.**	Course	Total Marks
Paper - I	Research Methodology	100
Paper - II	Research Specialization	100
	Total	**200**

Department of Biochemistry

Syllabus for Research Methodology

Unit I

Technical Writing: Preparation of research proposal – informal proposal, modification of informal proposal, submission of formal proposal. Experimental design and collection of results, submission of progress report (Year wise) and submission of technical report (format: title page, introduction, aims of the proposal/Research, hypothesis, methodology, results, interpretation of results, references, acknowledgements, budgetary preparation.

Unit II

Literature Search: Search Engines: Selection of research topic, Collection and review of literature, databases, data mining, how to write a research paper and plagiarism.

Unit III

Techniques in Biochemistry: I Separation Techniques: 1. Chromatography – Counter current distribution, Paper, Thin Layer, Reverse phase, absorption, ion exchange, Affinity, gel filtration, gas chromatography and HPLC. 2. Centrifugation – RCF, Gradient and analytical Ultra centrifuge in characterizing biomolecules. 3. Electrophoresis – paper, agar, immune electrophoresis, High voltage electrophoresis, capillary electrophoresis, iso-tachophoresis, Northern blot and Southern blot analyses. *in situ* hybridization, PCR, RT-PCR, Microarray.

Unit VI

Techniques in Biochemistry: II i. Radioactive Tracer techniques – Radioactivity, units of radioactivity, half-life, Decay constant, Radioactivity measuring techniques, biological effects of radiation, isotope dilution techniques, safety measurements from radioactivity and radioisotopes in biochemical and medical research, Autoradiography. ii. Spectroscopy – Electromagnetic spectrum, Beer-Lamberts Law, Principles and applications of UV-VIS, Fluorescence, Flame, FT-IR, flow cytometry, ESR, NMR and MALDI, CD & ORD, Principles and applications of X-ray diffraction, iii. Immunological Techniques – ELISA, Chemiluminescence, RIA. Western blot, introduction to animal cell culture techniques.

Unit V

Biostatistics and Computers in biology: i. Biostatistics – Measures of Dispersion, Probability and distribution, Correlation Co-efficient, Test of hypothesis – chi square test, F-Test, t-Test, simple liner regression, one way and two ways ANOVA. ii. Use of computers in Biology – Basics. Fundamentals of bioinformatics: Biological database sequence alignment, functional genomics, genome mapping, proteomics.

YOGI VEMANA UNIVERSITY

***M. Sc.*, Biotechnology -Choice Based Credit System**

APPROVED SYLLABUS BY BOARD OF STUDIES (Effect from 2018 – 2021)

I Semester

				Max.Marks:100		
Code	**Title of the Paper**	**No of Credits**	**Hours per week**	**Internal**	**External**	**Exam time (hrs)**
15081	Cell Biology and Genetics	4	4	25	75	3
15082	Biomolecules	4	4	25	75	3
15083	Microbiology and Microbial Genetics	4	4	25	75	3
15084	Biochemical and Biophysical Techniques	4	4	25	75	3
15081P	Practical 1: Cell Biology, Genetics and Biomolecules	4	8	100		3
15082P	Practical 2: Microbiology & Microbial Genetics, Biochemical and Biophysical Techniques	4	8	100		3
II Semester						
				Max.Marks :100		
25081	Molecular Biology	4	4	25	75	3
25082	Computer Applications & Biostatistics	4	4	25	75	3
25083	Immunology	4	4	25	75	3
25084	Enzymology	4	4	25	75	3
25081P	Practical 1: Molecular Biology and Computer Applications & Biostatistics	4	8	100		3
25082P	Practical 2: Immunology and Enzymology	4	8	100		3
Non-core-1	**Essentials of Biotechnology**	**4**	**4**	**25**	**75**	**3**
III Semester				**Max.Marks :100**		
35081	Genetic Engineering	4	4	25	75	3
35082	Medical and Pharmaceutical Biotechnology	4	4	25	75	3
35083	Food and Industrial Biotechnology	4	4	25	75	3
35084	Bioprocess Technology	4	4	25	75	3
35081P	Practical 1: Genetic Engineering and Medical and Pharmaceutical Biotechnology	4	8	100		3
35082P	Practical 2: Food and Industrial Biotechnology and Bioprocess Technology	4	8	100		3
Non-core-2	**Introduction to Bioethics in Biotechnology**	**4**	**4**	**25**	**75**	**3**
IV Semester: Theory				Max.Marks :100		

45081	Plant Biotechnology	4	4	25	75	3
45082	Animal Biotechnology	4	4	25	75	3
45083	Functional Genomics	4	4	25	75	3
45084	Bioethics and Biosafety	4	4	25	75	3
45081P	Practical 1: Plant Biotechnology and Animal Biotechnology	4	8	100	3	
45082P	Practical 2: Functional Genomics and Bioethics and Biosafety	4	4	25	75	
Total for core papers		**96**	**128**	**400**	**2000**	
Total for Non-core papers		**8**	**8**	**50**	**150**	
Grand Total (2600 marks)		104	136	**450**	**2150**	

External Member:

1. **Prof. D. V. R. Sai Gopal**, -

Chairperson and Convener
(Prof. P. Chandramati Shankar)

Programme: ***M. Sc.*, Biotechnology**
Course Title: ***Cell Biology and Genetics***
Type of Course: **Core**
Course No.: 15081
Semester: **I**

UNIT – I (16hrs): Cell Theory and The Cell: Discovery of cell and the cell theory, exceptions to the cell theory. Overview of Prokaryotic *vs.* Eukaryotic Cells. Eukaryotic cell compartmentalization. Cell Membrane: Historical models for structure of plasma membrane. Membrane proteins. Cell adhesion and Cell Junctions, Membrane transport and Vesicular transport. Cytoskeleton: Microtubles, Actin Filaments and Intermediate Filaments and functions. Role of cytoskeleton in intercellular transport and motor movements; implications in flagellar and other movement.

UNIT – II (16hrs): **Structure and Function of Cell Organelles:** Mitochondria, structural organization and biogenesis, Chloroplast (plastids): Polymorphic forms of plastids. Structural organization and functions of chloroplast. Role of mitochondria and chloroplast in cellular energy transactions., Endoplasmic Reticulum (E.R): structure and functions, Ribosomes: prokaryotic and Eukaryotic, Golgi complex, Lysomes and Peroxisomes. The Cell Nucleus: Structure and function of Nuclear Envelope, Nucleolus. Eukaryotic chromosome structure and charactaerstics– chromatin, and heterochromatin. Polytene and lamp brush chromosomes.

UNIT – III (16hrs):
Classical Genetics: Phenotype, Genotype, Trait, Mendelian Laws of Inheritance.
Modification of Mendelian Ratios: Incomplete Dominance, Codominance. Gene Interactions – Lethal Genes, Recessive Epistasis, Dominant Epistasis, Multiple Alleles, Pleiotropy, Penetrance and Expressivity. Cytoplasmic or Organellar Inheritance.
Linkage - Linkage and crossing over, cross over frequency, and interference.
Sex Determination: Genetics of sex chromosomes – sex determination, and dosage compensation: molecular mechanism of selective chromosomal condensation (Barr body formation).
Mutations: Types of mutations and chromosomal mutations. Chromosomal aberrations: deletions, duplications, translocations and inversions. Numerical changes in chromosome number – euploidy, haploidy, polyploidy – their fundamental and practical significance. Induction of mutations and mutagenesis – types of mutagens. Practical applications of mutations.

UNIT – IV (18hrs): Cell Division: **Mitosis:** Mechanism of cell division – mitiotic apparatus, cytokinesis, chromosome movement – present concept. Meiotic process – stages, Metaphase Chromosomes: Centromere and Kinetochore. **Meiosis:** Stages of Meiosis, chromosome pairing, molecular mechanisms of recombination - synaptonemal complex and Gene Conversion. Comparison of mitosis and meiosis. Significance of Meiosis. **Cell Cycle:** Overview of Cell Cycle, Cell division control in multi cellular animals (regulation of eukaryotic cell cycle).

REFERENCES

1. De Robertis EDP & EMF De Robertis. 2001. Cell and Molecular biology. Lippincott Williams & Wilkins.Bombay.
2. Freifelder D. 1990. Molecular biology. Narosa publication house, New Delhi
3. Harvey Lodish et al , Molecular Cell Biology, (W. H. Freeman; Sixth Edition edition)
4. Lewin B (2008). Genes IX, Jones and Barlett Publish ers
5. Hardin, Jeff; Bertoni, Gregory Paul; Kleinsmith, Lewis J. (2009) Becker's World of the Cell, Benjamin Cummings.
6. Cooper Geoffrey,M. 2000. The Cell-a molecular approach. 2nd Edn. ASM Press. Washington.
7. Alberts B, Johnson A, Lewis J, Raff Martin, Roberts K and Walter P. (2007) Molecular Biology of the Cell. Garland Publ., New York.
8. D. Peter Snustad, Michael J. Simmons. 2002. Principles of Genetics. John Wiley & Son, USA.
9. Peter J. Russell 2009. *iGenetics* A Molecular Approach. Pearson Ltd. USA.
10. Daniel L. Hartl, Elizabeth W. Jones. 1997. Genetics: Principles and Analysis. Jones and Bartlett Publishers Inc. USA.
11. Tamarin, R. H. 2004. Principles of Genetics. McGraw-Hill Higher Education. USA
12. Hartwell, et al. 2004 : Genetics:From Genes to Genomes. McGraw-Hill Higher Education. USA
13. P K Gupta.2010. Genetics. Rastogi Publications. India.
14. Gardner and Simmons Snustad, 2005. Principles of Genetics, John Wiley and Sons, Singapore.

Programme: ***M. Sc.*, Biotechnology**
Course Title: ***Biomolecules***
Type of Course: **Core**
Course No.: 15082
Semester: **I**

UNIT – I (16hrs):: Nucleic acids – Types of Nucleic acids, chemistry of Nucleic acids, structure of purines and pyramidines, modified bases nucleosides and nucleotides; structural polymorphism of DNA and RNA types. Identification of DNA and RNA molecules, Ribose Puckering, Melting Temperature ™, DNA binding proteins, forms of DNA (A,B and Z).

UNIT – II (17hrs):: Chemical bonds – covalent, coordinate, electrostatic hydrogen, ionic bonds; VanderWal forces; hydrophilic and hydrophobic interactions; functional groups. Definition and classification of carbohydrates. Outlines of structures of starch, cellulose, lignins, suberins, hemicellulose, amylose, amylopectin.

UNIT – III (16hrs):– Outline, structure, classification, chemical reactions of proteins and amino acids. Peptide bonding. Vitamins and plant growth regulators.

UNIT – IV(18hrs):: Introduction to Secondary metabolites –. Outline structures and biological functions of pigments, cytochromes, tannins, phenolics, microbial toxins and antibiotics, alkaloids terpenes of biotechnological importance

REFERENCES

1. Biochemistry. 1992. R.H. Abeles, Panima Publication. PP 894.
2. Principles of Biochemistry. 2nd ed. 1993. A.L. Lehninger, D.L.Nelson.M.Cox. Paniama Publications. PP. 1090.
3. Harper's biochemistry. 1988. R.K. Murray. D.K. Granner, P.A. Mayes. Printice Hall International. .
4. Biochemistry of the Nucleic acids. 1992. 11th ed. R.L.P. Adams, J.T. Knowler, D.P. Leader, Chapman and Hall.
5. Proteins: Structure, function and evolution. Dickerson & Geis, 2nd Edn.Banjamin/Cummings, Meulo park, Calif 1983.
6. The Proteins: Neurath and Hill, 3rd Edn. Academic New York.
7. Biochemistry, A problem approach, 2nd ed. Wood, W.B., Addison Wesley, 1981.
8. Biological Chemistry, Mahler & Cordes.
9. Text book of Biochemistry West, W.S. Todd, Mason & Vanbruggen, Macmillian & Co.
10. Principles of Biochemistry – White –A, Handler, P and Smith E.L.Mc.Graw-Hill.
11. Biochemistry – Cantrow, A. Sehepartz. B. Sunders – Japan.
12. The Carbohydrates: Pigman & Hartman Vol.II – A & II-B.
13. Biochemistry Voet & Voet.
14. Comprehensive biochemistry – Florkin & Storz, Academic Press.

Programme: ***M. Sc.*, Biotechnology**
Course Title: ***Microbiology and Microbial Genetics***
Type of Course: **Core**
Course No.: 15083
Semester: **I**

UNIT – I (17hrs): History and scope of microbiology- Discovery of microorganisms, Theory of spontaneous generation, germ theory of diseases, Major contribution and events, scope and relevance, systematic diversity, Carl wooes 3 domain system, five kingdom systems. Nutritional requirements to microorganisms – mode of nutrition – phototrophy, chemotrophy – methylotrophy organotrophy, mixotrophy, saprophytic, symbiotic and parasitic, Interaction of microbes. Microorganisms and disease

UNIT -11 (**(17hrs)**: Isolation, enumeration. approaches for obtaining pure cultures from different sources, cultivation of aerobic and anaerobic microorganisms, (continuos, batch, synchronous and stock cultures), maintenance and preservation of microbial cultures, methods of identification and characterization of microorganisms by staining techniques, Control of microorganisms – principles, physical and chemical agents, assay of antimicrobial action. Batch and continuous sterilization of media and air.

UNIT – 111 (16 hrs): Ultra structure of nucleus and nuclear envelop. Organization of prokaryotic and Eukaryotic chromosomes – structure of nucleosome, c-value, cell cycle overview, cell growth and extra cellular signals, regulations of cell cycle progressions, unit of genes, establishments of cistrons, recons and mutons, complementation, modern concept of gene, mutagenesis, mutation screening, AMES test.

UNIT IV(17hrs):: Gene transfer mechanisms in bacterial and viruses: Plasmids : types, properties, detection, transfer. Transposable elements and insertion sequences – types of transposons and transposition. Bacterial transformation –molecular mechanisms, Bacterial conjugation – Hfr transfer, Rec proteins. Bacteriophages T4 and Lamba – Genome organization, replication, recombination, generalized and specialized transduction . Eukaryotic viruses, Sub-Viral Agents (Prions).

REFERENCES

1. Microbiology: concepts and Applications. Michael J. Pelczar, Jr., E.C.S., Chan, Noel R. Krieg, 1993. Mc. Graw Hill, Inc.
2. Introductory Microbiology. 1995, by Trevor Gross.
3. Fundamentals of Microbiology. 4th ed. 1994. I.E. Alcamo. Scientific Publication.
4. Microbiology, 1990. 4th Ed.B.D. Davis, R. Dulbeco, H.N. Eisen and H.S. Ginsberg and J.B. Lippincott Company.
5. Fundamental Principles of Bacteriology. 1994. A.J. Sake. Tata McGraw Hill.
6. Laboratory Experiments in Microbiology. 3rd ed. Brief Version. 1992. T.R. Johnson and C.L. Case. Addision Wesley International Publications. PP 350.
7. Microbiological Applications : A Laboratory Manual in General Microbiology. 5th ed. 1990. H.J. Benson. Panima Publications. PP 459.

Practical Course

1. Skerman, N.B.D. A guide to the identification of the Genera of Bacteria.
2. Bergey's Manual of Determinative Bacteriology.

Programme: ***M. Sc.*, Biotechnology**
Course Title: ***Biochemical and Biophysical Technique***
Type of Course: **Core**
Course No.: 15084
Semester: **I**

UNIT – I(15 Hrs):
Principles and applications of light, phase contrast, fluorescent, electron microscopy (SEM and TEM). Preparation of specimen for microscopy
Centrifugation –principles of sedimentation, preparative and analytical centrifuges, rotors, sedimentation analysis, density gradient centrifugation.

UNIT –II(18 Hrs):
Chromatography – general principles. paper, thin layer, gas-liquid, ion exchange, HPLC, molecular sieve and affinity chromatography techniques.
Electrophoresis: Horizontal and Vertical Gel Electrophoresis. PAGE - Native and SDS PAGE. Agarose Gel Electrophoresis. Applications of PAGE and Agarose Gel Electrophoresis

UNIT – III(18 Hrs):
Spectroscopy – Electromagnetic spectrum of light Beer-Lambert law. UV-visible spectrophotomety fluorescence spectroscopy, Atomic Absorption spectroscopy, NMR spectrophotometry. Mass spectroscopy, MALDI-TOF. X-ray diffraction and X-ray crystallography.
UNIT – IV(18 Hrs):
Radioisotope tracer techniques – Nature and types of radioactivity, decay units, preparation of labeled biological compounds, detection and measurement of radioactivity (GM counter, scintillation counter auto radiography, Biological uses of radioisotopes, safety measures in handling radio-isotopes. Non-radio labelled Probes (DIG labelling)

REFERENCE:

1. Biochemical techniques : Theory and Practical. 1987. J.F. Robft and B.J. White, Waveland Press, Inc. Prospect Heights, IL, PP 407.
2. Principles and Techniques of Practical Biochemistry, 1994. 4th ed. Eds. K. Wilson and J. Walker.
3. Physical Biochemistry: Applications to Biochemistry and Molecular Biology. 2nd ed. David Freifelder. W.H. Freeman and Company, New York.
4. Affinity Chromatography: Bio selective adsorption on insert matrices. 1992. W.H. Scouten, John Wiley & Sons, New York, PP 348.
5. Applications of HPLC in Biochemistry : Laboratory Techniques in Biochemistry and Molecular Biology. 1987. A. Fallon, R.F.G. Booth and L.D. Bell, eds. Elsevier Science Publishers, Amsterdam, the Netherlands. PP 338.
6. Electron microscopy: Principles and Techniques for biologists. 1992. J.J. Bozola and L.D. Rusel, Jones and Bartlett Publishers, Boston, M.A. PP 542.
7. Electrophoresis : Theory, techniques and biochemical applications. 2nd ed. 1986. A.T. Andrews, Oxford University Press, Oxford. PP 452.
8. Enzymatic analysis : A practical guide. 1993. Janet. V. Passonneau and Oliver. H. Lowry, Humana Press, Totowa, N.J. PP 400.
9. Enzyme assay : A Practical Approach. 1992. R. Eisenthal and M.J. Danson, Eds. IRL Press. PP. 351.
10. Flow Cytometry: A practical approach. 1990. M.G. Ormerod. Ed. IRL Press. PP 279.
11. Introduction to Biophysical methods for protein and Nucleic acid research. (1995). J.A. Glasel; and Murray P. Deutscher. Academic Press. PP 505.
12. Special Analytical techniques in Nutritional Biochemistry. 1991. Gopalakrishna and S.K. Ranjhan. Kalyani Publishers.
13. Methods in Non-radioactive deteraction, 1993. Gary C Howard. Ed. Appleton & Lange Earwalk. CT. PP. 342.
14. Preparative centrifugation : A Practical approach. 1992. D. Rickwood. Ed.IRL Press, PP 400.
15. Principles of Laboratory Instruments. 1993. L.E. Schoeff, R.H. Williams, Mosby Year-book Inc. Pp 473.
16. Radioisotopes in Biology : A Practical approach. 1990. R.J. Slater, Ed., IRL Press, PP 307.
17. Physical Chemistry. 1986. P.W. Atkins, W.H. Freeman. Sanfrancisco Pub.
18. Principles and techniques of Practical biochemistry, 1994 (4th ed.) by K. Wilson and J. Walker (eds).

Programme: ***M. Sc.*, Biotechnology**
Course Title: ***Molecular Biology***
Type of Course: **Core**
Course No.: 25081
Semester: **II**

UNIT – I (16hrs): Identification of genetic material as DNA or RNA – Fred Griffith, Avery, Hershey Chase Experiments. Central dogma theory and flow of genetic information. Molecular organization of genetic material in prokaryotes and eukaryotes - DNA and histone proteins. Role of Histone proteins in genome organizationReplication of DNA- Semi conservative replication of DNA, rolling circle model of replication, enzymology of replication – Helicases, topoisomerases, SSB, DNA ligases, primases. DNA polymerase – *E.coli* DNA polymerase I, II and III and Eukaryotic DNA polymerases. Mechanism of DNA repair – Photoreactivation, excision, recombinational repair and SOS response.

UNIT – II (17hrs): Transcription – RNA polymerases – nature of prokaryotic and eukaryotic RNA polymerase. Mechanism of transcription in prokaryotes and eukaryotes – Initiation, elongation and termination of RNA synthesis. Polycistronic and monocistronic RNAs, Post transcriptional modifications of eukaryotic transcripts – capping, polyadenylation and RNA splicing. Types of introns and splicing mechanisms – group I and group II. Alternate splicing and mechanism of RNA Editing.

UNIT – III (18hrs): Translation - genetic code and its elucidation, experimental studies of Nurenburg and Khorana. Codon degeneracy, Wobble hypothesis, structure and composition of prokaryotic and eukaryotic ribosomes, structures of mRNA and tRNA. Events of protein synthesis - amino acid activation, initiation, elongation and termination in prokaryotes and eukaryotes, Inhibitors of protein synthesis. Mechanism of inhibition. Post-translational modification of proteins – Protein sorting and targeting, molecular chaperons, Protein folding and protein degradation.

UNIT – IV (16hrs):
Regulation of gene expression- Terminology – Operon, operator, promoter, attenuater, repressor, co-repressor, inducer, apoinducer, gratituous inducer, induction, repression. Organization of Prokaryotic genes- Operons and their regulation, Lac operon, Trp operon, negative regulation, positive regulation. Organization of eukaryotic genes and their regulation – Transcriptional factors, activators, and enhancers – Eukaryotes – Yeast: gal operon. Hormones and environmental factors affecting gene expression.

REFERENCES

1. Molecular Biology. 2nd ed. 1994. D. Freifelder. Springer.
2. Molecular Biology by G. Padmanabhan, K. Sivaram Sastry, C. Subramanyam, 1995, Mac Millan.
3. Molecular Biology and Biotechnology 2nd ed. J.M. Walker and E.B. Gingold. Panima Publications. PP 434.
4. Dictionary of microbiology and molecular biology. 2nd ed. 1994. Sigleton. P. and Sainsbury, D. Sciential Publication.
5. Molecular Biology of the Gene, 1987. 4th Ed. J.D. Watson, N.H. Hopkins, J.W. Roberts, J.A. Steitz and A.M. Weiner, 2 Vol. Benjmin/Cummings.
6. Biochemistry of the Nucleic acids. 1992. 11th ed. R.L.P. Adams, J.T. Knowler, D.P. Leader. Chapman and Hall.

Practical Course

1. Techniques in molecular biology. Vol.2. 1987. ed. J.M. Walker and Wim Gaestra. Panima Publications. PP 332.
2. Methods in Plant Molecular Biology. 1989. M.A. Schuler and R.E. Zielinski. Academic Press.
3. Methods for cloning and Analysis of eukaryotic genes. 1990. A Bothwell, G.D. yancoponlos and F.W. Alt: Jones and Bartlett Publishers. PP 1990.

4. PCR: A Practical approach. 1991. M.J. McPherson. P. Quirke and G.R. Taylor. Eds. IRL Press, PP 253.

Programme: ***M. Sc.*, Biotechnology**
Course Title: **Computer Applications & Biostatistics**
Type of Course: **Core**
Course No.: 25082
Semester: **II**

UNIT – I (18 Hrs): Introduction to computers, Definition, block diagram, Components such as CPU etc. Storage devises, concept of hardware and software, Organization and working of computers operating systems: basics of operating systems and types – DOS, Windows. Classification of computers based on technology, usage and working principle,

UNIT –II (20 Hrs): Bioinformatics- Overview, History, Scope, Importance, Objectives of Bioinformatics, Kind of Data used, Major Bioinformatic Data Bases and search tools: NCBI, EMBL, DDBJ. Data integration and Data Analysis,
Sequence analysis: Concepts, importance and alignment methods, comparative and multiple alignments and scoring methods. Applications of Bioinformatics: gene isolation (primer designing), comparative genomics, Insilico analysis drug designing and modeling.

UNIT –III (17 Hrs): Biostatistics- Introduction and scope of biostatistics – variables and attribution, diagrammatic representation of biological data. Measures of location and dispersion and skewness, Raw data, group data, construction of frequency distribution,

UNIT IV (18 Hrs):, Mean, Standard deviation and coefficient of variation, Correlation and regression concept,Tests of significance: Null hypotheis,T test, f-test, Dunken Hypothesis
Analysis of variance (ANOVA)-one-way and two-way classification. Elements of statistical quality control. Elements of Statistical packages and uses.

REFERENCES

1. Computing supplement to Models in Biology: Mathematics, Statistics and Computing. 1994. B. Brown and P. Rothery. Sciential Publication.
2. Meical informatics: Computer applications in Health care. 1990. E. H. Shortliffe, L.E. Pereault, G. Wiederhold and L.M. Fagan. Addision-Wesly International Publications. PP 714.
3. Computing for Biologists. 1985. A Fielding Addison-Wesley Publishers.
4. Microcomputers in Biology: A Practical approach. 1985. C. R. Ireland and S.P. Long. IRL Press.
5. Subhas Mehta, "Dos made simple", Golgotia Publications, New Delhi.
6. Taxali R.K., "Wordstat 4.0", Tata Mc. Graw-Hill Publishing Company Ltd., New Delhi.
7. Statistical methods in Agriculture and Experimental biology. 2nd ed. 1993. R. Mead, R.N. Curnow, A.H. Hasted, Panima Publication, PP 415.
8. Introduction to Biostatistics. 1995. R.N. Forthafter and E.S. Lee. Academic Press. PP 656.
9. Statistics with application to the biological and health sciences. 1985. R.D. Remington and M.A. Schork, Prentice-Hall.
10. Biostatistics an introductory text, Goldstein, Avrom, New York, The Mac Millian Company, 1971.

Programme: ***M. Sc.*, Biotechnology**
Course Title: ***Immunology***
Type of Course: **Core**
Course No.: 25083
Semester: **II**

UNIT – I (16hrs): Immunity – natural and acquired; specific and non-specific; Primary and Secondary organ of immune system – thymus, spleen, lymph nodes, bursa fabricus, other types of lymphoid tissue. Cells of the immune system; B and T lymphocytes, neutrophils, macrophages, plasma cells, eosinophils and basophils. Blood groups and cytokines, interferons and interleukins

UNIT–II (17hrs): Antigen – definition, properties, specificity, cross reactivity, immunogenicity, antigenic determinants and haptens. Antibody: nature and formation, classification of immunoglobulings and types, valency and avidity. production of polyclonal antibodies, Hybridoma technology

UNIT – III (17hrs): *In vitro* serological tests : precipitation in liquid, single and double diffusion tests using agar gel media, immunoelectrophoresis, rocket immunoelectrophoresis, hemagglutination, and Enzyme-Labeled Immune Assays (ELISA), Radio immune assay.

UNIT – IV (17hrs): Complement –definition, complement cascade pathway, complement fixation. Hyper sensitivity and its types. The major histocompatability complex. Transplantation and G.V.H. reactions.Immunopathology – Autoimmune diseases; immune complex diseases; immunodeficiency diseases, Tumor immunity

REFERENCES

1. Advanced immunochemistry. 2nd ed. 1990. E.D. Day, Wiley Liss, Inc, New York. PP 633.
2. Basic and clinical immunology, 7th ed. 1991. D.P. Stites and A.I. Terr Eds, Appleton and Lange, Norwalk, CT, pp. 870.
3. Clinical immunology : A practical approach. 1990. H.C. Goo, and H. Chapel. Eds. IRL Press, Oxford, PP 263.
4. Immunology: A short course, 2nd. 1991. B. Benjamin and S. Leskowitz, Wiley-Liss, NY. PP 459.
5. Immunochemical protocols : Methods in Molecular biology. Vol. 10, 1992, M.M. Manson. Ed. Humanma Press. Totowa. NJ, PP 480.
6. Immunology, 1995, R.B. Gallagher, J. Gilder, G.J.V.Nossal and G. Salvatore. Ed. Academic Press. PP 300.
7. Cellular and Molecular Immunology. 1991. A.K. Abbas, A.K. Lichtman, J.S. Pober, Harcourt Brace. PP 480.
8. Monoclonal antibodies. 1992. J.H. Peters and H. Baumgarten. Eds. Springer –Verlag. New York. PP 488.

Practical Course

1. Serological methods for detection and identification of viral and bacterial plant pathogens. 1990. R. Hampton, E. Ball and S.De.Boer (eds.) American Phytopathological Society.
2. Practical immunology. 1989. 3rd ed. Hudson and F.C. Horp. Blackwell Scientific Publication.
3. Antibodies : A Laboratory Manual. 1988. E. Harlow and D.Lane. Cold Springer Harbor Lab. NY. PP 726.

Programme: ***M. Sc.*****, Biotechnology**
Course Title: ***Enzymology***
Type of Course: **Core**
Course No.: 25084
Semester: **II**

UNIT – I (16hrs): Introduction to Enzymes:, history, Nomenclature and Classification, structure and function, specificity of enzyme action, Fischer Lock and Key Hypothesis, Koshland induced Fit hypothesis, Monomeric-O-Serine proteases, oligomeric enzymes- lactate dehydrogenase, extraction and purification methods of enzymes.

UNIT – II (17hrs): Introduction to bioenergetics, catalysis and kinetics. Concepts of Bioenergetics- 1st and 2nd Law of thermodynamics, enthalpy, entropy and free energy, standard free energy, factors effecting the rate of chemical reactions, Kinetics of single substrate enzyme catalysed reactions- Henry and Michaelis – Menton equation, Lineweaver Burk Plot.

UNIT III (17hrs): Enzyme inhibition- Reversible inhibition, competitive, uncompetitive, non competitive, Allosteric inhibitors, Irreversible inhibitors, Identification of Binding and catalytic sites. The chemical nature of enzyme catalysis, chymotrypsin, Ribonuclease, Lysozyme, Metalloenzymes, Cofactors, Coenzymes- NAD^+, FMN, FAD, ATP, ADP, AMP, CoASH, TPP, Hills coefficient, +/- cooperativity. Iso enzymes and its physiological significance, Ribozymes and Abzymes.

UNIT IV (17hrs): Ligand protein interaction, application of enzymology, enzymes as analytical reagents, instrumental techniques available for using enzymatic analysis in Medicine and Industry, Biotechnological applications of enzymes- Food and Drink Industry, Recombinant DNA Technology, Immobilised Enzymes. Inborn errors of metabolism-Phenylketonuria, Alkaptonuria, Sickle Cell Anaemia, Fructosaemia.

REFERENCES

1. Principles of Biochemistry: White. A, Handler, P., and Smith.
2. Biochemsitry, Lehninger A.L.
3. Biochemistry, David E. Metzler.
4. Biochemistry, Lubert Stryer.
5. Review of Physiological Chemistry: Harold A. Harper.
6. Biochemistry, 2nd Edition, G. Zubay (1988).

Practical Course

1. Practical Biochemistry – H. Varley.
2. Methods in Enzymology S.P. Colowick & N.O. Kapalan, Academic Press.
3. Methods in Biochemical analysis.
4. Oser: Hank's Physiological Chemistry.
5. Food analysis – Woodman.

Programme :*M.Sc.Biotechnology*
Course Title*: Essentials of Biotechnology*
Course no: Non Core 1.
Semester: II

UNIT I: History of Biotechnology.Introduction to Plant,Animal and Microbe cell structure. Introduction to Macromolecules:Nucleic Acids,Proteins,Carbohydrates.Mitosis,Meiosis, and its significance.

UNIT II: Introduction to Genetic Engineering and Bioinformatics.Genetic Engineering tools:Enzymes,Cloning Vehicles,Principle of cloning.Databases and their application in Biotechnology.

UNIT III: Introduction to Application of biotechnology in Agriculture,Industry,Medicine and Animal Biotechnology.

UNIT IV:

Introduction to Intellectual property Rights,Patents,Principles of Biosafety,GMO's

References

1. Basic Biotechnology-Colin Rotledge and Kristainsen
2. Cell and Molecular Biology-P.K.Gupta
3. Cell Biology-Verma and Agarwal
4. Cell Biology-Rastogi
5. Biochemical Techniques:Theory and Practical.1987.J.PRobftand B.J.White,waveland Press,Inc.Prospects HeightsIL,pp407
6. Biochemical Techniques:Theory and Practical.1987.J.PRobftand B.J.White,waveland Press,Inc.Prospects HeightsIL,pp407
7. Molecular Biology by G.Padmanabhan,K.Sivram Sastry,C.Subramanyam,1995,Mac Millan
8. Molecular Biology and Biotechnology2nd ed.J.M.Walker and E.B.Gingold,Panima Publications.PP434.
9. Dictionary opf microbiology and molecular biology2nd ed.1994.sigleton .P.and Sainsbury,D.Sciential Publications
10. Molecular Biology of Gene 1987.4th Ed.J.D.Watson,N.H.H opkins,J.W.Roberts,J.A.Steitz and A.M Weiner.2 VOL.Benjimin/Cummings
11. Biochemistry of Nucleic Acids.1992.11th ed.R.L.P.Adams.J.T.Knowler.D.P Leader.Chapman and Hall.
12. Genetic Engineering –Sandhya Mitra.
13. Biotechnology,IPRs and Biodiversity-M.B.Rao and Manjula garu

Programme: **M. Sc., Biotechnology**
Course Title: ***Genetic Engineering***
Type of Course: **Core**
Course No.: 35081
Semester: **III**

UNIT – I (16hrs): **Introduction to Genetic Engineering:** Outlines and tools for cloning - DNA cutting and joining. **Enzymes** – Restriction endonucleases, types, properties and applications, DNA ligases, polynucleotide kinase, alkaline phosphotases, S1 nuclease, terminal transferase, topoisomerases, methylases and gyrases. **Molecular vectors** – Properties and Characters of Cloning Vectors. *E. coli* Compatible Vectors - . Plasmids, Bacteriophage derivatives, Cosmids, BACs), yeast (YACs, shuttle vectors) and Algal Vectors. Characteristics of expression vectors. Molecular cloning strategies: **Generation of DNA fragments:** RE digestion, mechanical shearing. **Joining of DNA fragments to vectors:** homopolymer tailing, linkers and adaptors, Cohesive and blunt end ligation

UNIT – II (18hrs): Cloning and Sequencing of nucleic acids: Isolation of Desired Gene / Fragment – Genomic DNA Libraries and cDNA Libraries. Screening of Libraries for selection of desired genes. Principles of preparation of DNA probes and their application. Applications of Genomic and cDNA libraries.
Sequencing Techniques: Maxam –Gilbert chemical degradation and Sanger's dideoxy chain termination methods.
Modification Techniques: Principle and applications of Polymerase chain reaction (PCR) in recombinant DNA technology, Site Directed Mutagenesis and its applications in Genetic Engineering. Screening techniques - Southern, Northern and Western blotting.

UNIT – III (17hrs): Molecular Transformation: Delivery/introduction of recombinant molecules into selected host cells (transformation) - Introduction of Recombinant DNA molecules into appropriate hosts. Bacterial - Competent cells preparation, **e**lectroporation. Plant transformation methods – Agrobacterium (the natural genetic engineer, Ti- Plasmid, Agrobaterium mediated) Role of vir-genes in Agrobacterium, microinjection, Other Methods of Transformation: Particle bombardment, Microinjection, PEG mediated and Electroporation. Chloroplast transformation, selection of transformants and its applications.

UNIT – IV (16hrs):

Genetic Engineering – Applications in Medicine, Agriculture and Industry, social and moral implications.. Transgenic plants for Insect, pest,disease, abiotic stress, herbicide tolerance, Nutrition quality improvement and phytovaccines. Possible Ecological concerns and risks of transgenic crops and animals.

REFERENCES

1. Principles of Gene Manipulation. 1991. R.W. Old and S.B. Prim-Rose. 2nd ed. Blackwell Scientific.
2. Genetic Engineering – Sandhya Mitra
3. Biotechnology, IPRs and Biodiversity – M. B. Rao and Manjula Guru
4. DNA replication, 2nd ed. 1991. A. Kornberg and T.A. baker. W.H. Freeman and Company, New York. Ny. PP 931.
5. Glossary of Genetics. 5 ed. Classical and molecular, 1994, Reiger. R. et al., Springer.
6. Gene regulation, 2nd ed. 1994. D. latchman. Sciential Publication.
7. Bacterial and Bacteriophage genetics. 1994. E.A. Birge. Springerscan Publication.

Programme: ***M. Sc.*, Biotechnology**
Course Title: ***Medical and Pharmceutical biotechnology***
Type of Course: **Core**
Course No.: 35082
Semester: **III**

UNIT-I

Medical biotechnology- History,Definition, applications and uses of recombinant DNA technology Products like "Insulin, growth factor, factor- VIII, tissue plasminogen activator, interferons, B-cell, Blood products-Erythropoietin"

UNIT – II

Disease Diagnosis - Gene therapy- vector engineering and gene delivery methods, gene replacement, gene agumentation, gene silencing. Current strategies for development of vaccines against HBV, Malaria, Tuberculosis. Role of PCR and RFLP in disease prognosis

UNIT – III

Definition – history of development of pharmaceutical products by biotechnology, scope of biotech products in pharmaceutical industry. Drug designing, drug receptor interactions, antagonism- reversible and irreversible.

UNIT-IV

Vaccines- Genetic recombinant vaccine, recombinant vector based vaccines- live, subunit and their production of Hepatitis-B vaccines, HIV vaccine, pre clinical, toxicological acute, sub acute and chronic studies, types of clinical trials Phase-I, Phase-II and Phase III.

BOOKS RECOMMENDED:

1. Biotechnology by B.D.Singh (Kalyani).
2. Molecular Biology and Biotechnology by Meyers, RA, A comprehensive Desk reference (VCH Publishers).
3. Biotechnology by U. Satyanarayana (Books & Allied (P) Ltd).
4. Biopharmaceuticals-Walsh, John Willey and Sons, New York 1998
5. Pharmaceutical Biotechnology – Daan J.A. Crommelin, Robest D. Sindelar, Daan J.A. Crommelin Amazon. WM
6. Physical Methods to characterize Pharmaceutical Protines- James N. Herron, Wim jishkoor and Daan J.A. Crommelin Amazon. Wm
7. From clone to clinic (Developments in Biotherapy) Daan J.A. Crommelin and H. Schellekom Amazon.Wm
8. Hand Book of Pharmaceutical Biotechnology - Jay P.Rho, Star 4 lonie The Haworth press, Alice Sr. Bringhamtoon, NY 13904, US Tramas bartifai, Harold L. Dorn's

Programme: ***M. Sc.*****, Biotechnology**
Course Title: ***Food and Industrial Biotechnology***
Type of Course: **Core**
Course No.: 35083
Semester: **III**

UNIT – I(15hrs):

Scope of biotechnology in the food and drink industry: Traditional fermented foods – Curd, yoghurt, dhokla, miso, shrikand, cheese, butter milk, dosa. Modern fermented products – Wine, beer, brandy, vinegar, baker's yeast, sauerkrauts, sausages, fermentation of milk, meat, fruits and vegetables. Types of organisms in food like meat, poultry, sea foods, dairy products, fruits, vegetables and Cereal products.

UNIT – II (16hrs): General principles of food preservation; Microbiological standards Scope and importance of food processing. Principles and methods of food preservation-freezing, heating, dehydration, canning, additives, fermentation, irradiation, microwave processing. Juices and concentrates/membrane technology. Storage of food, modified atmosphere packaging. Refrigeration, freezing and drying of food, minimal processing, radiation processing. Food contamination and food borne disease, control and food safety. Food laws and standards,

UNIT – III (17hrs): Introduction, to Microbes and enzymes of industrial importance different types of bioreactors and bioreactor design. High fructose corn syrup, Dairy products and Cheese making, Single Cell Protein (SCP) production. Vaccines production, Biofuels, Brewing.

UNIT – IV(20hrs):
Biomolecules production – organic acids, amino acids, vitamins, antibiotics, enzymes, alcohols, food flavors,
Pharmaceuiticals Applications – vaccines, hormones. Applications of enzymes in industry and medicine; immobilized enzymes – their preparation and applications, Nutraceuticals and their significance

REFERENCES:

1. Frazier, W.C., and D.C. Esthoff: Food Microbiology, 4th ed., Mc Graw-Hill, New York, 1988.
2. Fermentation : A Practical approach. 1990. B. Mc Neil and L.M. Harvey. IRL Press. PP 226.
3. Manual of Industrial Microbiology and Biotechnology. 1986. Edited by Arnold L. Demain and Nadine. A. Solomon. PP 466.
4. Bioreactors in Biotechnology – A Practical Approach. AR. Seregg.
5. Industrial Microbiology by Samuel Cate Prescott and Cecil Gordon Dunn
6. Industrial Microbiology by L.E.J.R.Casida

Practical Course

1. Manual of Industrial microbiology and biotechnology. 1986. Edited by Arnold L. Demain and Nadine. A. Solomon. PP 466.
2. Vanderzant, C., and D. Splittstoesser. : Compendium of Methods for the Microbiological Examination of Foods, American Public Health Association, Washington, D.C. 1992.

Programme: **M. Sc., Biotechnology**
Course Title: ***Bioprocess Technology***
Type of Course: **Core**
Course No.: 35084
Semester: **III**

UNIT – I (16hrs):

Introduction to Bioprocess technology, Upstream processing- strain selection, media preparation, sterilization, seed inoculum, types of Bioreactors - Air Lift Reactor, Tower fermenter, Packed tower fermenter, Rotating disc, Stirred tank reactors.

UNIT – II (18hrs):

Bioprocess principles, Types of Fermentation process - Microbial mass, enzymes, metabolites and recombinant products., Batch culture, continuous culture, fed batch culture, Isolation, preservation and improvement of industrially important microorganisms, Conventional and Synthetic media for industrial fermentation processes,

UNIT – III (17hrs):

Downstream processing – Filtration (batch filters and continuous filters), centrifugation (Continuous Flow method) , cell disruption(physical, mechanical and chemical methods), extraction(liquid-liquid), chromatography(Adsorption, Ion, Affinity chromatography, HPLC), membrane processes (ultrafiltration and reverse osmosis), drying(spray drying,freeze drying,fluidized bed drier), crystallization, whole broth processing.

UNIT – IV(16hrs):

Applications of Bioprocess Technology- Industrial production of Chemicals, alcohol (ethanol), Acids (Citric acid and Acetic acid), Antibiotics (Penicillin, Streptomycin, Tetracyclin), Amino acid (Lysine, Glutamic acid), Single cell proteins,Vitamins,insulin, Human growth hormone

REFERENCES

1. Bio processing Engineering principles.1995. P.M.Doran. Har court Brace. PP 464
2.Biochemical engineering . 1992. James .M.Lee Prentice – Hall.
3. Biochemical engineering Fundamentals. 2ed 1986.J.E.Bailey and D.F.Oilis. Mc Graw-Hill Publication.
4.Chemical Process Control: An Introducation to theory and practice. 1984.G.Stephanopoulos, Prentice-hall.
5. Modelling and controlling of fermentation Process. Ed. J.R.Leigh
6.Biochemical Engineering by S.Aiba, AE Humphery, NF Millis, University, of Tokyo Press.
7. Chemical Engineering by JM Coulson and JF Richarson ,Pergamen Press
8.Fundamentals of Biotechnology by P.Prave , U.Faust W.Sitting and DA Sukatsch, VCH.
9. A Text Book on Biotechnology by HD Kumar, Affliated East West Press Private ltd.

Programme :*M.Sc.Biotechnology*

Course Title: Introduction to Bioethics in Biotechnology

Course no: Non Core 2.

Semester: III

UNIT I: What is ethics?Definition of bioethics,Principles of Bioethics.Principle of Biosafety,Globalization of Biosafety and Bioethic Issues.

UNIT II: Food and Agriculture Organization(FAO),World Health Organization(WHO),United Nations Environment Program(UNEP),International Center for Genetic Engineering and Biotechnology(ICGEB).United Nations Education, Scientific and Cultural Orgaganization,(UNESCO),United Nation Industrial Organization(UNIDO),Global Environmental Facility(GEF)

UNIT III: Introduction to international conventions, treaties and agreements on biosafety. Overview of wide application of biotechnology and concerns world wide, ethical. legal and social implications(ELSI) of biotechnology in agriculture, medical environmental.

UNIT IV:

Bioethical Issues in Biotechnology, Research and Application, Bioethical Issues on rDNA Technology. Other Scientific Research with Bioethics Considerations. Environmental and Health aspects of Biotechnology.

References

1. Gene Cloning-Brown
2. Concepts in Biotechnology-Balsubramanyam.D
3. Basic Biotechnology-Colin Rotledge and Kristainsen
4. Gene Biotechnology-Jogdand
5. From Genes to Clones.Introduction to Gene Technology-Winnacker, Ernst.L.
6. Safety,Moral,Social and Ethical issues related to geneticalls modified foods-SmithJ.E.
7. Molecular Biology and Biotechnology-Meyer R A
8. Biotechnology expanding horizons by B.D. Singh Kalyani Publisher
9. Biological warfare in the 21st century by M.R.Dando
10. Intellectual Property Rights in Agricultural Biotechnology by F.H. Erbisch and K.M.Maredia.

Programme: ***M. Sc.*****, Biotechnology**
Course Title: ***Plant Biotechnology***
Type of Course: **Core**
Course No.: 45081
Semester: **IV**

UNIT – I (16hrs): Introduction and History of Plant Biotechnology, Organization of Plant Tissue culture Lab, Sterilization, Media Preparation and different types of media, Instrumentation. concept of totipotency, Dedifferentiation, Redifferentiation, Types of plant tissue culture-Anther culture, Protoplast culture, Embryo culture, Shoot tip, callus and Cell suspension culture.Regeneration- Organogenesis and Somatic Embryogenesis. Acclimatization. Hydrophonics and Aero Phonics

UNIT – II (18hrs): Plant Genetic Engineering- Gene cloning techniques.Vector mediated or Indirect gene transfer (Agrobacterium-mechanism of T-DNA transfer, Ti and Ri plasmids as vectors), Direct Gene transfer-microinjection, electroporation,particle gun, Choloroplast transformation. Development of Herbicide Resistant, Virus resistant, Pest Resistant and Stress tolerant plants(drought and salt), Identification of transgenic plants. Gene silencing.

UNIT – III(17HRS): Laboratory culture of micro algae, Large scale production of microalgae. Marine algae and their products, Edible sea weed and their production. Blue green algal biofertilizers- Azolla, Anabaena. Biofertilizers, Biopesticides.

UNIT – IV(16HRS): Introduction to molecular markers, different types-PCR based and Non PCR based ,types of maps-physical and genetic map, applications of molecular markers in plant biotechnology. Phytodiagnostics using ELISA and PCR techniques, transgenic plants as biofactories- edible vaccines and plantibodies.

REFERENCES

1. Molecular approaches to crop improvement. 1991. Dennnis and Liwelly eds. PP. 164.
2. Plant cell and Tissue culture. A Laboratory Manual. 1994. Reinert. J. and Yeoman, M.M. Spring.
3. Plant biotechnology, 1994. Prakash and Pierik. Oxford & IBH Publishing Co.
4. Gene transfer to plants. 1995. Potrykus-I and Spangenberg, G. Des. Springer Scan.
5. Microalgal Biotechnology. 1988. Borocotizka M.A. and Borocoitzka L.J. Cambridge University Press.
6. Algal and Cyanobacterial biotechnology, 1989. Cresswell. R.C. Rees, T.A.V. and Shah, N.Eds. Longman Scientific and Technical, Essex, London.
7.Plant Biotechnology by A.Slater,N.W.Scott M.R..Fowler(oxford University Press)

Practical Course

1. Plant cell and Tissue culture. A laboratory manual. 1994. Reinert, J. and yeoman, M.M. Springer
2. Plant Biotechnology by H.S.Chawla

Programme: ***M. Sc.*, Biotechnology**
Course Title: ***Animal Biotechnology***
Type of Course: **Core**
Course No.: 45082
Semester: **IV**

UNIT – I (16hrs): Definition and history of animal tissue culture- Equipment and materials (culture vessels, CO_2 incubator, inverted microscope, cell counters and Biosafety Cabinet). Principles of sterile techniques. Sources of tissues, types of tissues - epithelial, muscle, connective, nerve and blood. Cell culture media - components and their functions. Role of serum, Measurement of cell number - hemocytometer, coulter counter. Measurement of cell viability and cytotoxicity.

UNIT – II (17hrs): Primary culture – Mechanical and enzymatic mode of desegregation, establishment of primary culture. Subculture - passage number. Cell lines - maintenance and preservation of cell lines. Contamination - bacterial, viral, and fungal, detection and control, cell transformation – normal vs. transformed cells, Scale-up of animal cell culture –Batch reactor, continuous culture.

UNIT – III (18hrs): Cloning - concept of nuclear transfer, and creation of Dolly. In vitro fertilization in cattle. Embryo culture, embryo transfer in farm animals. Stem cells - embryonic and adult stem cells. Transgenic animals - retroviral, microinjection, and engineered embryonic stem cell method of transgenesis. Application of transgenic animals - biopharming, disease models, functional knockouts mice.

UNIT – IV (16HRS).
Aquaculture- fresh water fish culture practices and types. Freshwater prawn culture. Brackish water fish, shrimp and crab culture practices. Pearl culture - pearl producing mollusks, rearing of oysters, nucleation for pearl formation and harvesting of pearls Molecular tools for the identification of diseases in aquatic species. Sericulture - species of silkworm, artificial rearing, seed production, technology of silk production and recent advances.

Referencee:

1. Culture of Animal Cells, (3rd Edn) R Ian Fredhney. Wiley-Liss
2. Animal Cell Culture – Practical Approach, Ed. John RW. Masters, Oxford
3. Cell Growth and Division: A Practical Approach Ed. R. Basega, IRL Press
4. Cell Culture Lab Fax. Eds. M Butler & M Dawson, Bios Scientific Publications Ltd. Oxford
5. Animal Cell Culture Techniques Ed Martin Clynes, Springer
6. Methods in Cell Biology, Vol. 57, Animal Cell Culture Methods Ed. Jenni P Mather and David Bames. Academic Press

Programme: **M. Sc., Biotechnology**
Course Title: ***Functional Genomics***
Type of Course: **Core**
Course No.: 45083
Semester: **IV**

UNIT I (16hrs): Introduction to Genomics- Model organisms. Genome projects- Human, Arabidopsis, Rice, C. elegans and Zebra fish. Whole genome analysis: Preparation of ordered cosmid libraries, bacterial artificial chromosome libraries, short gun libraries. cDNA libraries: Preparation of large scale EST generation and application of EST's in identification and cloning of full length genes. Sequencing methods: conventional sequencing (Sangers, Maxam and Gilbert methods), Automated sequencing, Next Generation Sequencing (NGS)

UNIT II (17hrs): Genome Mapping: Introduction and outlines of Genome mapping. Principles and applications of Molecular markers. DNA polymorphism and different kinds of molecular markers - Morphological markers, Biochemical markers, molecular markers, non PCR based and PCR Based molecular markers- RFLP, RAPD, SCARs, Simple Sequence Repeats, AFLP, ISSRs, CAPs, STMS, SNPs and its applications.. Fingerprinting vs marker assisted selection (MAS). Genetic and physical maps, physical mapping and map-based cloning. **QTL**: Quantitative traits loci (QTL) and its applications.

UNIT III (17hrs): Applications of Genomics: Experimental analysis (Gene inactivation by antisense RNA, Gene Overexpression), Yeast two hybrid system, microarray technology. DNA Microarrays: Printing of oligonucleotide and PCR products on glass slides. Gene expression analysis: Global pattern of gene expression using floourescent labeled cDNA or end labeled RNA probes, Real Time PCR and its applications. Applications of DNA and cDNA chips. **Genome Editing Technologies**: CRISPR technology principle, methodology and applications in crop improvement.

UNIT IV(17hrs): TILLING: Introduction and history of TILLING. Overview of TILLING, principle and mechanism of TILLING. TILLING projects and its applications. Determination of gene function through TILLING technique. Concept of EcoTILLIG,. TILLING vs EcoTILLING. Application of biodiverse lines in EcoTILLING. Application of EcoTILLING in superior gene discovery. **RNA interference (RNAi)**: Introduction to miRNA, siRNA, RNAi. Mechanism of RNAi and its applications. **Metagenomics:** Introduction to Metagenomics: Concept of metagenomics and its application in novel gene discovery.

REFERENCES

1. DNA replication, 2nd ed. 1991. A. Kornberg and T.A. baker. W.H. Freeman and Company, New York. Ny. PP 931.
2. Gene transfer and expression protocols: Methods in Molecular Biology, Vol.7, 1991. E.J. Murray Ed. Human Press, Clifton, NJ. PP 439.
3. Genes IV, 1990. B. Lewin. Oxford University Press. PP 857.
4. Microbial genetics. 1994. Freifelder, D. Springer.
5. Glossary of Genetics. 5 ed. Classical and molecular, 1994, Reiger. R. et al., Springer.
6. Methods in Enzymology. Vol.152. Guide to molecular cloning techniques. 1987. S.L. Berger and A.R. Kimmel. Eds. Academic Press.
7. Recombinant DNA Laboratory manual. 1989. J.W. Zyskind and S.I. Bernstein. Academic Press.
8. Methods in Molecular Genetics. Vol. 7, Viral Gene Techniques. Ed. By Kenneth W. Adoph, Academic Press, 1995.
9. Gene transfer and expression protocols : Methods in Molecular Biology, Vol.7. 1991. E.J. Murray Ed. Humana Press. Clifton, NJ. PP 439.

Programme: ***M. Sc.*****, Biotechnology**
Course Title: ***Bioethics and Biosafety***
Type of Course: **Core**
Course No.: 45084
Semester: **IV**

UNIT – I (17hrs):Introduction to Bioethics, Intellectual property rights – Definition – types of patents, copy rights and trade marks. IPR, Pan-Co-operation treaty (PCT), Positive and negative aspects of Biotechnology. Legal and Ethical aspects of Biotechnology.

UNIT – II (17hrs):– Prenatal diagnosis – Genetic screening – Surrogate mothers. gene therapy – cloning, Technology transfer. Social impacts and socioeconomic aspects of Biological weapon. Ethics and Biosafety consideration in Bioremediation.

UNIT – III (17hrs): – Role of Government, Industries and society in promoting, accepting and regulating the rDNA research, Intellectual Property Rights (IPR), WTO, TRIPS, Patenting- , procedures of filing patents Examples of patents in Biotechnology.

UNIT – IV(16hrs): Environmental and Health aspects of Biotechnology – Genetically engineered organisms – Introduction of novel species and natural equilibrium – Environmental security and safety – Precautionary measures – health safety. Cartagena Protocol on Biosafety, Biosafety concerned with radioactivity.

REFERENCES

1. Gene cloning – Brown
2. Concepts in Biotechnology – Balasubramanyam.D
3. Basic Biotechnolgy – Colin Rotledge and Kristainsen
4. Gene Biotechnology - Jogdand
5. From Genes to Clones , Introduction to Gene Technology- Winnacker, Ernst.L
6. Safety, Moral, Social and Ethical issues related to geneticalls modified foods – Smith J.E.
7. Molecular Biology and Biotechnology – Meyer R A
8. Biotechnology expanding horizons by B.D. Singh, Kalyani Publisher
9. Biological warfare in the 21st century by M.R.Dando
10. Intellectual Property Rights in Agricultural Biotechnology by F.H. Erbisch and K.M. Maredia.

PRACTICAL SYLLABUS

Programme: M. Sc., Biotechnology
Course Title: ***Cell Biology, Genetics and Biomolecules***
Type of Course: Practical
Course No.: 15081P
Semester: I

1. Karyotping, transduction, study of mutations by Ames test
2. Chromosomal aberrations
3. Mitosis and Meiosis – fresh and Permanent
4. Polytene chromosomes – Drosophila and Chyronomes larvae
5. Instrumental methods for Cell biology
6. Subcellular fractionation and marker enzymes
7. Histochemical techniques
8. Estimation of protein by Lowry / Bradford method
9. Estimation of carbohydrates
10. Estimation of aminoacids
11. Estimation of lipids
12. Estimation of Vitamins, Hormones and Vitamins
13. Analysis of oils –Iodine number, Saponification value and Acid Value
14. Estimation of DNA by DPA method

Programme: ***M. Sc.,*** **Biotechnology**
Course Title: ***Microbiology and Microbial Genetics and Biochemical and Biophysical Techniques***
Type of Course: Practical
Course No.: 15082P
Semester: I

1. Sterilization techniques
2. Preparation of culture media
3. Isolation and maintenance of organisms by plating, streaking and serial dilution methods.
4. Slants and stab culture storage of microorganisms
5. Isolation of pure culture from soil, water and air
6. Growth , Growth curve, measurement of bacterial population by turbidity and serial dilution methods
7. Effect of temperature, pH, carbon and Nitrogen sources on growth of microorganisms
8. Microscopic examination of bacteria, yeast and molds – fresh preparation and permanent slides
9. Study of organisms by Gram stain, acid fast stain and staining of spores
10. Assay of antibiotics and domestication of antibiotic resistance
11. Bacterial conjugation
12. Biochemical characterization of soil microbes, one step growth curve of coliphage

13. Bacterial phage culture
14. Separation techniques-Centrifugation and Chromatography - TLC, paper

Programme: *M. Sc.*, Biotechnology
Course Title: *Molecular Biology and Computer Applications & Biostatistics*
Type of Course: Practical
Course No.: 25081P
Semester: II

1. Isolation of genomic DNA from plant, animal and microbes
2. Isolation of RNA from plant, animal and microbes
3. Estimation of DNA and RNA by agarose gel electrophoresis and spectrophotometry
4. Isolation of plasmid DNA from *E.coli*
5. Biostatics problems
6. Hand on experience in handling biostatics softwares
7. General Bioinformatics Websites
8. Introduction to databases and uses
9. Extraction of gene of interest from databases
10. Primer designing for desired gene
11. Introduction to sequence analysis software , Internet access to software and databases
12. Nucleic acid sequence analysis - detecting ORFs, Gene prediction, codon usage, editors, sequence assembly
13. Sequence Alignment and applications - Pair wise and multiple

Programme: *M. Sc.*, Biotechnology
Course Title: *Immunology and Enzymology*
Type of Course: Practical
Course No.: 25082P
Semester: II

1. Instrumental training in Biochemistry and Immunology
2. Blood grouping / Typing
3. Double diffusion and Immuno electrophoresis
4. ELISA
5. Rocket and radial Immuno electrophoresis
6. Haemaglutination
7. Hapten conjugation quantisation
8. Immunodiagnostics
9. Blood film preparation and identification of cells (Differential cell counting)
10. Purification of Ig G from serum
11. Methods for immobilisation of enzymes
12. Effect of Enzyme activity (Amylase on starch)
13. Determination of Alpha amylase activity
14. Effect of ph on Enzyme activity
15. Effect of Temperature on Enzyme activity
16. Methods for immobilisation of enzymes
17. Enzyme isolation from various tissues and different methods for protein precipitation

18. Isoenzyme assays - Peroxidase, catalases, IDH and SOD

Programme: *M. Sc.*, Biotechnology
Course Title: *Genetic engineering and Medical and Pharmaceutical Biotechnology*
Type of Course: Practical
Course No.: 35081P
Semester: III

1. Total genomic DNA isolation from plants
2. Restriction enzyme analysis of genomic DNA
3. Preparation of competent cells - calcium chloride method
4. Bacterial Transformation
5. Plasmid isolation from *E.coli*
6. Restriction mapping of Plasmid
7. Colony PCR
8. Bacterial transformation
9. Fragment isolation and ligation
10. Selection of recombinants (Blue / white selection)
11. Total protein isolation, SDS PAGE / Native PAGE and Western Blotting
12. Sterilization By Autoclaving And Test For Sterility
13. Sterilization By Dry Heat And Test For Sterility
14. .Sterilization By Heating With Bactericide And Test For Sterility
15. Test For Presence Of Fungi In Tap Water
16. Immobilization Of Microbial Cells By Entrapment In Sodium Alginate
17. Bioinformatic software-Hex
18. Bioinformatic software -Rasmol
19. Drug Receptor intractions (Molecular docking)
20. DNA Finger printing for disease diagnosis

Programme: *M. Sc.*, Biotechnology
Course Title: *Food and Industrial Biotechnology and Bioprocess Technology*
Type of Course: Practical
Course No.: 35082P
Semester: III

1. Media preparation and sterilization (plant and microbe)
2. Isolation of industrially important microorganisms from different sources
3. Development of inoculums for industrial fermentation (Bacterial and mycelial)
4. Recovery and purification of fermentation products
5. Preparation of wine
6. Production of citric acid
7. Design of a fermentor
8. Types of bioreactors
9. Design of a typical aerobic fermenter
10. Preservation of industrially important microorganisms
11. Isolation of amylase producing microorganism from soil
12. Lethal effects of temperature on microorganisms (TDP)

13. Lethal effects of temperature on microorganisms (TDT)
14. Effects of pH on different microorganisms
15. Cell suspension culture for production of secondary metabolites

Programme: *M. Sc.*, Biotechnology
Course Title: *Plant Biotechnology and Animal Biotechnology*
Type of Course: Practical
Course No.: 45081P
Semester: IV

1. Instrumentation in Plant and Animal Biotechnology laboratory
2. Preparation of different types of culture media
3. Sterilization techniques
4. Inoculation techniques - embryo, shoot tip, axillary buds, leaves, nucellus, organ, anther
5. Development of callus and suspension cultures
6. Preparation of Artificial seeds
7. In-vivo and in-vitro seed germination techniques
8. Training for Acclimatization
9. Plant transformation
10. Screening of transgenics
11. Animal cell culture and characteristics
12. Staining and viability testing of Animal cells
13. Media preparation and membrane filtration
14. Preparation of single cell suspension from spleen and thymus

Programme: *M. Sc.*, Biotechnology
Course Title: *Functional Genomics and Bioethics and Biosafety*
Type of Course: Practical
Course No.: 45082P
Semester: IV

1. Restriction digestion - RFLP (Restriction Fragment Length Polymorphism) analysis
2. RNA isolation
3. cDNA synthesis
4. cloning of desired gene
5. construction of cDNA library
6. Analysis of manual sequencing Gel
7. PCR techniques - RAPD (Rapidly Amplified Polymorphic DNA)
8. SSR (Simple Sequence Repeats) analysis
9. Primer designing for desired gene
10. Concept of TILLING
11. Biosafety rules and Regulations for transgenics and GMO,s
12. Patenting- Examples of patents in Biotechnology

M. Sc., Degree Examination (Biotechnology) Model Paper

BT ----: Title of paper

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks **5 x 3= 15**

Each Answer should not exceed 1 page

Answer all questions at one place

1.
2.
3.
4.
6.
7.
8.

PART B **4 x 15 = 60**

9. } Unit -I or
10.

11. } Unit -II or
12.

13. } Unit -III or
14

15 } Unit -IV or
16

MODEL QUESTION PAPER

M.Sc. Degree Examinations, November 2008

First Semester

Biotechnology

Paper 15081: Cell Biology and Genetics

Time ; 3 Hours **Max. Marks:75**

(No additional sheet will be supplied)

PART A

Answer any five questions.
Each question carries three marks
Each Answer should not exceed **one** page

5 X 3= 15 Marks

1. Cell theory
2. Microtubules
3. Nucleolar organizing region
4. Linkage
5. Cytokinesis
6. Cell adhesion
7. Aneuploidy
8. Cell cycle

PART B 4x15=60

9. Write in detail principle of centrifugation? Give its applications in cell biology?

Or

10. What is the medium that separate the cell from the external environment? Explain its models and give its functions?
11. What are peroxisomes? Explain in detail their role in plant metabolism

Or

12. What is chromatin? What are different forms of chromatin? Give its molecular organization and functions?
13. Explain the laws of Mendelian inheritance? Explain non-mendelian inheritance and deviations of Mendelian laws?

Or

14. What are mutations? Explain mutagens and their molecular mechanism causing mutations? Give its applications in breeding?
15. Meiosis and its molecular events? Explain its significance?

Or

16. Define Oncogenesis and explain about the process and impediments leading to this phenomenon?

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 15082: Biomolecules

Time ; 3 Hours **Max. Marks:75**

(No additional sheet will be supplied)

PART A

Answer any five questions. Each question carries three marks **5x3= 15**
Each Answer should not exceed 1 page
Answer all questions at one place

1. Peptide Bonding
2. Nucleoside and Nucleotide
3. Plant Growth Regulators
4. Ribose Puckering
5. Secondary metabolites
6. DNA binding proteins
7. Modified Nucleotides
8. Cytochromes

PART B 4X15=60

9. Write about the methods involved in identification of DNA and RNA as a genetic material?

Or

10. Define DNA&RNA Explain about structural polymorphism of DNA and RNA
11. Explain the formation and classification of polysaccharides?

Or

12. Define chemical Bond, write about Non-covalent interactions.
13. Write about structures and classification of Amino acids. Add a note on their properties.
14. What are vitamins? Write about structures and functions.
15. What are pigments, describe few biological pigments and their significance?

Or

16. Define and explain in detail about alkaloids, terpenes and its biological importance

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 15083: Microbiology and Microbial Genetics

Time ; 3 Hours **Max. Marks:75**

(No additional sheet will be supplied)

PART A

Answer any five questions. Each question carries three marks **5x3= 15**
Each Answer should not exceed 1 page
Answer all questions at one place

1. Bacteriophages
2. Viriods
3. Nucleus strucrure
4. Fermentation
5. Rec proteins
6. Phototrophy
7. C-value
8. Recon and muton

PART B 4X15=60

9. Describe five kingdom classifications of microbes?

Or

10. How microbes are classified on the basis of their growth, Temp, pH, and O_2 requirement?
11. What is a synchronus culture? How is synchrony obtained in the culture

Or

12. How the microbes will be controlled, explain principle & mechanism of physical & chemical agents to control it?
13. Describe the cell growth and regulation. Explain the role of cyclins?

Or

14. What is complementation ? Discuss complementation test along with 3 examples.
15. Describe the role of usage of microorganisms in Biotechnology for useful purpose, write a note on limitations of usage of microorganisms?

Or

16. Explain briefly about different gene transfer mechanisms in bacteria and viruses and explain in detail about bacterial conjugation?

M.Sc. DEGREE EXAMINATIONS
FIRST SEMESTER
Biotechnology

Paper 15084: Biochemical and Biophysical Techniques
(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART- A
Answer ***any Five*** questions. **5x3=15 Marks**

Each question carries ***Three (3)*** marks .
Each answer should not exceed ***One (1)*** pages.

1. Beer – Lambert's law.
2. Reverse dialysis
3. Native PAGE
4. Lyophilization
5. Partition Coefficient
6. Sedimentation Coefficient
7. Safety Measures in handling radio isotopes
8. TLC or GM Counter

PART- B **4X15=60 Marks**
Answer ***ALL*** questions.
Each question carries ***Fifteen (15)*** marks .
Each answer should not exceed ***Six (6)*** pages.

9. a. Explain the Principle involved in Phase-contrast microscope?
   b. State the procedure for preparation of specimen for microscopy.

Or

10. a. Write short notes on Centrifugal force & Principle of sedimentation.
    b. Explain Rate zonal centrifugation, Equilibrium density gradient centrifugation.

11. Explain the terms of stationary phase, mobile phase and effective distribution coefficient.

Or

12. Write the principle of affinity chromatography and describe the procedure with a clear flow chart

13. How is NMR is different than X – Ray diffraction and describe the principle of NMR spectroscopy and describe its applications

Or

14. Write the principle of fluorescence spectroscopy and its applications
15. What is meant by concentration of macro molecules? Explain with any of the methods and write the applications of radioactivity in biological sciences.

Or

16. Write a specific nuclear reaction example for alpha, beta, and gamma decay

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper Paper 25081: Molecular Biology
(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks **5x3= 15**
Each Answer should not exceed 1 page
Answer all questions at one place

1. SOS repair
2. Promoters and enhancers
3. Lac Operon
4. RNA polymerase
5. tRNA structure
6. Transcription factors
7. Helicases
8. Repressor and Inducer

PART B 4X15=60

9. Describe the salient features to distinguish DNA replication in *E.coli* and eukaryotic DNA replication?

Or

10. Explain the different methods of DNA repair mechanisms.

11. Discuss the role of following in eukaryotic gene expression? A) Alternative splicing of mRNA b) Capping and polyadenylation of mRNA

Or

12. Explain the mechanism of transcription initiation, elongation and termination in eukaryotes

13. Explain mechanism by which newly synthesized proteins are transported to various organelles?

Or

14. Write in detail about different steps involved during translation process in prokaryotes

15. Explain how the gene expression is regulated in prokaryotes

Or

16. Explain hormonal regulation of genes in plants and animals?

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 25082: Computer Applications and Biostatistics

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks **5x3= 15**

Each Answer should not exceed 1 page

Answer all questions at one place

1. Primary Databases
2. BLAST and FASTA
3. Domains and Motifs
4. Clustal W and Clustal X
5. What is a scatter diagram? Give an example
6. Write about type-I and type – II errors
7. When do you use ANOVA? Give an example.
8. Write a note on Excel to handle statistical data.

PART B 4X15=60

9. In which databases would you find the following type of data? Where are these databases located?
   a) The DNA sequence corresponding to human hydrofolate productase gene
   b) The protein sequence of the gene listed in (a)
   c) The structure of this protein
   d) Metabolic pathway effected by this protein

Or

10. What is the difference between pairwise and Multiple alignment? How is the score and E value derived in BLAST ?

11. What are databases, mention different types and functions of these databases, implications of these databases in genomics and proteomics?

Or

12. Write a note on virtual library and bibliographic database giving some example?

13. What are various measures of central tendency? Write the method of working out the median of a data.

14. Calculate the Median of. Body length of an animal (in cms) from the following data.

Length	Less than 10	10-20	20-30	30-40	40-50	50 and above
No,. of animals	6	15	21	9	4	3

15. Explain in detail (i) Conditional probability and (ii) Random variable (iii) Geometric curve

Or

16. Describe Normal distribution and state its properties and applications in Biostatistics.

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 25083: Immunology

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks **5x3= 15**
Each Answer should not exceed 1 page
Answer all questions at one place

1. Interferons
2. Major histocompatibility complex
3. Rocket immune electrophoresis
4. Isohaemaglutinins
5. Antigenic determinants and haptens
6. T-lymphocytes
7. Blood groups
8. ELISA

PART B 4X15=60

9. Explain different cells and organs of immune system?

Or

10. Explain different modes of immunity?

11. What are monoclonal antibodies and give and account of the production and application of monoclonal antibodies ?

Or

12. Antigen presentation by MHC Class II molecules is important for the development of an antibody response. Explain Why?

13. Write about serological test in liquid and agar gel media?

14. Enzyme linked immune sorbent assay?

Or

15. What is hypersensitivity explain about type I, II, and III hypersensitivity?

Or

16. Write about auto immune diseases?

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 25084::Enzymology
(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks **5x3= 15**
Each Answer should not exceed 1 page
Answer all questions at one place

1.Fisher lock and Key Hypothesis / Koshland Induced Fit hypothesis
2. Lineweaver burk Plot
3. Competitive and Non competitive Inhibition
4. Immobilization of Enzymes
5. Spectrophotometry
6. What is enzyme specificity? Write about Fischer hypothesis.
7. Write about ligand protein interaction.
8. Explain about the significance of double-reciprocal plot.

PART B **4X15=60**

9. To what major classes do the following enzymes belong: alkaline phosphatase, trypsin,Thrombin, esterase, RNA polymerase, Eco RI, helicase, DNA Topo Isomerase. Explain in detail about RNA Polymerase?

Or

10. How is the activity of enzyme measured and expressed and what is the relation between 1 Unit of Enzyme activity and one katal?

11. Explain about different inborn errors in metabolism and give a brief account on sickle cell anaemia and phenylketonuria?

Or

12. Describe the methods used to study the enzyme activity?

13. State different techniques used in extraction and purification of enzymes and give a brief account on chromatography?

Or

14. Write a note on Hills coefficient and Scatchard plot?

15. What are isoenzymes? Explain the significance of Isoenzymes with the help of suitable example?

Or

16. Describe the biotechnological uses of enzymes

M. Sc Degree Examination (Biotechnology) Model Paper

Paper 35081:: Genetic Engineering

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any Five questions. Each question carries three marks **5x3= 15**

Each Answer should not exceed 1 page

Answer all questions at one place

1. YAC
2. Phytovaccines
3. Restriction FLP
4. Bacterial transformation
5. Polymerase chain reaction (PCR)
6. Ti Plasmid
7. cDNA synthesis
8. Bacteriophages as vectors

PART B 4X15=60

9. Discuss in detail about different molecular vectors used in cloning?

Or

10. Write about the different enzymes necessary for cloning and explain the mechanism of molecular cloning strategy
11. Explain the agrobacterial mediated gene transformation into plants

Or

12. Discuss the particle bombardment technique for the chloroplast transformation and explain the advantages over nuclear transformation

13. Write in detail about the construction of cDNA libraries

Or

14. Explain the different DNA sequencing methods

15. Discuss about the applications of genetic engineering in the field of agriculture, medicine and industry

Or

16. Explain the national and international guide lines and ethics for developing transgenics?

M. Sc., Degree Examination (Biotechnology) Dec, 2013.

Paper 35082: Medical and Pharmaceutical Biotechnology

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any Five questions. Each question carries three marks **5x3= 15**

Each Answer should not exceed 1 page

Answer all questions at one place

1) Receptors and ion channels
2) Antagonisms
3) Biopesticids
4) FDA
5) B-Cell growth factors
6) Placebo
7) Gene Replacement
8) Hepatitis B vaccine

PART B 4X15=60

9) Define drug explain the methods involved in drug designing

Or

10) Write the definition, history and development of pharmaceutical products.

11) Write about the conventional and rapid enzyme inhibitor techniques

Or

12) Define clinical trials explain steps involved in it

13) What are vaccines? Write about the r-DNA based vaccines

Or

14) write an account of biotech products that have medical and pharmaceutical importance

15) Explain gene therapy& its vectors based system in detail

Or

16) Write an account of various strategies used in gene delivery

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 35083: Food and Industrial Biotechnology

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks **5x3= 15**

Each Answer should not exceed 1 page

Answer all questions at one place

1. Brewing
2. Food preservation
3. Vermiculture
4. Bio fuel cell
5. Bioleaching
6. Blue green algae
7. Alginates
8. Microbial toxins

PART B 4x15=60

9. Describe different methods used for preservation of food?

Or

10. Write a note on large scale cultivation of edible mushrooms?

11. Explain in detail the pathway of nitrogen fixation in plants and mention the role of different enzymes in the pathway?

Or

12. What are biofertilizers? Describe the techniques of preservation of biofertilizers?

13. What are SCP? Explain the method of large scale production of SCP?

Or

14. Describe in detail the role of microbes in Bioremediation?

15. Explain the bioprocess for the production of antibiotics?

Or

16. Describe biodegradation of waste products with respect to microbes?

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 35084: Bioprocess Technology

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks **5x3= 15**

Each Answer should not exceed 1 page

Answer all questions at one place

1. Microbial mass
2. Antibiotics
3. Vitamins and Hormones
4. Whole cell Immobilisation
5. Air Lift Fermentor
6. Continuous culture
7. Affinity chromatography
8. Single cell protein

PART B 4x15=60

9. Explain the different stages involved in setting up a fermentation reaction with an appropriate example?

Or

10. Explain the different steps involved in purification and recovery of fermentation products?

11. Write a note on isolation, preservation and improvement of industrially important microorganisms?

Or

12. Explain what is batch and continuous culture ? State their advantages and disadvantages?

13. What is whole cell immobilization and write a note on its industrial application?

Or

14. Explain in detail about treatment and disposal of effluents?

15. Explain how monoclonal antibodies are produced using animal cell culture?

Or

16. Animal cells lack cell walls. Explain how this effects our ability to grow them in fermentors designed for the growth of microorganisms?

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 45081: Plant Biotechnology

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks 5x3= 15
Each Answer should not exceed 1 page
Answer all questions at one place

1. Totipotency
2. Haploid culture
3. Ti-plasmid
4. Plants as Bioreactors
5. Herbicide resistance
6. Biofertilizers
7. PCR
8. Male sterility

PART B **4X15=60**

9. Describe in detail about the architecture of plant genome?

Or?

10. Define somatic embryogenesis? Explain the different factors affecting the process of Somatic Embryogenesis?

11. Explain the different methods of plant transformation methods?

Or

12. What are viral antigens? Explain the production of viral antigens through plant genetic engineering

13. Discuss in detail about the regulation of nif genes involved in nitrogen fixation

Or

14. What are single cell proteins? Describe the production of single cell proteins?

15. What are molecular markers? Describe the different classes of molecular markers?

Or

16. What are physical and genetic map? Explain in detail how they are constructed?

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 45082: Animal Biotechnology
(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks 5x3= 15
Each Answer should not exceed 1 page
Answer all questions at one place

1. Hemocytometer
2. Artificial rearing
3. microinjection
4. Primary culture
5. Cytotoxicity
6. PDT
7. Batch reactor
8. Cell counters

PART B **4X15=60**

9. What are the basic constituents of animal cell culture media? Describe the importance of each constituent**?**

Or

10. Explain in detail about the equipment and materials required to set up animal cell culture lab?

11. Describe in detail about the detection of different bacterial, viral, fungal and mycoplasma contaminations in maintaining cell lines?

Or

12. What is Scale-up of animal cell culture? Discuss about the different factors to be considered in Scale-up of suspension and continuous cultures

13. What are stem cells? Describe the different types of stem cells and its application?

Or

14. Explain the different gene transfer techniques in animals and describe about microinjection methods?

15. Discuss in detail about the applications of animal cell culture?

Or

16. What is seri culture? Explain the role of biotechnology in silk production?

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 45083: Functional Genomics

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks **5x3= 15**
Each Answer should not exceed 1 page
Answer all questions at one place

1) Model Organisms
2) Polymorphism
3) antisense RNA
4) chemical method of sequencing
5) Real time PCR
6) RFLP
7) SSR
8) DNA chips

PART B 4x15=60

9) What is Genome project? Explain in brief about human genome project and its applications in human health?

Or

10) What are ESTs? Explain in brief, their generation and application in genomics?

11) What is a marker? Explain different kinds of markers and their applications in plant and animal biotechnology?

Or

12) What are physical and Genetic maps? Explain their advantages and disadvantages?

13) What are microarrays and how are they constructed? Give its applications?

Or

14) Explain in brief about the method of yeast two hybrid system? Give its practical applications in elucidation of gene function?

15) What is RNAi? Discuss in detail about the role of RNAi in gene silencing?

Or

16) Explain in detail about the TILLING and its applications

M. Sc., Degree Examination (Biotechnology) Model Paper

Paper 45084: Bioethics and Biosafety

(No additional sheet will be supplied)

Time : 3 Hours **Max. Marks : 75**

PART A

Answer any five questions. Each question carries three marks **5x3= 15**

Each Answer should not exceed 1 page

Answer all questions at one place

1. Surrogate mother
2. TRIPS
3. Intellectual property rights
4. GMO
5. Cartagena protocol
6. GATT
7. Trademarks
8. Aspect of biological weapon

PART B 4x15=60

9. Intellectual Property rights?

Or

10. Explain briefly The Cartagena Protocol and Biological Weapons ?

11. Write critical notes on patenting of life forms with examples?

Or

12. Indian Patent Act?

13. Write in detail on bio safety guidelines and regulations for release of GMO in India and Europe?

Or

14. WTO, Procedure of filing patents & Examples of patents in biotechnology?

15. Introduction of novel species and natural equilibrium?

Or

16. Write notes on role of Biotechnology in increased yield in agriculture?

BOS Approved Syllabus
for
5 year Integrated M.Sc.
Biotechnology & Bioinformatics Course

(Effective from the academic year 2018-19)

Dept. of Biotechnology & Bioinformatics

Yogi Vemana University

Vemanapuram, Kadapa - 516 003. Andhra Pradesh

5 Year Integrated M Sc Course Structure

Semester	Number of Papers	Marks in the Semester End Examinations for each Paper	Internal Tests for Each Paper	Total Marks for all the Papers
I	Theory:4 Physical Sciences I Practicals:3	75 70 100	25 30 -	100x4=400 100x1=100 100x3=300
II	Theory:4 Physical Sciences II Practicals:3	75 70 100	25 30 -	100x4=400 100x1=100 100x3=300
III	Theory:4 Physical Sciences III Practicals:3	75 70 100	25 30 --	100x4=400 100x1=100 100x3=300
IV	Theory:5 Practicals:3 Seminar	75 80 --	25 -- 60	100x5=500 80x3=240 60
V	Theory:5 Practicals:3 Seminar	75 80 --	25 -- 60	100x5=500 80x3=240 60
VI	Theory:5 Practicals:3 Seminar	75 80 --	25 -- 60	100x5=500 80x3=240 60
VII	Theory:5 Practicals:3 Seminar	75 80 --	25 -- 60	100x5=500 80x3=240 60
VIII	Theory:5 Non- core I Practicals:3 Seminar	75 75 80 --	25 25 -- 60	100x5=500 100x1=100 80x3=240 60
IX	Theory:5 Non-core II Practicals:1 Project Design Seminar	75 75 80 -- --	25 25 -- 80 40	100x5=500 100x1=100 80x1=80 80x1=80 40
X	Research Methodology Project (Individual) Viva Voce	100 150 50	-- 100 --	100x1=100 250 50
		Total		**7500** **200***

* These marks will not be considered for awarding the Grade Points but the candidate should pass since these are part of CBCS.

YOGI VEMANA UNIVERSITY
5 years Integrated M. Sc. Biotechnology & Bioinformatics

SYLLABUS
w.e.f. Academic Year 2018-19

Semester – I

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	16011	Second language (Telugu)	4	100	4
2	16012	Introduction to biology	4	100	4
3	16013	Mathematics-I	5	100	4
4	16014	Physical Sciences-I	4	100	4
5	16015	Cell biology	4	100	4
6	16011P	Biology Lab	3	100	4
7	16012P	Physics Lab-I	3	100	4
8	16013P	Chemistry Lab-I	3	100	4
Total			30	800	32

Semester – II

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	26011	English	4	100	4
2	26012	Computer Science-I	4	100	4
3	26013	Mathematics-II	5	100	4
4	26014	Physical Sciences-II	4	100	4
5	26015	Biodiversity and ecological principles	4	100	4
6	26011P	Computer science Lab-I	3	100	4
7	26012P	Physics Lab-II	3	100	4
8	26013P	Chemistry Lab-II	3	100	4
Total			30	800	32

Semester - III

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	36011	Communication Skills (English)-I	5	100	4
2	36012	Computer Science-II	4	100	4
3	36013	Mathematics and Statistics	6	100	4
4	36014	Physical Sciences-III	4	100	4
5	36015	Principles of Microbiology	4	100	4
6	36011P	Computer science Lab-II	3	100	4
7	36012P	Physics Lab-III	3	100	4
8	36013P	Chemistry Lab-III	3	100	4
Total			32	800	32

Semester - IV

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	46011	Communication Skills (English)-II	4	100	4
2	46012	Environmental Studies	4	100	4
3	46013	Principles of Management and Entrepreneurship	4	100	4
4	46014	Introduction to Bioinformatics	4	100	4
5	46015	Biomolecules	4	100	4
6	46011P	Communication skills lab	3	80	4
7	46012P	Microbiology & Introduction to Bioinformatics lab	3	80	4
8	46013P	Biomolecules lab	3	80	4
9	46011S	Seminar	3	60	4
Total			32	800	36

Semester - V

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	56011	Biochemical and biophysical tools	4	100	4
2	56012	Genetics	4	100	4
3	56013	Molecular biology	4	100	4
4	56014	Enzymology and Bioenergetics	4	100	4
5	56015	UNIX, HTML and BIOPERL	4	100	4
6	56011P	Biochemical and biophysical tools lab	3	80	4
7	56012P	Genetics and Molecular biology lab	3	80	4
8	56013P	Enzymology&UNIX,HTML&Bioperl lab	3	80	4
9	56011S	Seminar Presentation	3	60	4
Total			32	800	36

Semester – VI

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	66011	Immunology	4	100	4
2	66012	Genetic engineering	4	100	4
3	66013	Intermediary metabolism	4	100	4
4	66014	Data mining in bioinformatics	4	100	4
5	66015	Plant biotechnology	4	100	4
6	66011P	Immunology lab	3	80	4
7	66012P	Data mining in bioinformatics lab	3	80	4
8	66013P	Plant biotechnology lab	3	80	4
9	66011S	Seminar Presentation	3	60	4
Total			32	800	36

Semester – VII

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	76011	Genomics	4	100	4
2	76012	Microbial biotechnology	4	100	4
3	76013	Animal biotechnology	4	100	4
4	76014	Molecular modeling	4	100	4
5	76015	Elective 1: Plant system physiology/ Bacteriology and Virology	4	100	4
6	76011P	Genetic engineering & Genomics lab	3	80	4
7	76012P	Animal biotechnology lab	3	80	4
8	76013P	Molecular modeling lab	3	80	4
9	76011S	Seminar Presentation	3	60	4
Total			32	800	36

Semester – VIII

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	86011	Environmental Biotechnology	4	100	4
2	86012	Stem cell biology & Regenerative medicine	4	100	4
3	86013	Proteomics and Protein Engineering	4	100	4
4	86014	Drug design and targeting	4	100	4
5	86015	Elective 2: Animal System Physiology/ Agricultural biotechnology	4	100	4
6	86016	Non-core paper I Introduction to bioinformatics*	4	100	-
7	86011P	Microbial and Environmental biotechnology lab	3	80	4
8	86012P	Proteomics lab	3	80	4
9	86013P	Drug design lab	3	80	4
10	86011S	Seminar Presentation	6	60	4
Total			36	900	36

Semester – IX

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	96011	Cell signaling and Cancer Biology	4	100	4
2	96012	Bioethics, Biosafety, and IPR	4	100	4
3	96013	Elective 3: Nanobiotechnology/ Medical biotechnology	4	100	4
4	96014	Elective 4: Metabolomics/R Programme and system biology.	4	100	4
5	96015	Elective 5: Developmental biology/ Oxidative Stress, Antioxidant Defence in health & Disease.	4	100	4
6	96016	Non-core Paper II: Natural products in Industrial applications*	4	100	-
7	96011P	Cancer biology/R Programming lab	3	80	4
8	96011T	Project design	6	80	4
9	96011S	Seminar	3	80	4
Total			36	800	32

Semester – X

S. No.	Paper No.	Title of the Paper	Teaching Hours per week	Marks	Credits
1	06011	Research Methodology	4	100	4
2	06011T	Project/ Dissertation	28	300	8
Total			32	400	12

*Open to other PG departments as per CBCS system.

YOGI VEMANA UNIVERSITY
5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester I

Paper code 16011: Telugu (Second language)

5 సం॥ ఇంటిగ్రేటెడ్ పాఠ్యాంశ ప్రణాళిక

తెలుగు - మొదటి సెమిస్టర్

యూనిట్ - 1 : ప్రాచీన కవిత్వం

1.1. తిక్కన - ద్రౌపతీ పరిదేవనం - ఆంధ్రమహాభారతం ఉద్యోగ పర్వం తృతీయ ఆశ్వాసం (100-125)

1.2. ధూర్జటి - సాయుజ్యము - శ్రీకాళహస్తీశ్వర మాహాత్మ్యం ద్వితీయ ఆశ్వాసం (109-139)

యూనిట్ - 2

2.1. జాషువా - పిరదౌసి లేఖ (ఆ సుల్తాను నుండి అనుభవించేవరకు)

2.2. సావిత్రి - బందిపోట్లు

2.3. విద్వాన్ విశ్వం - పెన్నేటిపాట (1వ సర్గ)

యూనిట్ - 3 : గద్యభాగం

3.1. ముప్పాళ్ళ రంగనాయకమ్మ - అమ్మకు ఆదివారం లేదా

3.2. పాపినేని శివశంకర్ - చింతలతోపు

3.3. బండి నారాయణ స్వామి - సావు కూడు

యూనిట్ - 4 : ప్రత్యేక కవి

4.1. వేమన - సామాజిక, ఆర్థిక, కౌటింబిక అంశాలు

Prof. T. Rama Prasada Reddy
Head
Dept. of Telugu
Yogi Vemana University
KADAPA - 516 003, (A.P.)

YOGI VEMANA UNIVERSITY
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Semester I

Paper 16012: INTRODUCTION TO BIOLOGY

Unit I: Evolution and classification

Origin of life - Origin of basic biological molecules; concept of Oparin and Haldane; Miller experiment; evolution of prokaryotes; evolution of eukaryotic cells. Classification of living organisms; viruses, prokaryotes, Eukaryotes, fungi, plants, and animals.

Unit II: Cell and organism biology

Cell structures - Prokaryotic cell, Eukaryotic cell – plant, animal cell structures and differences. Animal tissues (epithelial tissue, connective tissue, muscle tissue). Plant tissues, plant structure and functions.

Unit III: Metabolism and reproduction

Energy and metabolism, modes of nutrition, autotrophs, heterotrophs, respiration, fermentation, photosynthesis. Reproduction – Asexual reproduction, sexual reproduction, breeding systems in plants and commercial applications, overview on development of an embryo to adult in humans.

Unit IV: Inheritance biology

Inheritance, DNA, the genetic material, Mendelian principles, law of dominance, law of segregation, independent assortment, mutations, cytoplasmic inheritance.

References:

1. Biological science – low price ed
2. Biology - Davidson
3. “Evolution” by D. J. Futuyma.
4. “Ecology-Principles and Applications” by Chapman and Reiss Cambridge
5. “Developmental biology” by Scott Gilbert
6. “Animal Physiology”, Hill R, Wise G A & Anderson M Sinauer.
7. “Plant Physiology” Taiz & Zeiger Sinauer.
8. “Molecular biology of the Cell” by Albert et.al
9. Verma PS, Agarwal V.K. Cell Biology, Genetics, Evolution and Ecology. S.chand & Co.

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Semester I

16013: MATHEMATICS-I

Unit-I: Partial Fractions

Introduction – General rules to resolve a given fraction into partial fractions - Non-repeated linear factors – Repeated linear factors – Quadratic factors.
Sections 1.1 to 1.6 of chapter **I** of Elementary Engineering Mathematics by Dr.B.S.Grewal.

Unit-II: Matrices

Introduction – Definition- Special matrices- Matrix operations – Related matrices – Matrix method of solution of simultaneous equations.
Sections 5.1 to 5.5 of chapter V of Elimentary Engineering Mathematics by Dr.B.S.Grewal.

Unit-III: Trigonometry

Trigonometric Ratios of Acute & Compound Angles

Sections 7.1 to 7.4 of Chapter **VII** of Business Mathematics by P.R.VITTAL Margham Publications.

Unit- IV: DIFFERENTATION:

Definition: General rules of differentiation – Derivatives of standard functions – Derivatives of parametric forms and implicit functions- Logarithmic differentiation.

Sections 12.1 to 12.4 of chapter **12** of Elementary Engineering Mathematics by Dr.B.S.Grewal.

Reference Books:

Units I & II "Intermediate Mathematics" –Volume II by S.Chand Publications.
Units III & IV "Intermediate Mathematics" by S.Chand Publications.

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Semester I

16014: Physical Sciences-I

Part A: Physics of Mechanics

Unit-I: **Vector analysis** **7 hours**

Scalar and Vector fields – Gradient of a scalar field and physical significance. Divergence and Curl of a vector field. Integration of vectors - Line, Surface and Volume integrals. Stock's, Guas's and Green's theorems.

Unit-II: Mechanics of Particles and a Rigid body **18 hours**

Laws of motion - Motion of variable mass system - motion of a rocket – Collisions in two and three dimensions – Concepts of impact parameter and scattering cross-section - Rutherford's scattering. Definition of a rigid body – Rotational motion – rotational kinematics relations – equation of motion of a rigid rotating body –angular momentum and inertia tensor- Euler's equation.

Reference Books:

1. Fundamentals of Physics by David Haliday, Robert Resnick and
2. Mechanics by Hans and Puri, Tata McGraw Hill Pub.
3. Introduction to Physics for Scientists and Engineers by F.J. Ruche(Mc Graw Hill).
4. Mechanics by Upadhyaya.
5. A text book of Engineering Mechanics by R.K. Rajput (Dhanpat Rai and sons).
6. B.Sc. Physics Vol.-1 by C. Murali Mohan Sastry, K. Shankar Rao, P. Babu Rao.
7. B.Sc. Physics Vol.-1 – Unified Physics.

Part B: Inorganic chemistry

Unit – I: Inorganic metals in biological system **11 hours**

Introduction, essential and trace elements, biological significance of sodium, potassium and chlorine, iron, zinc, cobalt, toxic metals and their toxicity of As, Hg, and Pb; metallophorphyrins with emphasis on hemoglobin – structure and fusion, chlorophyll – structure and fusion, functions of nitrogenase.

Unit – II: Coordination compounds **13 hours**

Introduction, nomenclature of inorganic molecules and complex compounds, Werner's theory – postulates, experimental evidences. Sidwick's theory – calculation of EAN, limitations. Metal – ligand bonding in transition metal complexes – valence bond theory – postulates, geometrics of coordination number 4 – tetrahedral and square planner, and coordination number 6 – octahedral complexes, and crystal field stabilization energy. (Elementary treatment – diagrams only).

Reference books:

1. Concise Inorganic Chemistry by J.D. Lee
2. Basic Inorganic Chemistry by Cotton & Wilkinson
3. Inorganic Chemistry by J.E. Huheey
4. Selected Topics in Inorganic Chemistry by Wahid U.Malik
5. Vogel's Text book of Qualitative inorganic Analysis
6. Unified course in Chemistry by O.P. Agarwal, Vol. I, II, and III

YOGI VEMANA UNIVERSITY
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Semester I

Paper 16015: Cell Biology

UNIT I:
Cell Theory and the Cell: Discovery of cell and the cell theory, exceptions to the cell theory. Cell structure – bacteria, plant and animal cell. Structural differences between prokaryote and eukaryotic cells and plant and animal cells.

UNIT II:
Membrane structure and function – Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, ion pumps, mechanism of sorting and regulation of intracellular transport, electrical properties of membranes.

UNIT III:
Structural organization and function of intracellular organelles: Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast, structure & function of cytoskeleton.

UNIT IV:
Organization of chromosomes: Structure of chromatin and chromosomes, organization of chromosomes in eukaryotes and prokaryotes, unique and repetitive DNA, heterochromatin, euchromatin, transposons. **Cell division and Cell cycle:** Mitosis and meiosis, their regulation, steps in cell cycle, and control of cell cycle.

References:
1. De Robertis and De Robertis. Cell and Molecular Biology, P.K.Gupta. Cell and Molecular Biology. Narosa Publisher.
2. Verma PS, Agarwal V.K. Cell Biology, Genetics, Evolution and Ecology. S.chand & Co.
3. Bruce Alberts. Essential cell biology an introduction to Molecular Biology of the Cell. Garland
4. Cooper – Introduction to the Cell.

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5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics

Semester I

16011P: Biology lab

i. pH determination
ii. Buffer preparation
iii. Colorimetric estimations of biomolecules (proteins, sugars)
iv. Cell biology experiments (Slides of various organisms, and types of cells)
v. Simple staining for bacteria.

16012P: Physics lab - I

i. Determine the acceleration due to gravity using compound pendulum.
ii. Determine the frequency of given tuning fork using Volume resonator.
iii. Determine the surface tension of a liquid using capillary rise method.
iv. Verify the laws of transverse vibrations of a given stretched string.
v. Study the oscillations of mass under series and parallel combinations of two different strings.
vi. Determine the viscosity of water.

16013P: Chemistry lab – I

Inorganic chemistry

i. Acid Base Titrations

Determination weight of carbonate in given Sodium Carbonate solution – by using acid base titration method.

ii. EDTA Titrations

Determination of weight of Zinc in given ZnSO4 solution by using standard EDTA solution.
Determination of weight of copper in given CuSO4 solution by using standard EDTA solution.

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Semester II

Paper code 26011: ENGLISH

SECTION	SELECTIONS	AUTHOR
Poetry- 20 Marks	1.Pied Beauty 2. Still I Rise	G.M. Hopkins Maya Angelou
Prose- 10 Marks	3.True and Rare Genius (Vemana) 4. The Power of Prayer	V. Narla Abdul Kalam
One Act Play	5.Thirst	M.V.Madasu

Grammar	40 Marks
1. Parts of Speech 2. Tenses	20 Marks
3. Concord (5 Sentences out of ten) 4. Transformation of Sentences 5. Synonyms and Antonyms	20 Marks

Books:

1. Selections from English Prose (Common Core Syllabus), Oxford Press
2. Poetry for Pleasure (Common Core for Under Graduate)
3. True and Rare Genius – Nala's writings Vol-11.
4. Finesse, Selections from Poetry and Prose. ISBN: 9878-93-5138-119-8.
5. Non detail (Common Core for Under Graduate)
6. Murphy's English Grammar, Cambridge University Press
7. Oxford English Grammar by John Eastwood, Oxford University Press.

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Paper 26012: COMPUTER SCIENCES - I

Unit-1
Creating new document; opening existing document; file, edit, insert format, tools, table, and window menu commands.
Working with excel; spread sheet features; file, edit, insert format and tools, using different types of charts
MS power point: auto content wizard; master slides; fines with other presentations

Unit-II
Introduction to C-programming language: History of C-program, structure of C-program, identifiers' and keywords, data types, constants, variables, arrays and pointers
Operators and Expressions: Arithmetic operators, unary operators, relational and logical operators, assignment operators, conditional operators and library functions

Unit-III
Control statement: Branching: if-else statement; Looping: while-loop, do-while and
For-loop statement; Jumping: break, continue, goto; switch statement and comma statement, I/O statements
Function: defining a function, accessing a function, function prototype, passing arguments to a function, recursion

Unit-IV
Program Structure: storage classes, automatic variables, global (external) variables, static variables
Programing in C: Arrays, pointers, structures and unions; file handling

TEXT BOOKS:
1. Let us C, Kanethkar
2. ANSI-C Balaguruswamy
3. MS office 2007

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Paper 26013: MATHEMATICS-II

Unit – I: Integration:

Definition: Standard results – Integration by substitution – Integration by Parts. **Sections 16.1 to 16.3** and **16.8** of Chapter **16** Elementary Engineering Mathematics by Dr.B.S.Grewal.

Unit – II: The Plane

Definition – Equation to the plane into the normal form – Angles between two planes – Perpendicular distance of a Point from a Plane – Distance between Parallel Planes – Planes Bisecting the Angles Between two Planes.

Chapter – 3 of " A Textbook of B.Sc., Mathematics – Volume –II" by S.Chand Publications.

Unit- III: The Right Line

Definition – Angle between a line and a Plane- Conditions for a line to lie in a plane-Coplanarity of lines – Shortest Distance Between two skew lines – Length of the Perpendicular from a point to a line.

Chapter-4 of " A Textbook of B.Sc., Mathematics – Volume –II" by S.Chand Publications.

Unit-IV: Differential Equation of First order and First degree

Introduction- Separation of variables – Homogeneous equations- Equations reducible to homogeneous form. **Sections 2.1 to 2.6** of Chapter **-2** of Ordinary and Partial Differential Equations by M.D.Raisinghania.

Reference Books:

Unit-I: "Intermediate Mathematics" by S.Chand Publications.
Unit –II, III,IV : Higher Engineering Mathematics by Dr.B.S.Grewal.

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PAPER 26014: PHYSICAL SCIENCES-II

Part A: Physics of Thermodynamics and Optics

Unit-I: **Thermodynamics (15 hours)**
The zeroth law and first law of thermodynamics – Internal energy – work done in isothermal and adiabatic processes – reversible and irreversible processes – Carnot's theorem – Carnot's engine – efficiency – Clausius – Clapeyron equation. Second law of theoremdynamics – entropy – concept – entropy and disorder measurement of entropy changes in reversible and irreversible processes – entropy of universe. Joule – Kelvin effect – expression for Joule - Kelvin coefficient – Liquefaction of gases – Principle of Refrigeration.

Unit-II: **Interference Diffraction & Polarization (13 hours)**
Interference of light – the principle of superposition – Young's double slit theory and experiment - Diffraction – Fraunhofer diffraction – Fraunhofer diffraction at a single slit and double slit. Diffraction grating – Grating spectrum – Fresnel half period zones – zone plate.
Polarization – Nicol prism – theory of circular and elliptical polarized light – Quarter and Half wave plates – Polarimeter experiment.

Reference Books:
1. B.Sc. Phyics Vol.-II by Sastry and Babu Rao (S. Chand and Co.)
2. Optics by Brijlal and Subrahmanyam (S. Chand and Co.)
3. Heat and Thermodynamics by Brijlal and Subrahmanyam (S. Chand and Co.)
4. B.Sc. Physics Unified Physics- II by Gupta and Gupta (Jai Prakashnath & Co.)

Part – B: Physical Chemistry

UNIT–I: Chemical kinetics
Rate of a reaction, factors of influencing the rate of a reaction-concentration, temperature, pressure, solvent, catalyst and light. Concentration dependence of rates, mathematical characteristics of simple chemical reaction-zero order, first order second order, pseudo first order, Half-life. Determination of order of a reaction-deferential method, method of integration, half-life method and isolation method. Methods of determining order of a reaction.

Unit–II: Phase Equilibria
Homogeneous and heterogeneous system, statement and meaning of the terms-Phase, Component and degrees of freedom, Gibb's Phase rule, phase equlibria of one component system-water system. Phase equlibria of two-component system-solid-liquid equlibria, simple eutectic. Pb-Ag system, desilverization of lead. Solid solutions-definition of compound with congruent melting point system and incongruent melting point system. NaC1-H2O system.

Reference books on Physical Chemistry
1. Thermodynamics for Chemists by S. Glasstone
2. Chemical Thermodynamics by R.P. Rastogi & S.S. Misra
3. Advanced Physical Chemistry by Gurdeep Raj
4. Principles of Physical chemistry by Puri, Sharma and Pathania

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Semester II

Paper 26015: Biodiversity and Ecological principles

Unit I:
Biodiversity: Introduction, definition, levels of biodiversity, magnitude and distribution of biodiversity, methods for biodiversity monitoring, megadiversity zones and hot spots.

Unit II:
Natural history of Indian subcontinent: Biodiversity at global, National and local levels. Major habitat types of the subcontinent, geographic origins and migrations of species; common Indian mammals, birds; seasonality and phenology of the subcontinent.
Organisms of health and agricultural importance: Common parasites and pathogens of humans, domestic animals and crops.

Unit III:
Biodiversity conservation: Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. IUCN threat categories, Red data book. Strategies for biodiversity conservation: Principles of biodiversity conservation, in-situ and ex-situ conservation strategies. Biodiversity act.

Unit IV:
Ecology: Environment, concept of habitat and niche, ecological succession, concept of climax. Ecosystem – structure and function, energy flow, structure and functions of some Indian ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, estuarine). Biogeography.

References:

1. Raven P.H.et al. (2006) Biology 7th edition Tata Mc Graw Hill Publishers, New Delhi.
2. Mauseth, James.D (2003) Botany: An introduction to plant biology. 3rd edition Jones and Bartlett Publishers.

26011P: Computer lab – I

MS-OFFICE LAB EXERCISE:

EXERCISE 1: To create a resume using MS Word

EXERCISE 2: Procedures to create a mail merge letter

EXERCISE 3: procedures to create a worksheet with 4 columns enter 10 records and find the sum of all columns

EXERCISE 4: procedures to create a student result sheet

EXERCISE 5: procedures to create a simple bar chart to high light the sales of a company for 3 different periods

PROGRAMMING USING C LAB PRACTICAL:

1. WAP to reverse a number?
2. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100?
3. WAP to print a triangle of stars as follows (take number of lines from user):

```
    *
   ***
  *****
 *******
*********
```

4. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not?
5. WAP to display Fibonacci series?
6. WAP to calculate Factorial of a number?
7. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file?
8. Write a program to retrieve the student information from file created in previous question and print it in following format: Roll No. Name Marks?
9. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order?
10. Write a program that swaps two numbers using pointers?

26012P: Physics lab – II

1. To form a wedge shaped air film between two glass plates with a given wire and determine the thickness of the given wire.
2. To determine the Radius of curvature of the given palno-convex lens by forming Newton's Rings?
3. To determine the dispersive power of the material of a given quartz prism using a spectrometer?
4. To determine the wavelengths of a given white light using a plane transition grating placed in normal incidence position.
5. To draw the graph between the angle of incidence(i) and angle of deviation (d) produced by minimum deviation and refractive index of the prism?
6. To determine the refractive index (M) of a given liquid and glass using boy's method

26012: Chemistry Lab - II **Physical chemistry**

1. Chemical kinetics: Determination of specific rate of the hydrolysis of methyl/ethyl acetate catalyzed by hydrogen ion at room temperature.
2. Electrochemistry: Determination of HCl strength conductometrically using standard NaOH
3. Critical solution temperature (CST): Determination of CST of phenol-water system.
4. Determination of adsorption isotherm of acetic acid on activated charcoal.

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III Semester

PAPER 36011: COMMUNICATION SKILLS (English) - II

1. Communication
1. Objectives of Communication
2. Types of Communication
3. Verbal and Non-verbal Communication
4. Characteristics of Successful Communication
5 Principles and Barriers of Communication

2. Listening
1. The Listening Process 2. Types of Listening
3. Principles of Good Listening 4. Listening with a purpose
5. Barriers to Listening

3. Speaking
1. The Syllable 2. Word Stress
3. Accent and Rhythm in Connected Speech 4. Intonation
5. American and British Accents

4. Writing
1. Principles of Effective writing 2. Formal and Informal Letter Writing
3. E-mail 4. Resume & Job application

Books Suggested:

1. Essentials of Business Communication by Rajendra Rao
2. A Course in Listening and Speaking II
3. Business Correspondence and Report Writing R.C. Sharma Krishna Mohan
4. The Oxford Guide to Writing and Speaking by John Seely, (Oxford)
5. Developing Communication Skills by Krishna Mohan & Meera Benerji, Macmillan.
6. Effective Technical Communication – M. Ashraf Rizvi (Tata Mc Grew Hill)
7. Communication – C.S. Rayudu, Himalaya Publishing House
8. Business Communication – D.D. Chaturvedi, Mukesh Chaturvedi (Pearson Edu.)
9. Communication Skills – Dr. Nageshwara Rao, Dr. Rajendra P. Das (Himalaya Publication House)

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III Semester

36012 COMPUTER SCIENCES- II

Unit-1

Introduction to DBMS: Introducing the database and DBMS, Database system Applications, Problems with File System and advantages of Database Management systems, View of Data, Database Language, Database Architecture: Data base users and Administrators, Data Dictionary.

Data Models: Entity-Relationship Model-Developing ER-Diagrams, Constraints, Keys, **Advanced Data Modeling**: The Extended Entity Relationship Mode

Unit-2

Relational Algebra: Basic Operations, Union (U), Difference (-), Intersection, Cartesian product (x); Additional Relational Algebraic Operations, Projection, Selection, JOIN, Division **Relational Calculus:** Tuple Relational Calculus, Semantics of TRC Queries, Examples of TRC Queries; Domain Relational Calculus; Relational ALGEBRA vs Relational CALCULUS

Unit-3

Normalization: Functional Dependency; Anomalies in a Database; Properties of Normalized Relations; First Normalization; Second Normal Form Relation; Third Normal Form; Boyce-Codd Normal Form (BNCF); Fourth and Fifth Normal Form

SQL: Basic Structure and Queries (DDL, DML, DRL, DCL and TCL Statements), clauses

Advanced SQL: Relational Set Operators, SQL Join Operators, SQL views, SQL Functions

Unit-4

Java Basics: History of Java, Java buzzwords, Simple Java program, How to set Java path, how to compile and execute java program, how to read data from keyboard and how to display data on the monitor

TEXT BOOKS:

1. DATABASE SYSTEM CONCEPTS SIXTH EDITION Abraham Silberschatz Yale University Henry F. Korth Lehigh University S. Sudarshan Indian Institute of Technology, Bombay
2. Database Management Systems - 3rd Edition Raghu Ramakrishnan Johannes Gehrke
3. Peter Rob, Carlos Coronel, Database Systems Design, Implementation and Management, Seventh Edition, Thomson (2007) 2. Elimasri / Navathe, Fundamentals of Database Systems, Fifth Edition, Pearson Addison Wesley (2007).
4. Elimasri / Navathe, Fundamentals of Database Systems, Fifth Edition, Pearson Addison Wesley (2007)

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III Semester

36013: MATHEMATICS & STATISTICS

Unit-I: Vector Calculus:

Definitions and Properties of the Dot or Scalar products and Cross or Vector products - Gradient – Divergence – Curl.
Chapter 4 of "Vector Analysis" by Schaum's Outline Series.

STATISTICS
Unit-II:

Definition – Scope – Limitations- Primary and Secondary data -collection and Sources of data – Classification and Tabulation – PieChart – Histogram- Frequency Polygon- Frequency Curve- Ogive.
Scope and standard as in **"Fundamentals of Statistics – by SC Gupta, Himalaya Publications"**
Sections 1.1 to 1.4 of chapter 1,
Sections 2.1.3, 2.1.4 of 2.1; 2.2,2.3,2.5 of chapter 2
Sections 3.1 to 3.5 of chapter 3
Sections 4.1 to 4.4 of chapter 4

Unit-III: Measures of Central Tendencies and Dispersion.

Mean –Median – Mode- Range- Quartile Deviation – Mean Deviation – Standard derivation – Coefficient of variation. Scope and standard as in **"Fundamentals of Statistics – by SC Gupta, Himalaya Publications".** Sections 5.3,5.4,5.6,5.7,of Chapter 5 and Sections6.1, 6.4,6.5,6.6,6.8.6.9 of Chapter 6

Unit-IV: Correlation and Regression.

Curve fitting-Fitting of a straight line-Fitting of a parabola-fitting of Exponential Curve-Types of Correlation-Regression Line of Y on X – Regression Line of X on Y.
Scope and standard as in **"Fundamentals of Statistics – by SC Gupta, Himalaya Publications"**
Sections 11.5.3 of Chapter 11.
Sections 8.1 to8.4 of Chapter 8.
Sections 9.1 to9.3 of Chapter 9.

Reference Books:

"Fundamentals of Statistics – by SC Gupta, Himalaya Publications
S.P.Gupta : Statiscal Methods by S.Chand.
S.C.Gupta : and V.K.Kapur – Fundamentals of Mathematical Statistics by S.Chand.
Probability and Statistics by SCHAUM'S OUT LINE SERIES.

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III Semester

36014: PHYSICAL SCIENCES-III

Part A: Physics of Semiconductor devices and Lasers

Unit-I: Semiconductor devices (15 hours)

Intrinsic and extrinsic semiconductors –p-n junction diodes – energy band diagram - Zener diode – applications of Zener diode – tunnel diode – transistors - Bipolar junction transistor-p-n-p transistors - CB,CE,CC configurations - transistor hybrid parameters - determination of hybrid parameters from transistor characteristics.

Unit-II: Lasers (10 hours)

Introduction – Characteristics of Laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Ruby Laser – Helium- Neon Laser – Applications of Lasers In Industry, Scientific and Medical Fields.

Reference Books

1. B.Sc. Physics: Unified Physics Vol.III
2. Engineering Physics by M. R. Srinivasan, New Age Publications

Part B - Organic Chemistry

Unit–I: Structural theory in Organic Chemistry (12 hours)

Bond polarization: Factors influencing the polarization of covalent bonds, electro negativity – electromeric effect, inductive effect, mesomeric effect or resonance and hyperconjugation, and their applications. Concept of aromaticity-definition, Huckel's rule-application to Benzenoid and Non-benzenoid compounds. Reactions-General mechanism of electrophilic substitution, mechanism of nitration and sulfonation. Mechanism of halogination, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution-definition of *ortho, para* and *meta* directing groups

UNIT–II: Stereochemistry of carbon compounds (12 hours)

Molecular representations: Wedge, Fischer, Newman and Saw-horse formulae, stereoisomers: enantiomers and diastereomers, conformational and configurational isomerism. Enantiomers: Optical activity: wave nature of light, plane polarized light, interaction with molecules, optical rotation and specific rotation. Chiral centers: definition-molecules with similar chiral carbons-definition of mesomers. Molecules with dissimilar chiral carbons. Number of enantiomers and mesomers-alculation. D, L & R, S configuration for symmetric and dissymmetric molecules. Cahn-Ingold-Prelog rules. Racemic mixture, racemization and resolution techniques.

Reference Books

Organic Chemistry

1) Advanced Organic chemistry- Reactions, Mechanism and Structure, Jerry March, Wiley.
2) Organic Chemistry, R.T. Morrison & R.N. Boyd, Prentice-Hall.
3) Text book of Organic Chemistry, T.W. Solomon.
4) Stereo Chemistry, P.S. Kalsi
5) Reaction mechanisms by P.S. Kalsi
6) A guide book to Mechanisms in Organic Chemistry by Mukherji & S.P. Singh

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Semester III

Paper 36015: Principles of Microbiology

Unit I:
Historical introduction - Discovering the Microbial world and developments in Microbiology, origin and evaluation of microbes, Scope of Microbiology and Importance of microorganisms to human welfare. Principles of physical, chemical, and mechanical sterilization methods, antimicrobial compounds.

Unit II:
Classification – Basics of microorganisms classification (Hackle and Whittakar Kingdom concepts, Bergey's manual, Alexopoulos classifiction), General and distinctive characteristics of the major groups of Microorganisms – Bacteria, mycoplasma, actinomycetes, fungi and protozoa. Ultra-structure of bacteria. Cell wall structure and staining techniques, Microscopy – light and electron microscopy

Unit III:
Isolation and characterization of common microorganisms – bacteria, cyanobacteria, fungi. Direct and indirect methods of maintenance and of cultures. Preservation of microbial cultures (glycerol stocks, oil overlay, drying and freeze- drying). **Viruses:** Nature, properties and classification of Viruses. Viruses of Plants, animals and microorganisms. Morphology, size, ultra-structure and life cycles of some representative viruses - TMV, T4, Lambda, HIV and SV40, Prions, Viroids.

Unit IV:
Nutritional requirements – mode of nutrition – Phototrophy, chemotrophy, symbiotic and parasite microorganisms. Saprophytes; symbiotic and parasitic modes of nutrition. Types of media – basal, defined complex, enrichment, selective, differential, maintenance and transport media. Cell growth and kinetics of bacterial growth, Normal and biphasic growth curve, batch and continuous cultures,

References:

1. Microbiology: concepts and Applications. Michael J. Pelczar, Jr., E.C.S., Chan, Noel R. Krieg, 1993. Mc. Graw Hill, Inc.
2. Fundamentals of Microbiology. 4th ed. 1994. I.E. Alcamo. Scientific Publication.
3. Microbiology, 1990. 4th Ed.B.D. Davis, R. Dulbeco, H.N. Eisen and H.S. Ginsberg and J.B. Lippincott Company.
4. Fundamental Principles of Bacteriology. 1994. A.J. Sake. Tata McGraw Hill.
5. Microbiological Applications: A Laboratory Manual in General Microbiology. 5th ed. 1990. H.J. Benson. Panama Publications. PP 459.
6. Microbiology Prescott et al., Wm. C. Brown Publications

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Semester III

36011P: Computer lab – II

Sql lab Programs:

1. Selecting all records from a table and displaying all columns
2. Get First_Name,Last_Name from employee table
3. Get First_Name from employee table in upper case
4. Get First_Name from employee table in lower case
5. Get unique DEPARTMENT from employee table
6. Get length of FIRST_NAME from employee table
7. Get all employee details from the employee table order by First_Name Ascending
8. Get all employee details from the employee table order by First_Name descending
9. Get all employee details from the employee table order by First_Name Ascending and Salary descending
10. Get employee details from employee table whose employee name is “John”
11. Get employee details from employee table whose employee name are “John” and “Roy”
12. Get employee details from employee table whose employee name are not “John” and “Roy”
13. Get employee details from employee table whose first name starts with 'J'
14. Get employee details from employee table whose first name contains 'o'
15. Get employee details from employee table whose first name ends with 'n'
16. Get employee details from employee table whose first name starts with 'J' and name contains 4 letters
17. Get employee details from employee table whose Salary greater than 600000
18. Get employee details from employee table whose Salary between 500000 and 800000
19. Get employee details from employee table whose joining year is “2013”
20. Get Last Name from employee table after replacing special character with white space
21. To Perform set operators
22. To perform aggregate functions
23. Create , update and drop operation on views
24. To perform simple join queries

Java programming lab:

1. Write a java program that swaps two numbers from keyboard
2. Write a java program to find the given number is palindrome or not
3. Write a java program to perform quadratic equation
4. Write a java program to perform the factorial value
5. Write a java program to print the below pattern
   a) ******
      ******
      ******

   b) ******
       *****
        ***
         **
          *

36012P: Physics lab – III

1. To draw the I-V characteristics of a given p-n junction diode.
2. To draw the I-V characteristics of a given zener diode.
3. To draw the I-V characteristics of a transistor and determine the h-parameters of transistor.

36013P: Chemistry lab – III

Organic chemistry:
1. Qualitative analysis: identification of an organic compound through the functional group analysis and preparation of suitable derivatives
2. Preparations
a) Preparation of *p*-bromo acetanilide
b) Preparation of *p*-nitro acetanilide

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Semester IV

Paper code 46011: COMMUNICATION SKILLS – ll

75 MARKS

I. Listening **20M**
1. Listening Comprehension 2. Effective Listening Strategies
3. Listening to structured Talks 4. Intensive Listening
5. Team Listening (Listening & Note Taking)

II. Speaking **20M**
1. Oral Communication 2. Presentation Skills
3. Use of Visual Aids 4. Group Discussions 5. Facing Interviews

III. Reading **15M**
1. Types of Reading 2. Understanding the gist of an argument
3. Identifying the topic sentence

IV. Writing **20M**
1. Paragraph Writing 2. Report writing
3. Minutes Drafting 4. Information Transfer 5. Interpreting data editing a passage

Books suggested:
1. Essentials of Business Communication by Rajendra Rao
2. A Course in Listening and Speaking II
3. The Oxford Guide to Writing and Speaking by John Seely, Oxford
4. Developing Communication Skills by Krishna Mohan and Meera Benerji (Macmilan)
5. Speaking English Effectively by Krishna Mohan and N.P. Singh (Macmilan)
6. Effective Technical Communication – M. Ashraf Rizvi (Tata Mc Grew Hill)
7. Communication – C.S. Rayudu, Himalaya Publishing House
8. Business Communication – D.D. Chaturvedi, Mukesh Chaturvedi (Pearson Edu.)
9. Communication Skills – Dr. Nageshwara Rao, Dr. Rajendra P. Das (Himalaya Publication House)

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Semester IV

Paper 46012: ENVIRONMENTAL STUDIES

Unit – I
Environment: introduction; Bio-geo chemical cycles and their significance in nature. Ecosystem: Definition, Components, Structure, types of food chain, food web and energy flow, rain water harvesting, climate change.

Unit –II
Natural resources, and sustainable development energy resources, renewable energy resources, bio fuels, solar energy, forest type of India, soil erosion, water management.

Unit –III
Biodiversity conservation: biodiversity, definition, value of biodiversity, hot spots of biodiversity, threats to biodiversity, India a mega diversity nation, types of conservation, ex-situ conservation and in-situ conservation

UNIT-IV
Pollution and control measures air pollution greenhouse effect global warming ozone depletion water pollution industrial effluents agricultural and municipal wastes. Soil pollution heavy metals pesticides prevention and control measures.

References

1. Prithipal Sigh (2006) Perspectives in Plant Ecology and environmental biology. Scientific Publishers Jodhpur
2. SAHU T.R and sahu P.K (2006) biodiversity and sustainable utilization of biological resources. Scientific Publishers Jodhpur
3. Aravind Kumar(2003)environmental challenges of the 21 century . APH Publishing Carporation New Delhi.
4. Subramanian V (2002)A text book of environmental science. Narosa Publishing House , New Delhi
5. Sharma PD. (2006) Ecology and environment Rastogi Publications, Meerut.
6. Biswarrop Mukharjee (1997) Environmental biology. Tata Mc Graw hill publishing Company Limited.
7. Kumar H.D. (1994) Environmental ecology, Vikas Publishing House Pvt. Ltd. New Delhi
8. A.B. Choudary and sarkar D.D (2006) Biodiversity Endangerd. Scientefic Publishers Jodhpur.
9. A text book of environmental studies (2014). Asthana and Meera Asthana.

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Semester IV

Paper 46013: PRINCIPLES OF MANAGEMENT AND ENTREPRENEURSHIP

UNIT – I:
Introduction to Management: Definition - Concept – Significance - Management Vs Administration – Leader Vs Manager - Principles of Management - Functions of Management; Planning – Definition of Planning – Steps in Planning – Types of Plans.

UNIT – II:
Organizing and Communication: Nature of Organizing – Organisation Levels – Organisation Design and Structure – Delegation; Communication - Process of Communication – Barriers to Effective Communication - Measures to Effective Communication.

UNIT – III:
Motivation, Leadership and Controlling: Motivational Theories – Maslows Need Hierarchy Theory – Two Factor Theory; Leadership Styles; Controlling - Concept - Process – Control Techniques.

UNIT – IV:
Entrepreneurship Development: Concept – Characteristics - Functions of Entrepreneur – Types of Entrepreneur - Factors Affecting Entrepreneurial Growth - Women Entrepreneurship - Problems in Entrepreneurship Development - Role of Entrepreneurship in Economic Development – Entrepreneurship Development Programmes (EDPs) - Various Entrepreneurship Development institutions in India.

Reference Books:

1. Subba Rao P., Management & Organisational Behaviour, Himalaya Publications, New Delhi.
2. Agrwa, Research and Development Organisation and Management, Tata McGraw hill.
3. Koontz and Weichrich; Essential of management, Text and cases, Tata Mcgraw.
4. S.S. Khanka, Entrepreneurship Development, S. Chand Publications, New Delhi
5. Vasanth Desai, Dynamics of Entrepreneurship Development and Management, Himalaya Publications, New Delhi.

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Semester IV

Paper 46014: INTRODUCTION TO BIOINFORMATICS

Unit I:
Basics of Internet: Internet, Applications, World Wide Web. Elementary commands and protocols used in Bioinformatics.

Unit II:
Introduction to Bioinformatics: Definition, history and development of Bioinformatics, Aim and Scope of bioinformatics, Branches of bioinformatics, Applications of Bioinformatics.

Unit III:
Biological data bases: Definition, types of data bases, Sequence data bases, Primary data bases - nucleic acid, proteins, Secondary data bases, Specialized data bases, Structural databases, Data retrieval.

Unit IV:
Sequence Alignment: Definition, local and global alignments, pair-wise, multiple sequence alignment. Phylogenetic analysis - definition, software used in phylogeny.

References:

1. Essential bioinformatics by C.S.V. Murthy
2. Basic concepts are bioinformatics by P. Goutham
3. Introduction to Bioinformatics by T.K. Attwood and D.J. Parry Smith.

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Semester IV

Paper 46015: BIOMOLECULES

Unit I:
Chemical foundation of biology – pH, pK, acids, bases, chemical bonding, properties of water. **Carbohydrates** – Classification, structure and properties of carbohydrates, mono (glucose, galactose, fructose) di (lactose, maltose, sucrose), polysaccharides (starch, glycogen, cellulose). Mucopolysaccharides. **Lipids** –Classification. Structure and biological functions of fatty acids, triacylglycerols, phospholipids, steroids. Physico-chemical properties and analysis of fats and oils. Structure and functions of prostaglandins, leukotrienes, thromboxanes.

Unit II
Amino acids – Classification, structures and physicochemical properties. Peptides – Peptide bonds, naturally occurring peptides. **Proteins** – Classification, properties, functions, Isolation and purification of protein, criteria of homogeneity. Primary structure of proteins and its sequence determination.

Unit III
Secondary (alpha, beta, random coils, Ramachandran plot), tertiary and quaternary structural features of proteins, Forces responsible for protein stability. Structural organization of globular (myoglobin, hemoglobin), fibrous proteins (collagen, keratins, silk fibroin). Denaturation and renaturation of proteins, chaotropic agents. Structure and functions of glycoproteins and lipoproteins. Classification and functions of vitamins.
Unit IV
Nucleic Acids – Structure of purines, pyrimidine, nucleosides, and nucleotides. Structure, properties and functions of nucleic acids (DNA, RNA). Different forms of DNA and RNA. Denaturation and renaturation of nucleic acids, cot curves. The law of DNA constancy and C value paradox.

References:
1. Principles of Biochemistry. A.L. Lehninger, Nelson and Cox. (C.B.S., India).
3. Principles of Biochemistry General Aspects. 1983 by Smith *et al*., (McGraw Hill).
4. Biochemistry (2nd edition) by Donald Voet and Judith Voet.
5. Biochemistry (4th edition) by L. Stryer (Free man).
6. Textbook of Biochemistry with Clinical Correlation by Thomas M. Devlin.
7. Biochemistry by Zubay.
8. Nucleic acid Biochemistry and Molecular Biology by Main Waring *et al*., (Blackwell).

YOGI VEMANA UNIVERSITY
5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester IV

46011P: Communication skills laboratory

Problems as per theory

46012P: Microbiology & Introduction to Bioinformatics laboratory

1. Rules and regulations of Microbiology Laboratory
2. Sterilization
3. Preparations of Media
4. Simple staining
5. Gram staining
6. Motility test for Microorganisms from soil by Hanging –Drop method
7. Preparations of slant and stab cultures
8. Isolation and maintenance of microorganisms
9. Enumeration of microorganisms from soil
10. Enumeration of microorganisms from water
11. Enumeration of microorganisms from air
12. Slides:
13. NCBI
14. Data bases – GenBank, DDBJ, EMBL
15. Data retrieval
16. BLAST
17. FASTA
18. CLUSTAL W
19. PHYLIP

46013P: Biomolecules laboratory

1. General reactions of amino acids and sugars to identify the unknown solutions
2. Preparation of buffers
3. Isolation and estimation of glycogen from liver
4. Isolation and estimation of Cholesterol from brain
5. Preparation of lecithin
6. Estimation of proteins by Biuret, modified Lowry, UV methods and Bradford method.
7. Estimation of amino acids by ninhydrin method.
8. Estimation of glucose by glucose oxidase/Nelson-Somagyi method
9. Titration curve of an amino acid and calculation of pK and pI values.

YOGI VEMANA UNIVERSITY
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Semester V

Paper 56011: BIOCHEMICAL AND BIOPHYSICAL TOOLS

Unit – I: Measurement of pH, biochemical buffers, oxygen electrode and biosensors. Cell disruption methods: French press, sonication, freeze-thaw techniques, enzymatic method, use of liquid nitrogen in cell disruption. Centrifugation. Basic principles of sedimentation, types of centrifuges and rotors. Preparative ultracentrifugation - differential centrifugation, density-gradient. Analytical ultracentrifugation and applications.

Unit – II: Separation methods - General principles and definitions. Methods based on polarity. Partition chromatography (Paper chromatography), adsorption chromatography (thin-layer chromatography), gas-liquid chromatography, reverse phase liquid chromatography. Methods based on size - Principle of Gel filtration, methodology and applications. Methods based on affinity - Principle of Affinity chromatography, methodology and applications. High-performance liquid chromatography - Principle, instrumentation, practical procedure and applications. HPTLC, Ion-exchange chromatography - Principle, ion exchangers, methodology, applications. Amino acid analyzer.

Unit – III: Electrophoresis. General principles and definitions. PAGE. Native-PAGE, SDS-PAGE, Isoelectricfocussing, 2D electrophoresis, capillary electrophoresis. Agarose gel electrophoresis - Preparation, separation and determination of molecular size of DNA, Pulse-field gel electrophoresis - Principle, methodology and applications.

Unit – IV: Biophysical methods: Principles, laws of light absorption, Instrumentation and applications of UV-Vis spectrophotometer, fluorescence spectroscopy, ESR, NMR, Mass spectroscopy, Radioisotope Techniques - Types of isotopes, radioactive decay. Detection and measurement of radioactivity - GM counter, scintillation counter, autoradiography. Incorporation of radioisotopes in biological tissues and cells, CD and ORD. Principles and applications of X-Ray diffraction.

References:

1. Biochemical methods - Pingoud
2. Biochemical research technique. Ed. John M. Wriggles worth
3. Analytical biochemistry by David J. Holmes and Hazel peck
4. Biophysical chemistry Upadyay and Nath
5. Practical experimental Biochemistry – Rodney Boyer.
6. Practical biochemistry: Principles & Techniques. Wilson & Walker,

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Semester V

Paper 56012: GENETICS

Unit I:
Mendelian principles: Dominance, segregation, independent assortment, deviation from Mendelian inheritance. **Concept of gene:** Allele, multiple alleles, pseudoallele, complementation tests. **Extensions of Mendelian principles:** Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters. Non-Mendelian inheritance.

Unit II:
Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants. **Extra chromosomal inheritance:** Inheritance of mitochondrial and chloroplast genes, maternal inheritance.

Unit III:
Microbial genetics: Methods of genetic transfers – transformation, conjugation, transduction and sexduction, mapping genes by interrupted mating, rII locus (Benzers expt), fine structure analysis of genes. **Human genetics:** Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders. **Quantitative genetics:** Polygenic inheritance, heritability and its measurements, QTL mapping.

Unit IV:
Population Genetics - Gene pool and gene frequencies: Hardy-Weinvberg principle. **Mutation:** Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis. **Structural and numerical alterations of chromosomes:** Deletion, duplication, inversion, translocation, ploidy and their genetic implications. **Recombination:** Homologous and non-homologous recombination, including transposition, site-specific recombination.

Reference books:

1. Genetics ; From Genes to Genomes by Hartwell I.H. etal (2000) McGraw Hill
2. Human Molecular Genetics by Sudbery P (1998). Addison – Wesley Longman Harbor.
3. Gene VIII & IX by Benjamin Lewin, Odford University press, Oxford.
4. Genetics and Analysis of Quantitative traits by Lynch. M and B. Walsh (1997). Senauer Associates, Sunderland.
5. Evolutionary Genetics by Maynard Smith J (1989), Oxford University press.
6. Genes in Population by Spiess. E (1989) 2nd Edition. Wiley-Liss, New York

YOGI VEMANA UNIVERSITY
5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester V

Paper 56013: MOLECULAR BIOLOGY

Unit I:
DNA replication, repair and recombination: Evidence of DNA as genetic material, Evidence of semi conservative mode of replication, Unit of replication, enzymes involved, Replication origin and replication fork, fidelity of the replication, Replication mechanism in E.coli, extrachromosomal replicons, Replication apparatus and mechanism of DNA replication in eukaryotes, DNA damage and repair mechanisms. Recombination – Homologous, site-specific and transposition.

Unit II:
Transcription: RNA synthesis and processing: RNA synthesis in prokaryotes - Transcription factors and machinery, formation of Initiation complex, transcription activators and repressors, RNA polymerases, capping, elongation and termination, RNA synthesis in eukaryotic cell – RNA polymerases, RNA synthesis, RNA processing, RNA editing, splicing, polyadenylation, structure and function of different types of RNA, RNA transport.

Unit III:
Translation: Protein synthesis and processing: Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, translational proof reading, Mechanism of protein biosynthesis in E.coli, translational inhibitors, post- translational modification of proteins.

Unit IV:
Gene regulation: Principles of gene regulation, Operon concept, structure, function and expression of lac, trp, ara in E.coli and gal operon in yeast. Induction of transcriptional activity by environmental and biological factors in regulation of eukaryotic gene expression (hsp), light (Rubisco), signal molecules. Molecular control of transcription - DNA sequence and protein involved in the control of transcription in eukaryotes. Role of chromatin in regulating gene expression and gene silencing.

References:
1 Molecular Biology of the Gene (4th Edn) JD Watson, NH Hopkins, JW Roberts,
2 Molecular Cell Biology (2nd Edn) J. Darnell, H.Lodish and D. Baltimore, Scientific American Books, Inc. USA 1994
3. Genetics – Conceptual approach, Benjimin Pierce
5. Molecular Biology, TA Brown (Ed) Bios Scientific Publishers Ltd.,Oxford, 1991

YOGI VEMANA UNIVERSITY
5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester VI

Paper 56014: ENZYMOLOGY AND BIOENERGETICS

Unit I: Enzyme Definition, general properties, IUB nomenclature and classification of enzymes. Nature of enzymes, active site, coenzymes, cofactors, assay of enzyme, units of enzyme activity. Kinetics of enzyme catalyzed reaction - Michaelis-Menten equation Determination of Vmax, Km, Kcat, and their significance. Factors affecting on enzyme activity. Mechanism of enzyme catalysis.

Unit II: Enzyme inhibition – Reversible and irreversible. Competitive, non-competitive and feed-back enzyme inhibition, enzyme poisoning. Enzyme regulation – Allosteric modification, covalent modification, zymogens activation. Isoenzymes (LDH), Multienzyme complexes, Multifunctional enzymes, Modern concepts of evolution of catalysis – ribozymes, Abzymes

Unit III: Bioenergetics: Concept of free energy, thermodynamic principles in biology. Free energy changes in biological transformations in living systems. High energy compounds, Biological Oxidation-Reduction Reactions, Components and organization of mitochondrial electron transport system (experimental approach). Classes of electron-transferring enzymes, inhibitors of electron transport. Oxidative phosphorylation and ATP synthesis. Uncouplers, Regulation of Oxidative Phosphorylation,

Unit IV:
Photosynthesis: Light harvesting complexes; mechanisms of electron transport; Mechanism of photosynthesis. Plant mitochondrial electron transport and ATP synthesis, alternate oxidase.
Secondary metabolites of bacteria, fungi and plants – Types, structures, properties and functions.

References:

1. Lehninger's Biochemistry2008 Nelson and Cox CBS India.
2. Harpers Illustrated Biochemistry 28th Edition. Longman
3. T B Biochemistry Clinical relations – Thomas Devlin 2005
4. Outlines of Biochemistry By Cohn and Stumf
5. Biochemistry by Zubay.
6. Principles of Biochemistry General Aspects. 1983 by Smith *et al*., (McGraw Hill).
7. Biochemistry (2nd edition) by Donald Voet and Judith Voet.
8. Biochemistry (4th edition) by L. Stryer (Free man).

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Semester V

Paper 56015: UNIX, HTML and BIOPERL

UNIT – I:
Introduction to UNIX
Listing files and directories, Making Directories, Changing to a different Directory ,More about home directories and path names, Copying Files Moving Files, Removing Files and directories, Displaying, Searching the contents of a file on the screen Redirecting the input, Output, File system security (access rights).

UNIT – II:
Basics of HTML
The web browsers in use, the use of hypertext, design a web page using web documents, Hypertext Markup language, the HTML Elements, format of HTML text, Rules for the HTML language.

UNIT – III:
Introduction to PERL
Starting a PERL Script and data types, scalars, arrays, and hashes @ ARGV, operators, variables, control structures, file handlings and debugging.

UNIT – IV:
Bio PERL
BIOPERL installation and applications, BIOPERL modules – databases, sequence retrieval and alignment, Phylogentic tree construction, restriction enzyme analysis, maturation studies.

Reference Books:
1. UNIX: Concepts and applications by sunitha dass.
2. HTML: Web enablead commercial applicatons Development using HTML,DHMFL,PERL CGI by Bagross ivan
3. Harsha Vardhan Bal PERL programming for Bioinformatics, TATA MACGRAWHILL, 2003.
4. James Lee. Beginning PERL, 2004.
5. Micheal Murrows, Paul Berring. Bioinforamtics Biocomputing of PERL. Wiley, 2004.

YOGI VEMANA UNIVERSITY
5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester V

Practical 56011P: Biochemical and Biophysical tools

1. Preparation of buffers and measurement of pH
2. Separation and identification of amino acids by paper chromatography.
3. Separation and identification of sugars by TLC.
4. Separation and identification of lipids by TLC.
5. Separation of amino acids by Ion-exchange chromatography.
6. Separation of proteins by Gel filtration
7. Absorption spectra of amino acids, Proteins and nucleic acids
8. Verification of Beer's law.
9. Dialysis.
10. HPLC demonstration
11. Isolation of mitochondria by subcellular fractionation.
12. SDS PAGE
13. Agarose gel electrophoresis

Practical 56012P: Genetics and Molecular biology

1. Genetics problems from theory
2. Estimation of gene frequencies and testing equilibria at loci with two alleles – multiple and sex linked genes
3. Testing Hardy-Weinberg equilibrium for two linked loci
4. Calculation of inbreeding coefficient from pedigree data
5. Effects of mutation and selection on gene frequency
6. Problems on genetic drift and effective population size.
7. Genetics problems
8. Isolation of genomic DNA from bacteria, plant and sheep liver
9. Determination of purity of the isolated DNA by UV spectrophometry
10. Quantification of DNA
    . Spectroscopic method (UV absorption method)
    . Colorimetric method (Diplhenylamine reagent)
11. Thermal denaturation of DNA and demonstration of hyperchromic effect.
12. Determination of melting temperature (Tm) and estimation of GC content.
13. Isolation of RNA and estimation of RNA.
14. Isolation of plasmids from *E.coli* and separation of CCC, Open circular and linear forms of plasmids
15. Agarose gel electrophoresis – Separation and molecular size determination of DNA
16. Isolation and separation of proteins by SDS- PAGE

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Semester V

Practical 56013P: Enzymology and Unix, HTML and BIOPERL lab

1. Assay of trypsin
2. Assay of alpha-amylase from saliva
3. Assay of LDH from serum
4. Assay of acid and alkaline phosphatase
5. A preparation of urease crystals from horsegram seeds and assay
6. Purification of an enzyme and effect of time pH, temperature, substrate concentration, enzyme concentration, inhibition on enzyme activity.
7. Molecular weight determination of enzyme by SDS - PAGE
8. Mitochondrial respiration by oxygraph (O_2 electrode)
9. Warburg Manometer
10. Operation of Unix commands
11. Solving biological problems using Bioperl
12. HTML usage in web design

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5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester VI

Paper 66011: IMMUNOLOGY

UNIT – I

History and scope of immunology, structure, composition and function of cells and organs involved in immune system. Types of immunity, innate immunity, acquired immunity; immunohematology, blood groups, blood transfusion and Rh – incompatibility, phagocytes, inflammation. **Antigens – Antibodies:** Antigens – structure and properties – types (Iso and allo) haptens, adjuvants, antigenic specificity. Membrane receptors for antigens; Immunoglobulins, structure – heterogeneity – types and sub types properties (physico chemical and biological); theories of antibody – production, polyclonal, monoclonal and recombinant antibodies and their applications.

UNIT – II

Antigen and Antibody interactions: Affinity and avidity, Immunodiffusion, Immuno-electrophoresis, Immuno-florescence. RIA, ELISA, western blot. Complement system; complement components, complement activation, regulation of complement system, biological consequences and pathways of complement activation, and complement deficiencies.

UNIT – III

Structure and functions of MHC and HLA system; gene regulation and r – genes; HLA and tissue transplantation – tissue typing, methods for organ and tissue transplantations in humans; graft versus host reaction and rejection. Auto immunity, autoimmune diseases and their treatment, tumor immunology–tumor specific antigens, immune response to tumor, Immunotherapy of tumors, genetic control of immune response.

UNIT – IV

Hypersensitivity reactions: Classification, Antibody–mediated–type I. Anaphylaxis; type II Antibody dependent cell cytotoxicity; Type III Immune complex mediated reactions; type IV cell mediated hypersensitivity reactions (the respective diseases, immunological methods of their diagnosis, lymphokines and cytokinins, their Assay methods. **Immunization:** Active and passive immunization**;** objectives of immunization, types of vaccines: whole organism vaccines, recombinant vector vaccines, DNA vaccines, synthetic peptide vaccines, subunit vaccines, immunization procedures, adverse reactions to vaccines.

BOOKS RECOMMENDED

1. Essentials of Immunology - Ian Roitt - Blackwell Scinentific Publications.
2. Fundamentals of immunology - William C. Boyed (Wiley Toppan).
3. Introduction to Immunology - John W. Kinball.
4. Fundamentals of Immunology - Otto S. View and others.
5. Immunology - D.M. Wier.

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Semester VI

Paper 66012: GENETIC ENGINEERING

Unit I:
Introduction and outlines of gene cloning**,** isolation and purification of RNA & DNA. Different enzymes used in rDNA technology, Restriction and modification enzymes – Classification, nomenclature and importance, Restriction mapping. RFLP, Polymerase chain reaction – Principle, variations of PCRs (RT PCR, QPCR, inverse PCR, nested PCR) and their applications. RAPD, AFLP, DNA fingerprinting. DNA sequencing – Maxum-Gilbert, Sanger and automated.

Unit II:
Host cells and Vectors - Characteristics of a vector. Vectors used for cloning in *E.coli* (plasmid vectors – pBR, pUC, Bluescript vectors, bacteriophages, cosmids, phasemids), Super vectors - BACs, YACs, shuttle vectors, higher plants (Ti plasmid, caulimovirus) and animal cells (constructs of SV 40 and retroviruses). Baculovirus vectors. Expression vectors.

Unit III:
Cloning strategies: Preparation of genomic and cDNA libraries. Generation of DNA molecules, Cloning from mRNA, Cloning from genomic DNA, Joining of DNA fragments to vector molecules - cohesive termini ligation and blunt end ligation - linkers, adaptors and homopolymer tails, delivery of recombinant molecules into host cells – transformation, transfection; Agrobacterium mediated transformation, electroporation, particle bombardment method. Screening and identification of positives clones-antibiotic, nucleic acid and protein based approaches.

Unit IV:
Expression of cloned genes, IPTG, x-gal, lac, trp, tac promoters. Factors influencing the expression of recombinant proteins. Expression of fusion protein tags, purification tags (His tags, GST tags), IPTG inducible expression systems, inclusion bodies, solubilization of proteins. Production of recombinant insulin, growth hormone. Genetically engineered organisms.

References:
1. An Introduction to genetic engineering - Nicoll
3. Molecular Cloning: A Laboratory manual, J. Sambrook, E.Ffrisch and T.Maniatis, Old Spring Harbor Laboratory Press New York, 2000
4. Introduction to Practical Molecular Biology, P.D. Dabre, John Wiley & Sons Ltd,
5. Genetic engineering - TA Brown (Ed)
6. From Genes to Genome – Dale
7. Principles of gene manipulation – Primrose et al.

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Semester VI

Paper 66013: INTERMEDIARY METABOLISM

Unit-I

Introduction to intermediary metabolism, Glycolysis and its regulation. Fermentation. HMP shunt pathway and its significance. Glucuronic acid pathway and ascorbic acid pathway. TCA cycle - reactions of the TCA cycle and regulation. Anaploretic reaction. Shuttle systems, glyoxylate cycle. Gluconeogenesis and regulation. Glycogen metabolism and regulation. Disorders of carbohydrate metabolism- glycogen, Lactose, Galactose and fructose.

Unit -II

Lipid digestion, absorption and transport. Oxidation of fatty acids - oxidation of unsaturated, odd-chain fatty acids, peroxisomal oxidation. Regulation of fatty acid oxidation. Degradation of triacyl glycerol and phospholipids. Ketone bodies - Formation and utilization. Fatty acid synthase complex, biosynthesis and regulation of fatty acid synthesis. Biosynthesis of TAG and its regulation. Sphingolipid storage diseases. Biosynthesis of cholesterol and its regulation, Biosynthesis of prostaglandins.

Unit - III

General metabolic reactions of amino acids. Urea cycle and its regulation. Metabolic breakdown of individual amino acids. Ketogenic and glucogenic amino acids; Biosynthesis and regulation of aspartate family amino acids, branched chain amino acids, Metabolic defects of amino acid metabolism. Amino acids as biosynthetic precursors - formation of creatine, serotonin, melatonin, histamine, anserine, carnosine. GABA, melanin, catecholamine.

Unit IV

Biosynthesis and degradation of porphyrin (Heme). Biosynthesis, degradation and regulation of purine and pyrimidine nucleotides, Salvage pathway. Disorders of purine and pyrimidine metabolism.

References:

1. Principles of Biochemistry. A.L.Lehninger(CBS Publishers).
2. Biochemistry. Lubert Stryer (5th Edition).
3. Principles of Biochemistry. General aspects . Smith et al., (8th edition).
4. Harper.s Review of Biochemistry. Martin et al., (Lange).
5. Text Book of Biocehmistry with clinical correlation. Thomas M.Devlin (John Wiley).
6. Text Book of Biochemistry. West et al., 1966 (MacMillian).
7. Biochemistry 2nd ed. C.K.Mathews and K.E.Van Holde (1995).
8. Biochemistry 2nd ed Donald Voet and J.G.Voet (1994)(John Wiley).

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5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester VI

Paper 66014: DATA MINING IN BIOINFORMATICS

UNIT– I: The central dogma in molecular biology-the killer application, Parallel universes, top-down verses bottom-up, information flow from data to knowledge. Data management in bioinformatics – strategies & their limitations.

UNIT – II: Data lifecycle-creation, acquisition, modification, archiving. Biological data integration- specifications, technical approaches, development process, nature of biological data, data sources in life science, approaches to integrate data bases & scientific algorithms, ontology.

UNIT–III: Data Mining Techniques - knowledge discovery process. Data mining methods, technology overview, infrastructure, pattern recognition, machine learning technologies, Text mining - Text summarization, tools. Bioinformatics problems related to data-mining.

UNIT – IV: Intermolecular interactions & biological pathways: Introduction, pathway and molecular interaction databases - primarily molecular interaction databases (e,g BIND, DIP). Primarily metabolic pathway databases – KEGG, ECOCYC. Prediction algorithms for pathways and interactions – methods to predict protein-protein interactions.

Reference Books:

1. Bioinformatics-A Practical guide to the analysis of genes & proteins by Andres D. Baxevnes B.F. Francis Ouellette
2. Advanced Data Mining Technologies in Bioinformatics – Hui- Huang Hsu.
3. Bioinformatics Managing scientific data by Zoe Lacroix, Terence Critchlow.
4. Bioinformatics computing by Bryan Bergeron,M.D.

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Semester VI

Paper 66015: PLANT BIOTECHNOLOGY

Unit I: Introduction to cell and tissue culture. Tissue culture media. Initiation and maintenance of callus and suspension culture. Organogenesis, somatic embryogenesis. Shoot-tip culture: Micro tip culture; rapid clonal propagation and production of virus-free plants. Embryo culture and embryo rescue. Anther, pollen, ovary, ovule, nucellus culture, Endosperm culture for production of haploid plants and homozygous lines. Protoplast isolation, culture and fusion, selection of hybrid cells and regeneration of hybrid plants, symmetric and asymmetric hybrids, cybrids. Cryopreservation.

Unit II : Plant Transformation Technology, Vector mediated or Indirect gene transfer - Agrobacterium-mechanism of T-DNA transfer and its integration into plant genome, basis of tumor formation ,role of virulence gene, use of Ti and Ri plasmids as vectors, Direct Gene transfer-microinjection, electroporation, particle gun, Chloroplast transformation and applications Gene silencing. Nitrogen fixation and biofertilizers - nitrogen fixation genes, transfer of *nif* genes to microorganisms.

Unit III: Application of Plant Transformation for Productivity and Performance-Herbicide Resistance, Male sterility, Virus resistance, Pest Resistance, Fungal resistance. Genetic Engineering of plant for extended shelf life of fruits, manipulation of starch biosynthesis. Terminator technology, plantibodies.

Unit IV: Introduction to molecular markers, different types-PCR based and Non PCR based, role of molecular marker in plant breeding, types of maps-physical and genetic map, applications of molecular markers in plant biotechnology. phytodiagnostics based on immunological and molecular techniques, biopesticides, transgenic plants as biofactories-biodegradable plastics, therapeutic proteins

References:

1. Molecular approaches to crop improvement. 1991. Dennnis and Liwelly eds. PP. 164.
2. Plant cell and Tissue culture. A Laboratory Manual. 1994. Reinert. J. and Yeoman,
3. Plant biotechnology, 1994. Prakash and Pierik. Oxford & IBH Publishing Co.
4. Gene transfer to plants. 1995. Potrykus-I and Spangenberg, G. Des. Springer Scan.
5. Methods in Plant Molecular Biology and biotechnology, 1993.
6. Genetic engineering with plant viruses. 1992. T. Michale. A. Wilson and J.W. Davies.
8. Microalgal Biotechnology. 1988. Borocotizka M.A. and Borocoitzka L.J. Cambridge University Press.

YOGI VEMANA UNIVERSITY
5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester VI

Practical 66011P: Immunology

1. Staining of blood smear and identification of different lukocytes.
2. Determination of A,B, O and Rh blood groups in humans
3. Identification of primary and secondary lymphoid organs.
4. Recognition of T-cell by rosette formation.
5. Injection of antigen into experimental animals by different routes.
6. Preparation of antigen
7. Electrophoretic study of normal and immune serum - immunodiffusion
8. Isolation and separation of immunoglobulins by gel electrophoresis.
9. Labeling of purified immunoglobulins with enzymes/dyes.
10. Western blotting
11. Different serological tests
    a. Agglutination - Brucella system
    b. Precipitation test - Ring interface and agar gel double diffusion tests.
    c. Immunoelectrophoresis - Counter current and Rocket.
    d. Hemagglutination and Hemagglulination inhibition tests.
    e. Labeled antibody tests - ELISA, Dot ELISA, FAT and Western blotting.
    f. Viral infectivity neutralization test.
12. Cell - mediated immunity tests
    a. Leukocyte migration inhibition test
    b. Opsonic index.

Practical 66012P: Data mining in bioinformatics

1. Primary molecular interaction databases
2. Protein- protein interactions analysis.
3. Protein secondary and tertiary structure prediction.
4. Metabolic pathway databases.
5. Sequence and structure analysis.
6. Molecular interaction databases.

Practical 66013P: Plant Biotechnology

1. Preparation of tissue culture media
2. Surface sterilization
3. Organ culture
4. Callus propagation, organogenesis, transfer of plants to soil.
5. Protoplast isolation and culture
6. Anther culture, production of haploids.
7. Cytological examination of regenerated plants
8. *Agrobacterium* culture, selection of transformants, reporter gene (GUS) assays.
9. Developing RFLP and RAPD maps

YOGI VEMANA UNIVERSITY
5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester VII

Paper 76011: GENOMICS

Unit I:
Introduction to genomics, types of genomics and its databases, genome, genome sizes, organization and structure of genomes of viruses, prokaryotes and eukaryotes, organization of organelle genomes. Genome projects – Aims of project, model organisms, Human genome project and its applications. Computational genomics – concepts.

Unit II:
Structural Genomics - Concept, genome mapping, genome sequencing, sequence assembly, genome annotation, whole genome sequencing by shotgun approach and sequencing; Analysis of sequence data – ORF, exon/intron boundaries, promoters, expression signals, etc. Gene ontology, phylogenetics. Centers of Genomics -JCSG, BSGC, MCSG, NYSG, TBSG. Comparative genomics – introduction, comparative genomics of prokaryotes, eukaryotes and organelles.

Unit III:
Functional genomics – concepts and applications. Analysis of gene function - gene knockouts, complementation, gene function through protein interactions. Forward genetics, reverse genetics – knock-ins, knock-outs, RNAi technology Mutagenesis as functional genomics tool – T- DNA, T- DNA Insertional mutagenesis, transposan (*Ac*/*Ds* and *En*/*Spm*), Genome wide mutation screening - TILLING (Targeted Induced Local Lesion IN Genome) - principle and mechanism. DeALING (Detecting Adducts Local Lesions IN Genome) – principle and experimental approach to identify deletions.

Unit IV:
Functional genomics and epigenomics – Activation tagging. GAL4 mediated over expression. Gene expression analysis - traditional sequence based approaches, microarray based approaches. SAGE, SADE and microbead – based expression profiling, Epigenomics – mechanism and applications. *In silico* genomics, metagenomics.

References:

1. Principles of Gene Manipulation and Genomics. 3rd Edition By S B Primerose and R. M. Twyman.
2. A Primer of genome science. 2nd Edition by G Gibson, and S V Muse
3. Essential bioinformatics by Jin Xiong, Cambridge University press.
4. From Genes to Genome by Dale and Schanz.
5. Functional genomics by Hunt and Livesey.
6. Genomics by Arther Lesk.

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5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester VII

Paper 76012: MICROBIAL BIOTECHNOLOGY

Unit I:
Introduction to Fermentation process
Fermentation – Definition. The component parts of a fermentation process, chronological development of fermentation industry. Fermentors/Bioreactors – types and features. Isolation, preservation and strain improvement of industrially important microorganisms. Media design and sterilization for industrial fermentation. Principles of microbial growth and culture system, scale up, and downstream processing.

Unit II:
Immobilized Enzymes
Introduction, definition, applications. Commercial production of enzymes. Methods of immobilization of cells and enzymes. Stabilization of enzymes and cells. Production of amylases, glucose isomerase and proteases. Biosensor – definition, types and applications.

Unit III:
Production of products.
A brief outline of process for the production of some commercially important organic acids – citric acid, lactic acid, acetic acid, aminoacids - Glutamic acid , Lysine, aspartic acid; antibiotics – pencillins, aminoglycosides, tetracyclines; Vitamins – Vit $B_{12,}$ Beverages- alcohol, wine and beer. Production of hepatitis B vaccine.

Unit IV:
Microbial transformations – types of biotransformation reactions, Steroids and antibiotics transformation. **Introduction to food technology** - Elementary idea of canning and packing. Sterilization and pasteurization of food products. Technology of typical food/food products (bread, cheese, idli, yoghurt). Food preservation. Commercial production of SCP. Production of biogas from biomass.

References:

1. Industrial Microbiology - J.E. Casida
2. Industrial Microbiology – A.H.Patel
3. Microbial biotechnology Glazer and Nikaido 1995
4. Principles o fermentation technology, Stanbury, Whittaker and Hall 1997
5. Prescott and Dunns Industrial microbiology. Reed (Ed)
6. Biotechnology 3 rd edition by john E.Smith . Cambridge low price editions.

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5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester VII

Paper 76013: ANIMAL BIOTECHNOLOGY

Unit I: History and development of animal tissue culture. Application of animal cell culture. Equipment and materials required. Principles of sterile techniques. Sources of tissues, types of tissues. Balanced salt solution. Cell culture media - components of the medium, physical, chemical and metabolic functions of media. Role of serum and supplements, serum-free media, features and specifications of MEM, DMEM, RPMI and Ham's medium. Role of antibiotics in media. Measurement of cell number. Measurement of cell viability and cytotoxicity. Measuring parameters of growth – Growth curves, PDT, Plating efficiency and factors influencing growth.

Unit II: Primary culture – Mechanical and enzymatic desegregation, establishment of primary culture. Subculture - passage number, split ratio, seeding efficiency, criteria for subculture. Cell lines - definite and continuous cell lines, characterization, authentication, maintenance and preservation of cell lines. Contamination - bacterial, viral, fungal and mycoplasma, contamination detection and control. Cell transformation – normal vs. transformed cells, growth characteristics of transformed cells. Viral and chemical-mediated methods of cell immortalization.
Scale-up of animal cell culture – Factors to be considered. Scale-up of suspension cultures - Batch reactor, continuous culture, perfusion systems. Scale-up of monolayer cultures – roller bottles, Nunc cell factory, microcarrier cultures. Organotypic culture, Histotypic culture. Concepts of tissue engineering.

Unit III: *In vitro* fertilization - Concept of superovulation, collection, maintenance, and maturation of oocytes, fertilization of oocytes, Maintenance and assessment of embryos, embryo transfer - Artificial insemination, preparation of foster mother, surgical and non-surgical methods of embryo transfer, donor and recipient aftercare. Animal cloning - concept of nuclear transfer, nuclear reprogramming and creation of Dolly. Transgenic animals. Application of transgenic animals. Biopharming, disease models, functional knockouts. Gene therapy - *ex vivo* and *in vivo* gene therapy methods, applications. Vaccine production through cell culture.
Unit IV: Aquaculture: Principles and species suitable for aquaculture. Pisciculture, Genetic status of culture stocks. Chromosome manipulations - Production of all male and sterile populations, Hypophysation in fishes and prawns. Pearl culture - pearl producing mollusks, rearing of oysters, nucleation for pearl formation and harvesting of pearls. Probiotics and their significance in aquaculture. Molecular tools for the identification of diseases in aquatic species.

References:

1. Culture of Animal Cells, (3rd Edn) R Ian Fredhney. Wiley-Liss
2. Animal Cell Culture – Practical Approach, Ed. John RW. Masters, Oxford
3. Animal Biotechnology – Ramasamy

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Semester VIII

Paper 76014: MOLECULAR MODELING

Unit I:
Introduction to molecular modeling, Geometric parameters in proteins, nucleic acids and small molecular systems. Stereochemistry – 3D structures from X-ray-CPK space filling models, Computer models and Calculations, Physical and computer models, Visualization of peptides, proteins and different representations.

Unit II:
Computer aided molecular design, energy minimization, molecular mechanics, force field, Conformational studies. Molecular dynamics - concept of molecular dynamics, periodic boundary conditions, salvation, long range electro statistics, numerical integrations, termination criteria, equilibration and production phase, trajectors of RMSD, conformational flexibility and RMSF, High temperature dynamics, Brownian dynamics, Homology modeling and protein folding.

Unit III:
Prediction and visualization of shapes and properties of biological and simple molecules, modeling reaction pathways and animating transition states, Application to conformations and vibrations, Applications of modeling in development of chemical sensors and probes, Study of molecular properties, 2D diagrams.

Unit IV:
Solving and Building of structures, SHELX program, drawing using Ortep, Rasmol, Chime and crystal office. Software packages in molecular modeling, detailed discussions on GROMACS, AMBER, CHARMM, Discovery studio.

References:
1. Principles of Gene Manipulation and Genomics Third Edition By Richard M.Twyman, Sandy Blackadder Primrose Blackwell Scientific Publications.
2. Introduction to Proteomics - Dunn
3. Computational Modeling of Genetic and Biochemical Networks by James M.Bower and Hamid Bolouri, MIT press.

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Semester VII

Elective 1: Paper 76015A: PLANT SYSTEM PHYSIOLOGY

Unit I.
Photosynthesis and Respiration & photorespiration: Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO_2 fixation-C_3, C_4 and CAM pathways. Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway.

Unit II.
Plant hormones and Secondary metabolites: Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action. Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles.

Unit III.
Sensory photobiology: Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins; stomatal movement; photoperiodism and biological clocks.

Unit IV.
Stress physiology: Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses; mechanisms of resistance to biotic stress and tolerance to abiotic stress

References:

1. Plant Physiology- Salisbury & Ross
2. Plant Growth & Development: Hormones and Environment- Srivastava
3. Plant Physiology-Taiz and Zeiger

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Semester VII

Elective 1: Paper 76015B: BACTERIOLOGY & VIROLOGY

UNIT I: Morphological types- cell walls of archaebacteria, Gram positive Gram negative bacteria and L-forms; antigenic properties; capsule types, composition and function., Cell membrane- structure, composition and properties. Structure and function of flagella, cilia, pili, gas vesicles, chromosomes, carboxysomes, magnetosomes, phycobilisomes, nucleoids, spores and cell division. Reserve food materials polyhydroxybuterate, polyphosphate granules, oil droplets, cyanophycin granules and sulfur inclusions.

UNIT II: Salient features and classification of bacteria as per the second edition of ergey's Manual of Systematic Bacteriology. Characteristics, classification and economic importance of major bacterial groups: *Enterobacteriae*, *Rickettsiae*, *Mycoplasma*, *Mycobacteria*, oxygenic and anoxigenic photosynthetic bacteria and actinomycetes (as per First edition of Bergey's manual).

UNIT III: Brief outline on discovery nature and properties of viruses, Chemical composition of viruses, morphology, architecture, principles of symmetry with reference to T4, TMV, Adeno Polio, Influenza, Rhabdo, Reo and HIV. Nucleic acid diversity, sub viral particles, satellite viruses, viroids, virusoids. DI particles and prions. Taxonomy of viruses: classification and nomenclature of viruses, as per ICTV. General methods of detection, Isolation, cultivation, characterization and assay / qualification of plant, animal and bacterial viruses.

UNIT IV: Life Cycles of bacterial viruses; one step growth curve, lytic and lysogenic cycles with reference to T4, λ and φ X 174. Importance of Phages.Replication strategies of viruses (TMV, CaMV.) and animal viruses (SV 40, HBV, HIV).Transmission management on plant and animal viral diseases.

Reference:

1. Atlas, RM., (1998) Microbiology, Fundamentals and Applications (IIed) Macmillan Publishing Company.
2. A. Balows, A.G. Thuper, M. Dworkes, W. Harder, (1991) The Prokaryotes, K. Schleifer, Springer Verleag, Publ.
3. A. J. Salle A Fundamental principles of Bacteriology Publ.
4. Alan J. Cann (1997). Principles of Molecular virology.(2nd edition).Academic press, California.
5. Bergey's Manual 2nd Ed. "Systemic Bacteriology" 2001-2005

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Semester VII

Practical 76011P: Genetic engineering and Genomics

1. Bacterial culture and antibiotic selection media.
2. Preparation of competent cells.
3. Isolation of lambda phage DNA
4. Agarose gel electrophoresis and restriction mapping of DNA
5. Construction of restriction map of plasmid DNA
6. Cloning in plasmid/phagemid vectors –Selection of positive clones using blue/white colours.
7. Preparation of single stranded DNA template
8. DNA sequencing
9. Gene expression in *E.coli* and analysis of gene product
10. PCR
11. Reporter gene assay (Gus/CAT/b-GAL)
12. Demonstration of blotting methods – Sourthern, northern.
13. Bioinformatics for genome sequence
14. Finding genes in prokaryotic and eukaryotic genomes ORF, contents, signals
15. Searching DNA databases with FASTA and BLAST
16. Multiple sequence alignment

Practical 76012P: Animal biotechnology

1. Preparation of tissue culture medium and membrane filtration
2. Preparation of single cell suspension from spleen and thymus
3. Cell counting and cell viabililty
4. Macrophage monolayer from PEC, and measurement of phagocytic activity
5. Trypsinizaation of monolayer and subculturing
6. Cryopreservation and thawing
7. Measurement of doubling time
8. Role of serum in cell culture
9. Preparation of metaphage chromosomes from cultured cells.
10. Isolation of DNA and demonstration of apoptosis by DNA laddering
11. MTT assay for cell viability and growth
12. Cell fusion with PEG

Practical 76013P: Molecular modeling

1. Solving and Building of structures
2. Protein structure modeling by SwissParam.
3. Structural prediction through homology modeling, Stereo chemical quality. Structure
4. Protein folding.
5. Visualization software usage – RASMOL, Phymol.

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Semester VIII

Paper 86011: ENVIRONMENTAL BIOTECHNOLOGY

Unit I:
Environmental pollution and biotechnological methods for management**.** Water pollution and sewage. Microbiology of waste water treatment – aerobic and anaerobic processes, activated sludge, oxidation ditches, trickling filters, towers, rotating discs, rotating drums, oxidation ponds. Aerobic and Anaerobic microbes. Purification of water by water weeds and membrane filters, reclaim of treated waste water.

Unit II
Pesticides and other pollutants degradation by microorganisms and genetically engineered microbes. Degradation of oil spills and plastics by microorganisms for production of useful products. Recovery of minerals by microbes. Bioindicators of hazardous pollutants, Aquifer (underground water) indicators and mineral indicators. Use of biosources for detecting environmental pollutants and environmental resources.

Unit III
Bioremediation of contaminated soils and water land, Biopesticides in integrated pest management, Biofertilizers (Rhizobial, free living N_2 fixers and Phosphate solubilizing bacteria) and their importance significance and practice. Production of biopesticides and biofertilizers for large scale production. Genetically engineered bacteria in bioremediation of organic pesticides, insecticides, oil spills. Phytoremediation

Unit IV
Microbial leaching – Introduction, organisms for leaching, chemistry of leaching and commercial processes. Genetically engineered microbes in environmental health. Genetically engineered plants and microbes in agriculture and productivity,

Referenes:

1. Microbial Ecology – fundamentals and applications. Atlas and Bartha
2. Environmental Microbiology. Grant and Long
3. Microbial aspects of Pollution. Skyes and Skinner.
4. Microbial Biotechnology – Glazer and Nikaido 1995
5. Biotechnology – A Text Book of Industrial Microbiology – Crueger and Crueger.
6. Concepts in Biotechnology – Balasubramanian, Bryce, Dharmalingam, Green and Jayaraman

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Semester VIII

Paper 86012: STEM CELL BIOLOGY AND REGENERATIVE MEDICINE

Unit I

Basics of stem cell biology: Overview, different types of stem cells, stem cell differentiation, Self-renewal of Stem Cells, Study the factors that generate stem cells and to maintain stem cells in undifferentiated, trafficking of stem cells Asymmetric Cell Division and Cellular Aging, Germ Cell Specification and Pluripotency, Nuclear Reprogramming Unexpected Cellular Plasticity. Stem cell plasticity.

Unit II

Stem cell assay protocols and stem cell therapies: Isolation of defined stem cell population, Stem cell banks, Progenitor cell assays, Flow cytometry, cell selection through MAb, Magnetic approaches to cell separation. Stem cell therapies – Clinical applications – neurodegenerative diseases Human embryonic stem cells - Generation of human embryonic stem cell lines; ES cells a tool to study cellular & molecular mechanisms of disease. Use of embryonic stem cells for drug testing

Unit III

Regenerative Medicine: Define regenerative medicine, Importance in medicine, Organogenesis Hematopoietic and Vascular Stem Cells, Mesenchymal and Cardiac Stem Cells Pancreatic and Liver Regeneration, Neural Stem Cells.

Unit IV

Tissue engineering: Embryonic Stem Cells role in tissue engineering, and their Ethics, Hematopoietic Stem Cells and Transplantation, Cancer Stem Cells, Cell and Gene Therapy, Scaffolds for tissue regeneration

References:

1. Nature Insight "Stem Cells," edited by Natalie Dewitt, Nature 414, 87-131, 2001.
2. Cogle, C. *et al.* (2003) An overview of stem cell research and regulatory issues. Mayo Clin Proc 78(8): 993-1003

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Semester VIII

Paper 86013: PROTEOMICS AND PROTEIN ENGINEERING

Unit I: Introduction to Proteomics - The concept of proteomics, Types of proteomics: Expression proteomics, structural proteomics, functional proteomics, applications of proteomics. Structural overview of proteins structures and functions, Protein localization and compartmentalization, Protein structure visualization, protein structure databases, visualization databases and tools, Prediction of secondary, tertiary structures of proteins, protein function prediction and modeling,

Unit II: Tools of proteomics – Technology for protein expression analysis - Protein separation of proteins by 2D electrophoresis – principles, detections, and softwares to handle electrophoretogram, Alternatives of Electrophoresis separation and isolation of protein, Protein digestion techniques. Protein characterization - Mass spectrometry, ESIMS, Tandem MS, MALDI-TOF, QTOF, SELDI, and SALSA. DIGE, SILAC. Mass Spectrometry Protein Identification, Protein Identification through Database Searching, Protein structure analysis - X-ray Crystallography, NMR. CryoEM. Post translational modifications and their predictions through bioinformatics tools. Protein identification through database searching,

Unit III: Functional Proteomics - Protein expression analysis - Protein biochips, Protein microarrays (Ab array, Ag array). Protein - protein Interactions – Phage display, Yeast two hybrid; Protein expression profiling; Protein folding - Chaperones and their role in protein folding. Proteomics approach to protein phosphorylation; protein mining. Making of proteins through rDNA technology - Native and fusion proteins, Yeast expression systems, The baculovirus expression system, Mammalian cell lines.

Unit IV: Protein engineering – Concepts and significance, Methods in protein engineering – Rational design and direct evolution, site directed mutagenesis for specific protein function. Protein engineering of lysozyme, and sublitisin, protein engineering - protein design, design of peptide and protein mimics, development of peptide vaccines. Biomarker discovery through proteomics; Pharmaceutical proteomics for drug development.

Reference:

1. Concepts in biotechnology – Balasubramanian
2. Protein Engineering – Moody and Wilkinson.
3. C. Kohner and U L Rajbhandary, Protein Engineering Springer
4. J LCleland and C S Craik. Protein engineering Wiley
5. S Lutz and U T Bornscheuer, Protein enginnering Handbook. Wiley VCH
6. S B Primrose and R M Twyman. Principles of Gene manipulation and Genomics,
7. Principles of proteomics – R M Twyman
8. Principles of proteomics tools for the new biology

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Semester VIII

Paper 86014: DRUG DESIGN AND TARGETING

UNIT – I:
Introduction: History of drug design, Introduction and overview, Drug-receptor interactions and mechanisms, Molecular basis of receptor subtypes, Pharmacogenetics/Drug Resistance, Molecular Approaches to Drug Mechanism.

UNIT – II:
Molecular Approaches to Drug Discovery: From Disease to Target to Drug: Finding new drug targets for anti-cancer drugs, High-throughput/combinatorial approaches, Biological combinatorial approaches, Structure-based drug design. Drug Docking – Auto dock, and GOLD; QSAR software.

UNIT – III:
Targeting Molecular Pathways for Drug Discovery: Targeting signal transduction, Designing receptor antagonists, disrupting intracellular signaling, Designing drugs vs. central dogma targets. Drug designing – use of Dock program – selection of new molecules as potential ligands, receptors and inhibitors – energetics – reactions of drugs, virtual screening.

UNIT – IV:
Drug discovery cycle, Role of Bioinformatics in Drug designing, Modeling of target-small molecule interactions, Insilco analysis of drug designing and modeling. Structure display – calculation of low energy pathways for reactions – structure refinement – ADMET Toxicity.

Reference Books:

1. Greer, J., Eickson, J.W,Baldwin,JJ and Varney,MD. Application of the three-dimensional structures of protein targe molecules in structure- based drug design.
2. Cohen,N.c. Molcular modeling SW and methods for medicinal chemistry.
3. Kuntz, I.D, Meng, EC; and shoichet, BK structure – based Molecular Design.
4. Kanny lal dey :Ingerious drugs of India. Hand book of spectrophotometric data of drugs.

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Semester VIII

Elective 2: 86015A: ANIMAL SYSTEM PHYSIOLOGY

Unit I. Cardiovascular System: Blood, hemopoiesis, homeostatis. Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above. Thermoregulation,

Unit II. Respiratory system and digestive system: Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration. Digestive system - Digestion, absorption, energy balance, BMR.

Unit III. Nervous system and endocrine system: Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture. Sense organs – vision, hearing and tactile response. Endocrinology - Endocrine glands, basic mechanism of hormone action, hormones and diseases

Unit IV. Excretory system and reproductive system: Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance. Reproductive processes, gametogenesis, ovulation, neuroendocrine regulation.

References:

1. C.L. Prosser, Comparative Animal Physiology. W.B. Saunders & Company
2. R. Eckert. Animal Physiology. Mechanisms and Adaptation. W.H. Freeman & Company
3. W.S. Hoar. General and Comparative Animal Physiology
4. Schiemdt-Nielsen. Animal Physiology. Adaptation and Environment. Cambridge
5. C.L. Prosser. Environment and Metabolic Physiology. Wiley-Liss, New York.

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Semester VIII

Elective 2: 86015B: AGRICULTURAL BIOTECHNOLOGY

Unit I:
Production of commercially useful compounds by cell culture Secondary plant products useful to mankind; cultured plant cells and tissues as a source of secondary products; cell line selection and commercial production of pharmaceutically important compounds using cell culture techniques; physical and chemical factors that influence the production of secondary metabolites in vitro; induction of hairy root cultures and their uses; biotransformations using cell culture methods; production and use of biopesticides

Unit II:
Molecular aspects of beneficial plant microbe association Types of plant microbe association; symbiotic and other beneficial associations, pathogenic association; Rhizobium plant interaction and biological nitrogen fixation; plant mycorrhizal association in plant improvement; plant mycorrhizal and the molecular mechanism of antagonistic process

Unit III:
Introduction to biotic and abiotic stress; Biotic stresses – viral resistance, bacterial resistance, fungal resistance, insect resistance; Abiotic stresses – drought tolerance, salt tolerance, temperature tolerance, submergence tolerance, photooxidative stress.

Unit IV:
Biotechnology for crop improvement Conventional methods for crop improvement; tissue culture in crop improvement; genetic engineering in for increasing crop productivity by manipulation of photosynthesis, nitrogen fixation, nutrient uptake efficiency; Genetic engineering for abiotic stress tolerance; Molecular breeding; plants as bioreactors

References:

1. Principles of plant breeding by Robert W allard
2. Plant cell, tissue and organ cultute Applied and fundamental aspects by Bajaj and Reinhard
3. Plant tissue culture and biotechnology by W Barz

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Semester VIII

Practical 86011P: Microbial and Environmental Biotechnology

1. Production of alcohol by *S. Cerevisiae*
2. Production of citric acid by *A. niger*.
3. Production of streptomycin by fermentation.
4. Production of wine from grapes.
5. Production of glutamic acid.
6. Production of protease/glucose isomerase by batch fermentation.
7. Preparation of toxoid from a toxin.
8. Immobilization of an enzyme by gel-electrophoresis.
9. Immobilization of whole cells for enzyme/antibiotic production by gel entrapment.
10. Characterization of microbes useful in biodegradable organic matter destruction.

Practical 86012P: Proteomics

1. Isolation and purification of protein
2. SDS - PAGE
3. Separation of protein through 2D PAGE
4. Mass spectroscopy MOLDI TOF
5. protein structure prediction by bioinformatics
6. Protein structure prediction and classification
7. Bioinformatics in support of proteomic research
8. Searching protein sequence databases with FASTA and BLAST
9. Protein structure visualization
10. Secondary structure prediction
11. Protein structure prediction. Structure visualization, Secondary structure prediction, Structural prediction through homology modeling,

Practical 86013P: Drug design and targeting

1. Drug –receptor interactions (Molecular docking)
2. Chemo informatics
3. Drug bank-Drug card analysis
4. Protein structure analysis
5. Restriction site analysis
6. Retrieval of Human annotated gene from Entrez database

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Semester IX

Paper 96011: CELL SIGNALING AND CANCER BIOLOGY

Unit I:
Cell signaling - Intracellular signaling, types of signal receptors - Cytosolic, Nuclear & Membrane bound receptors, Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, Chemo receptors of Bacteria (Attractants & Repellents), signal transduction pathways, secondary messengers, protein kinases, regulation of signaling pathways, bacterial and plant two-component signaling systems, bacterial chemotaxis and quorum sensing.

Unit II
Cellular communication: Regulation of hematopoiesis, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation.
Host parasite interaction - Recognition and entry process of different pathogens like bacteria, viruses into animal cells. Pathogen induced diseases in animals.

Unit III:
Cancer - basic concepts, Introduction and Characteristics of Cancer Cells, Types of Tumors, Factors influencing on the development of Cancer, Genetic Alterations in Cancer Cells, modulation of cell cycle in cancer, Causes of Cancer,

Unit IV:
Molecular Basis of Cancer – Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, growth factors. Cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, Signal transduction mechanisms, telomerase, apoptosis, angiogenesis and metastasis, cancer therapy.

References

1. The Cell by Cooper.
2. Cell and Molecular biology – De Robertis and De Robertis (1998) Waverly Pvt.
3. "Cancer Biology", Raymond W. Ruddon, Oxford University Press
4. Cell & Molecular Biology by Gerald Karp (2nd Ed.) Wiley publishers.
5. The World of the cell by Becker, Reece, Poenie (3rd edition) Benjamin Publishers.
6. Molecular Biology of the cell by Bruce Alberts.
7. The biochemistry of Cell Signalling-Ernst J.M.Helmreich. Oxford Press.
8. The world of Cell. 5th edition- Becker, Kleinsmith, Harden,-Pearson Publishers.

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Semester IX

96012: BIOETHICS, BIOSAFETY, AND IPR

Unit I
Biotechnology and Society – Social, ethical and legal aspects of biotechnology. Implications of biotechnology on health, environment, food and sustainable agriculture. Beneficial application and development of research focus to the need of the poor, identication of directions for yield effect in agricultural, aqua cultural, bioremediation.

UNIT I
Ethical issues - introduction, causes of unethical acts, ignorance of laws , codes policies and procedures, recognition, friendship, personal gains, ethical decision making ,teaching ethical values to scientist , good laboratory practices, good manufacturing practices, laboratory accreditation. Bioethics and biosafety regulations

UNIT II
Environmental and health aspects of biotechnology – Genetically engineered microorganism – introduction of novel species and natural equilibrium – environmental security and safety – precautionary measures – Genetically modifies foods –health safety, biosafety concern with radioactivity.
Prenatal diagnosis – Genetic screening – surrogate mothers, manipulation of human genome, gene therapy, cloning, technology transfer.

Unit IV
IPR – definition – classification and forms, Rationale for protection of IPRs, importance of IPRs in the fields of science and technology. Patenting – Examples of Patents in Biotechnology. Essential requirements for IPR procedures of filling. Global and Indian Biodiversity Act, Indian Patent Act and their revised versions. Regulatory mechanisms in releasing GMOs. Plant breeders rights, WTO, GATT & TRIPS.

References:

1. Sasson A. Biotechnologies in developing countries present and future, UNESCO publishers, 1993.
2. Singh K. Intellectual Property rights on Biotechnology, BCIL, New Delhi. Gene cloning – Brown
3. Concepts in Biotechnology – Balasubramanyam.D
4. Safety, Moral, Social and Ethical issues related to geneticalls modified foods – Smith J.E.
5. Environmental Biotechnology- Forster and wase

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Semester IX

Elective 3: 96013A: NANO-BIOTECHNOLOGY

Unit I

Introduction to Nano biotechnology: Definitions, history of nanotechnology; motivation for nanotechnology; nanoparticles and properties, types, bionanomaterials and properties; calculating the size and concentration of nanoparticles.

Unit II

Nanoparticles fabrication – micro and nanolithocraphy; characterization – structurally (XRD, TEM, SEM, STM, AFM), chemical and optical characterization; outline design of enzyme reactors based on nano-structured materials; Use of biological organisms (biological methods) for nanoparticle synthesis, Magnetotactic bacteria for natural synthesis of magnetic nanoparticles; Viruses as components for the formation of nanomaterials – VLPs, VNPs; Role of plants in nanoparticle synthesis.

Unit III

Nanobiotechnology and its advanced biomedical applications covering topics like medical nanorobotics, artificial organ, DNA chip, smart bomb for cancer, nanodiagnosis, treatment nanosystem for heart, nanosurgeries, Nano drug delivery system, nanobiotechnology for HIV virus and its diagnosis and treatment, Cancer diagnosis, and treatment through nanotechnology. Nanotechnology for tissue regeneration. DNA based nanomechanical devices.

Unit IV

Nanoparticles as molecular labels and imaging applications. Nanodevices for sensing and therapy. Environmental and safety aspects of nanotechnology, Potential Health Impact of Nanoparticles, Nanosensors, nanobiolistics. Nanotribology, Concept of nanotoxicology.

References

1. Bionanotechnology: Lessons from Nature by David S. Goodsell
2. Nanotechnology by Mark Ratner and Daniel Ratner, Pearson Education.
3. Nanomaterials by A.K. Bandyopadhyay; New Age International Publishers
4. Nanomedicine, Vol. IIA: Biocompatibility by Robert A. Freitas
5. Handbook of Nanostructured Biomaterials and Their Applications in Nanobiotechnology - Hari Singh
6. Nanobiotechnology; ed. C.M.Niemeyer, C.A. Mirkin.

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Semester IX

Elective 3: 96013B: MEDICAL BIOTECHNOLOGY

Unit I:
Genetic disease – Chromosomal disorders, gene controlled diseases (autosomal and X-linked disorders, mitochondrial disorders); identification of disease; functional cloning; positional cloning; candidate gene approach (Marfans, alzeimers); molecular basis of human disease; Genomic imprinting.

Unit II:
Microbial Diseases and Host Pathogen Interaction: Normal microbiota; Classification of infectious diseases; Reservoirs of infection; Nosocomial infection; Emerging infectious diseases; Mechanism of microbial pathogenicity; Nonspecific defense of host; Humoral and cell mediated immunity; Vaccinnes; Immune deficiency; Human disease caused by viruses, bacteria, and pathogenic fungi.

Unit III:
Chemical Synthesis and oligo nucleotides and PCR reaction in disease, diagnostics and other potentialities. Expression systems and Markers for identification of transformed and transected genes; transient transfection, stable transfection and targeted transformation. Viral markers – diagnostic and therapeutic markers. Markers for evaluation of therapeutic response. Reverse genetics, Random and site directed DNA mutagenesis.

Unit IV:
Diagnostics and therapeutics: Prenatal diagnosis – invasive techniques and noninvasive techniques; Diagnosis using protein and enzyme markers. DNA/RNA based diagnosis. Gene therapy; Antisense therapy, protein aptamers, intrabodies. Vectors used in gene therapy. Stem cell therapy, nanomedicine. Strategies for the Expression of therauptic portions and proteins of commercial importance in heterologus systems.
Viral therapies – current targets and candidate drugs for viral infections in humans. Application in molecular medicine – the applications of recombinant viruses. Viral vectors and viral antigens in molecular diagnosis and therapy. Metabolomics and significance.

References:

1. Introduction to Human molecular genetics – Strachen
2. Human genetics molecular evolution – Mc Conkey
3. Principles and practice of Medical Genetics, I,II,III volumes

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Semester IX

Elective 4: 96014A: METABOLOMICS

Unit I: Introduction to metabolomics:
Introduction, background and definitions of metabolomics; Importance of metabolomics, Metabolomics, Endometabolome, Exometabolome; Approaches for metabolomics – targeted and nontargeted; Metabolite library; UIUC Metabolomics; Metabolite identification.

Unit II: Analytical platforms
Spectroscopy – UV-Vis, FT-IR, Raman, NMR (C13, H1, N15), Metabolite isolation and analysis by Mass Spectrometry, Sample preparation (fractionation, enrichment, derivatization), Mass (LC/GC-MS, DIMS, IRMS, MALDI-TOF). Chromatography – Column, TLC, HPTLC, HPLC, FPLC, GC, UPLC.

Unit III: Metabolome Foot printing and Finger printing and metabolic target analysis. Quenching protocols for microbial metabolite profiling. Metabolites and their pathways; KEGG pathways, MetaCyc, The Human Metabolome Databases, Biocart; Computational modeling of metabolic control and pathway simulation.

Unit IV: Prospects
Metabolic pathways discovery and disease characterization; Drug metabolisms and pharmacology; Mining of novel and new metabolites; Environmental sciences and toxicology: Molecular markers and systematics. Integrated analysis of transcriptomics and metabolomics; industrial applications. Nutritional applications

References:

1. Measuring the metabolome: current analytical techniques. Dunn etal (2005).
2. Metabolomics: Methodologies and applications LIN (2006)
3. Metabolome analysis Birkemeyer et al (2005)
4. Metabolomics and system biology Kell (2004).
5. The Handbook of Metabolomics and Metabolomics by John C. Lindon, Jeremy K. Nicholson

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Semester IX

Elective 4: 96014B: R PROGRAMMING AND SYSTEM BIOLOGY

Unit I.
R Programming: Introduction, functions introduction, R Data Structures, Vectors: Scalars, Arrays and Matrices.

Unit II.
Data frame, factors and tables, control statements, Maths functions, Installing R, Installation of packages. Writing of software packages writing and debug; profile R code.

Unit III.
Algorithms: Introduction to Genetic Algorithms. Smith-Waterman Algorithm and Neddleman-Wunsch Algorithm, Dynamic Programming, Multiple alignment, developing decision support for clinical bioinformatics.

Unit IV.
Systems Biology: Introduction, Basic Concept, Modelling System Biology, Biological Networks, representation, Network visualization, Structural Analysis, Metabolic Networks, System Biology databases and software for System Biology.

References:
1. Introduction to Mathematical methods in bioinformatics—Alexande Isaev
2. The art of R Programming – Norman Matloss (A Tour of Statistical software designing).
3. Introduction to System biology –
4. Handbook of system biology

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Semester IX

Elective 5: 96015A: DEVELOPMENTAL BIOLOGY

Unit I

Basic concepts of development: Potency, commitment, specification, induction, competence, determination and differentiation; morphogenetic gradients; cell fate and cell lineages; stem cells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development.

Unit II

Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination.

Unit III

Morphogenesis and organogenesis in animals: Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis – vulva formation in *Caenorhabditis elegans;* eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development-larval formation, metamorphosis; environmental regulation of normal development; sex determination. **Programmed cell death, aging in animals**

Unit IV

Morphogenesis and organogenesis in plants: Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum*, **senescence in plants**

References:

1. Animal Embryology
2. Guha and maheswari Embryology

YOGI VEMANA UNIVERSITY
5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester IX

Elective 5: 96015B: Oxidative stress, antioxidant defense in health & disease

Unit I:
Chemistry of Oxygen Free radicals – definition, Oxygen radicals – types, mechanism of formation, environmental factors in generation of free radicals. Effect of free radicals on bimolecules – carbohydrates, lipids, proteins and nucleic acids. Oxidative stress related disorders.

Unit II:
Free radicals, Oxidative stress and lipid peroxidation -Non enzymatic lipofusion (age pigments) – enzymatic - leukotrienes- mediators of allergy, asthma - Prostaglandins- mediators of inflammation and cancer

Unit III:
Oxidative stress and degenerative disorders – Inflammation; Chronic respiratory disorders – asthma, cardiovascular disease, atherosclerosis, neurodegenerative disorders, stroke, Parkinsosn's, Alzheimer's, Diabetes, Cancer and aging.

Unit IV:
Antioxidant protection from oxidative damage; enzymatic and nonenzymatic protectants – glutathione, vitamins, minerals. Natural products. Biopharming. Golden rice. Functional food. Neutraceuticals and health.

References

1. Free radical biology

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Semester IX

Practical 96011P: Cancer Biology & R programme

1. Identification of cancer cells
2. Cell proliferation assay
3. Cell signaling
4. R studio use for solving problem
5. Programmes

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5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester X

Paper 06011: RESEARCH METHODOLOGY

Unit I

Introduction to research methodology- Define research? Basic and applied research. Significance of Research. Essential steps in research, Literature survey - defining the research problem, Formulation and Validation of hypothesis - Designing experimental techniques and Execution of designed experiments – Data compilation and analysis - Presentation of research findings in graphs and tables - Preparation of technical report or manuscript for publication in peer reviewed scientific journals.

UNIT – II:

Design of the experimental programme- variable in the experiments, materials and methods, application of methods. Progress of research – evaluation of results, statistical approach, comparison with existing methodologies, validation of findings, research communications.

Unit III

Scientific writing - Research report, thesis and dissertation, Manuscript/research article, review monographs. Preparation of Manuscript/Dissertation for research proposals. Introduction or review of literature, aims and objectives, Materials and methods, Result analysis – evaluation of results, statistical approach, Discussion and comparison of results, literature citation, bibliography and reference, impact factor of journals.

Unit – IV

Plagiarism; softwares used in plagiarism; Ethics in manuscript writing; Conflicts of interest; Copyright issues; patents; uploading of manuscript; Thesis; Dissertation; Shodhganga and its importance; Themes and role of different scientific funding agencies of India and abroad.

References:

1. Sasson A. Biotechnologies in developing countries present and future, UNESCO publishers, 1993.
2. Singh K. Intellectual Property rights on Biotechnology, BCIL, New Delhi. Gene cloning – Brown
3. Concepts in Biotechnology – Balasubramanyam.D
4. Safety, Moral, Social and Ethical issues related to geneticalls modified foods – Smith J.E.
5. Environmental Biotechnology- Forster and wase
6. Biotechnological Innovations in Environmental Management – Leach and Van Dam-mieras

YOGI VEMANA UNIVERSITY
5 years Integrated *M. Sc.*, Biotechnology and Bioinformatics
Semester X

06011T: PROJECT WORK

Duration of project - 3 months

Students are required to carry out a research project of 3 month duration related to Biotechnology and bioinformatics. Arrangements could also be made to pursue research studies at institutions other than the relevant faculties of Yogi Vemana University. In such circumstances, the student is assigned with two supervisors: an internal supervisor from the panel of teachers and an external supervisor from the institution where the research project is carried out. After completion of project, students have to submit their project dissertation to the Yogi Vemana University, Kadapa and also to be given project viva and presentations in the presence of departmental board and external examiner.

Paper No.	Title of paper	Marks in semester end exam	Internal marks for exam	Total marks
06011	Research methodology	100	-	100
06012T	Project Individual project Viva- voce	 150 50	 100 -	 300

YOGI VEMANA UNIVERSITY
Department of Biotechnology and Bioinformatics
Choice based credit system

Open for other PG Departments of University

Non-core Paper I: INTRODUCTION TO BIOINFORMATICS

Unit I:
Define bioinformatics? Goals of Bioinformatics; Scope of Bioinformatics; Applications and limitations of Bioinformatics. Generation of large scale molecular biology data through genome sequencing, and protein sequencing. Introduction to Internet and internet resources of biology interest.

Unit II:
Define database? Types of databases; General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). Protein databases (Primary, Composite, and Secondary). Specialized Genome databases (SGD, TIGR, and ACeDB). Structure databases (CATH, SCOP, and PDB). Information retrieval from biological databases.

Unit III:
Introduction to sequences, sequence alignments – Pairwise alignment (BLAST and FASTA) and multiple sequence alignment (Clustal W). Methods for presenting large quantities of biological data: sequence viewers (SeqVISTA), 3D structure viewers (Rasmol).

Unit IV:
Introduction to phylogenetics, construction of phylogenetic tree.
Introduction on molecular modeling and drug design.
Role of bioinformatics in Genomics, proteomics and metabolomics.

References

1. Text book of Bioinformatics – S C Rastogi
2. Bioinformatics – Ghosh
3. Essential bioinformatics - Xiong

YOGI VEMANA UNIVERSITY
Department of Biotechnology and Bioinformatics
Choice based credit system

Open for other PG Departments of University

Non-core Paper II: Natural Products in Industrial Applications

Unit I:

Introduction to bioactive natural compounds

Terpenes, phenols, flavonoids, tannins, quinones, amines and alkaloids, anthocyanins, amino acids, and nucleosides. Production of natural products by plant tissue culture, and molecular farming.

Unit II:

Isolation and characterization of bioactive compounds

Solvent extraction, Isolation of phenols, nucleosides, and alkaloids. Characterization by UV, IR, NMR and MS spectroscopy. Biological activity screening against microbes and cancer cells, toxicity evaluation through teratological study and mutagenic and carcinogenic study.

Unit III:

Therapeutic applications of bioactive compounds

Bioactive compounds therapeutic applications in - Anesthetics, Sedatives and hypnotics, Anticonvultants, Muscle relaxants, CNS stimulants, Antipyretic analgesics, Cardiovascular drugs, Antihistamines, diuretics, NSAIDS, antimalarials, Antibiotics, antivirals, Anticancer agents. Insulin and oral hypoglycemic agents, Steroids, Antipsychotics (Tranquilizers),

Unit IV:

Natural products in drug discovery

Important parameters for drug discovery. Concept of lead molecule. Computational approaches for the discovery of natural lead structure. Strategies for development of drug from natural products using bioinformatics tools. Natural product derived pharmaceuticals.

References:

1. Modern phytomedicine (2006)
2. Medicinal chemistry (2009)

MODEL QUESTION PAPER

5 Year M.Sc., Degree Examinations 2018 (Model Paper)

Semester: VI

Subject: Biotechnology and Bioinformatics

Paper 66012: Genetic Engineering (Example)

Time: 3 Hours Max marks: 75 Marks

Part – A

Answer any five (5) questions.

Each question carries Three (3) marks (5X3=15)

1. Isolation of mRNA
2. RAPD
3. pUC19
4. Charan phases
5. Adapters
6. Gene gun method
7. Taq promoters
8. His tag

Part B

Answer all questions.

Each question comes FIFTEEN (15) Marks (4 X15=60)

9. Discuss about the restriction endonucleases properties, classification, and nomenclature.

OR

10. Describe in detail about the Sangers dideoxy chain termination method.

11. Give detailed account on the vectors used cloning of genes in plants.

OR

12. Explain about the supervectors.

13. Describe the genomic library preparation.

OR

14. Discuss about the methods used in the screening and identification of positive clones.

15. Write about the factors influencing the expression of recombinant proteins.

OR

16. Describe the production of insulin through recombinant DNA technology.

5 Year M.Sc., Degree Examinations 2018 (Model Paper)
Semester: X
Subject: Biotechnology and Bioinformatics

Paper 06011: Research methodology

Time: 3 Hours Max marks: 100 Marks

Part – A
Answer any five (5) questions.
Each question carries four (4) marks (5X4=20)

1. Origin of problem
2. Peer reviewed journal
3. Impact factor
4. Evaluation of results
5. GMO
6. Legal aspects of biotechnology
7. WIPO
8. Patenting

Part B
Answer all questions.
Each question comes twenty (20) Marks (4 X20=80)

9. Discuss about the literature survey for identification of problem and formulation of hypothesis.

OR

10. Describe the preparation of manuscript for publication in scientific journal.

11. Give detailed account on the experimental design for any research work.

OR

12. Explain the methods of evaluation and presentation of results.

13. Describe the social, and ethical issues of biotechnology.

OR

14. Explain the implications of biotechnology in health, environment, food and sustainable agriculture.

15. Discuss about the IPR definition, classification and importance in science and technology.

OR

16. Describe the global and Indian Biodiversity Act.

YOGI VEMANA UNIVERSITY: KADAPA
DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Pre PhD Examination Syllabus

Paper I: RESEARCH METHODOLOGY

UNIT – I:
Characteristics of Research –definition, steps in research process, selection of research problem, literature survey, hypothesis, Designing experimental techniques for validating the hypothesis, Execution of designed experiments, presentation and interpretation of research data, preparation of abstract/technical report/manuscript for publication in peer reviewed scientific journals, research proposal preparation for grants.

UNIT – II:
Ethical and legal aspects in biotechnology, Bioethics and Biosafety regulations. IPR, importance of IPRs in the field of science and technology, patenting, Indian patent Act, Regulatory mechanisms in releasing GMO's, Global and Indian biodiversity Act, WTO, GATT, TRIPS.

UNIT – III:
Techniques: Isolation and separation of cell organelles and macromolecules, Principles and application of centrifugation (Preparative, analytical). Chromatography principles and applications (GLC, Gel filtration, affinity, ion exchange, HPLC and FPLC). Electrophoresis (agarose gel, PAGE, 2D gel). Spectrophotometric principles and application (UV-Visible, MS, NMR). X-RD.

UNIT- IV
Biostatistics – collection, classification and tabulation of data. Importance of statistics in biology, principles of experimental design, normal distribution test, significance, analysis of variance (ANOVA), F-test, T-test. Correlation and regression analysis.

UNIT – V:
Bioinformatics definition, history and application of Bioinformatics in Biology. Sequence date bases and their use: NCBI, EMBL, DDBJ, protein sequence data bases: UNIPROT, PDB, PIR. Sequence database searching tools: FASTA, BLAST. Sequence Alignment: Pairwise and multiple Sequence Alignment (MSA) (CLUSTALW). Phylogeny: phylogenetic tree.

References:
1. Concepts in Biotechnology – Balasubramanyam.D
2. From Genes to Clones, Introduction to Gene Technology- Winnacker, Ernst.L
3. Safety, Moral, Social and Ethical issues related to genetically modified foods –
4. Molecular Biology and Biotechnology – Meyer R A
5. Biotechnological Innovations in Environmental Management – Leach and VanDam
6. Modern Practical Experimental Biochemistry – Rodney Boyer

YOGI VEMANA UNIVERSITY: KADAPA
DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Pre PhD Examination

Paper I: Research Methodology
(Model question paper)

Time: 3 hours Max. Marks: 100

Answer all questions
Each question carries 20 marks

Unit – I

1. Write down the steps involved in designing and execution of an experiment after formulation of hypothesis

(OR)

2. How will you prepare a research proposal for obtaining grants? Name the national and international funding agencies who support for research in biotechnology.

Unit – II

3. Describe the ethical and legal aspects of biotechnology

(OR)

4. What is IPR? Write its importance in the field of science and technology

Unit – III

5. Describe the methodology involved in protein isolation and purification

(OR)

6. Discuss the principle and applications of mass spectroscopy.

Unit – IV

7. Describe analysis of variance (ANOVA)

(OR)

8. Discuss the importance of statistics in biotechnology

Unit – V

9. Write down on multiple sequence alignment

(OR)

10. How will you construct the phylogenetic tree?

YOGI VEMANA UNIVERSITY: KADAPA
DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Panel of examiners for paper setting and evaluation

Eligibility:

Any Government university teacher (Professor, Associate Professor and Assistant Professor) or Institution Scientist are eligible for paper setting, evaluation and conducting practical examinations for 5 Year Integrated Biotechnology & Bioinformatics course.

Panel of examiners for paper setting and evaluation for

Pre-Ph.D examination and Ph.D Thesis evaluation

Eligibility:

Any Government university teacher (Professor, and Associate Professor) or Institution Scientist (Above Scientist D cadre) are eligible for paper setting & evaluation of Pre-Ph.D examinations and also for thesis evaluation and conducting Viva-voce in Biotechnology & Bioinformatics course as per university norms.

CHAIRPERSON & CONVENER
(Prof. P. CHANDRAMATHI SHANKAR.)

YOGI VEMANA UNIVERSITY

M.Sc. BOTANY SYLLABUS
SEMESTER & CBCS PATTERN
(w.e.f. 2018-19)

DEPARTMENT OF BOTANY
YOGI VEMANA UNIVERSITY
KADAPA - 516005
ANDHRA PRADESH
INDIA

APRIL - 2018

INDEX

MEMBERS OF BOARD OF STUDIES

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"The task of the modern education is not to cut down the jungles, but to irrigate the deserts".

C. S. Lewis

SEMESTER-I

Paper	Title of the paper	Instructional Hrs./Week	Internal Assessment Marks	Semester End Marks	Total Marks	Credits
15011	Biology and Diversity of Virus, Bacteria, Fungi and Plant Pathology	4	25	75	100	4
15012	Genetics and Plant Breeding	4	25	75	100	4
15013	Biology and Diversity of Algae, Bryophytes, Pteridophytes and Gymnosperms	4	25	75	100	4
15014	Taxonomy of Angiosperms	4	25	75	100	4
15015 P	Corresponding to 15011 &15012	8	100		100	4
15016 P	Corresponding to 15013 & 15014	8	100		100	4
	Field Trip/Botanical Tour for minimum of 5 days must for all students	Herbarium/Field note book will cover total of 20 marks (10 Marks in 15015 P & 10 marks in 15016 P)				

SEMESTER-II

25011	Plant Developmental Biology	4	25	75	100	4
25012	Plant Reproduction	4	25	75	100	4
25013	Plant Ecology and Environment	4	25	75	100	4
25014	Cell Biology and Cytogenetics	4	25	75	100	4
25015 P	Corresponding to 25011 & 25012	8	100		100	4
25016 P	Corresponding to 25013 & 25014	8	100		100	4
Elective-I	Plants and Society	4			100	4

SEMESTER-III

35011	Ethnobotany and Pharmacognosy	4	25	75	100	4
35012	Plant Physiology	4	25	75	100	4
35013	Tools and Techniques in Plant Science and Biostatistics	4	25	75	100	4
35014	Molecular Biology of Plants	4	25	75	100	4
35015 P	Corresponding to 35011 & 35012	8	100		100	4
35016 P	Corresponding to 35013 & 35014	8	100		100	4
Elective-II	Herbal Medicine	4			100	4

SEMESTER-IV

45011	Plant Tissue Culture	4	25	75	100	4
45012	Genetic Engineering of Plants	4	25	75	100	4
45013	Plant Metabolism	4	25	75	100	4
45014	Biodiversity Conservation and Management	4	25	75	100	4
45015 P	Corresponding to 45011 & 45012	6	100		100	4
45016 P	Corresponding to 45013 & 45014	6	100		100	4
	Total for Core Papers	**128**	**400**	**2000**	**2400**	**96**
	Total for Elective Papers	**8**	**50**	**150**	**200**	**8**
	Grand Total	**136**	**450**	**2150**	**2600**	**104**

15011 - Biology and Diversity of Viruses, Bacteria, Fungi and Plant Pathology

Unit-I: Viruses

General characters, virus genetic material, ultrastructure of virions, isolation and purification of viruses; chemical nature, replication and transmission of viruses (by grafting, seeds,contact, water, air, soil, agricultural tools, insects). Economic importance of virus. viral diseases in plants. Viroids and Prions.

Unit-II: Bacteria and Phytoplasma

General account; classification, ultrastructure, cell wall of bacteria, nutrition, **reproduction**: fission and **genetic recombination** (transformation, transduction and conjugation), economic importance (useful and harmful aspects) , symbiotic and asymbiotic nitogen fixation by bacetria. Phytoplasma; general characteristics and economic importance.

Unit- III: Mycology

General characteristics of fungi, cell wall composition, **nutrition:** (Saprobic, biotrophic, symbiotic); **reproduction:** (vegetative, asexual, sexual), heterothallism, Heterokaryosis; Para sexuality, recent trends in classification and Ainsworth's classification of fungi. **economic importance of fungi** (in industry, as medicine and food, biocontrol agents). **Lichens**: structure and reproduction, mycorrhizae. Mushroom cultivation methods.

Unit –IV: Plant pathology

Classification of plant diseases and symptomology. Mechanism (s) of pathogenesis and resistanc and disease control measures (physical, chemical and biological control). **Case studies of economically important causative agents with special refernec to crop plants**. Plant-virus interaction with emphasis on-TMV & BYMV, Plant-bacterial interaction with emphasis on blight of paddy & citrus canker; Plant-fungus interaction with emphasis on-downy mildew of bajra, club root of crucifers**,** red rot of sugarcane, leaf spot and tikka diseases of groundnut. Beneficial interactions of mycorrhizae.

Suggested Practicals:

1. Preparation of stains and fixatives and micrographs of virus
2. Gram staining of Bacteria
3. Demonstration of motility in Bacteria.
4. Determination of microbial counts by using Heamocytometer.
5. Morphological study of fungi belonging to Myxomycota, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina
6. Study of symptomology of locally available diseased specimens.
7. Isolation of fungi from soil: media preparation, dilution plate technique.

8. Study of crustose and foliose lichens
9. Mushroom cultivation

Suggested Readings:

1. Ainsworth G.C., E.K.Sparrow & A.S.Sussman, 1973.The Fungi-An advanced treatise. Academic Press.
2. Alexopoulos, C.J., Mims, C.W. and Blackwel, M. 1996. Introductory Mycology. John Wiley & Sons Inc.
3. Bilgrami, K.S. & H.C. Dube (1990) : A Text Book of Plant Pathology, Vikas publishing House Pvt., Ltd.,New Delhi, India.
4. Burnett, J.H. (1968) : Fundamentals of Mycology. Edward Arnold (Publishers) Ltd., London.
5. Dube, H.C . (1992) : A Text Book of fungi, Bacteria & Virus, Vikas Publishing House (P) Ltd., New Delhi.
6. Mandahar, C.L. 1978. Introduction to Plant viruses. Chand & Co., Ltd., Delhi.
7. Mehrotra, R.S. and Aneja, K. R. 1998. An Introduction to Mycology. New Age International Press.
8. Mehrothra, R.S (1994) : Plant Pathology, Tata McGraw Hill Publishing Co., Ltd., New Delhi
9. Pandey, B.P. (1999) : Plant pathology-Pathogens & Plant Diseases, S. Chand & Co., New Delhi-492 pp.,
10. Pelczar, M.J., E.C.S.Chan & N.R.Krieg. 1986. Microbiology. Tata McGraw Hill, New Delhi.
11. Rangaswamy, G. and Mahadevan, A. 1999. Diseases of Crop Plants in India (4^{th} Ed.) Prentice Hall of India Pvt. Ltd., New Delhi.
12. Sharma, P.D. 2000. Plant Pathology. Narosa Publishing House, India.
13. Singh, R.S. (2000) : Introduction to Principles of Plant pathology (3_{rd} Edition), Oxford & IBH Publishers, New Delhi.
14. Sullia, S.B. and Shantharam, S. 2000. General Microbiology. Oxford & IBH Publ. , New Delhi.
15. Webster, J. (1999) : Introduction to Fungi (2_{nd} edition), Cambridge University Press
16. R. Hall (2005). Plant Virology. Printice Hall

15012 - Genetics and Plant Breeding

Unit- I: Classical Genetics

Trait, Genotype, Phenotype**, Mendelian Principles:** Dominance, segregation, independent assortment. **Extensions of Mendelian principles:** Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity. **Sex determination**: Chromosomal Sex-Determining Systems, Genic Sex-Determining Systems, Environmental Sex Determination. **Sex-Linked Characteristics**: Sex linkage, sex limited and sex influenced characters.

Unit- II: Linkage, Recombination, Gene mapping methods and extra chromosomal inheritance

Linkage: Morgans work in Drosophila and Cross over; **Genetic Maps**: Constructing Genetic Maps, Concept of a Genetic Map. Gene Mapping with Two-Point Testcrosses, Gene Mapping with Three-Point Testcrosses, Calculating the Recombination Frequencies, Linkage maps, tetrad analysis. **Recombination**: Types, Molecular mechanism of recombination. Homologous, site specific and non-homologous recombination. Factors affecting recombination. **Extra chromosomal inheritance**: Inheritance of mitochondrial and chloroplast genes, maternal inheritance.

Unit- III: Mutation and alterations of chromosomes

Mutation: **Types:** Based on Base-pairs alterations-Base substitution, Insertions and Deletions, Frameshift Mutations. Germinal vs somatic mutants, Spontaneous vs Induced mutations. Visible Mutants, Nutritional Mutants- loss of and gain-of-function, Lethal mutations- recessive and dominant, conditional lethal mutations. **Causes of Mutation**- Spontaneous and Induced Mutations. **Detection of Mutations**: in Bacteria, fungi and Plants. **Structural and numerical alterations in chromosomes**: Deletion, duplication, inversion, translocation, ploidy and their genetic implications. **Transposable Elements:** General Features; General Properties of Plant Transposable Elements; Study of Transposable Elements in Plants (Corn).

Unit-IV: Plant breeding

Historical perspectives and objectives of plant breeding. **Breeding methods** – **general methods**: Plant introduction, **selection**: pureline, mass and clonal selection and hybridization. Inbreeding depression, heterosis, male sterility, self-incompatibility. **Special breeding methods:** Polyploidy breeding and mutation breeding in crop improvement. **Breeding Applications**: Breeding of plants for improving yield, quality and resistant to abiotic stress, diseases and pests, earliness and adaptability.

Suggested Practical's:

1. Problems related to Mendel's laws, Probability, Pedigree analysis
2. Problems related to codominance, multiple alleles, lethal alleles, epistasis, complementation analysis, X linkage, sex-limited and sex influenced inheritance.
3. Problems related to two-point test cross, three point mapping
4. Sex determination in Drosophila humans, and plants

5. Study of floral biology, Pollination mechanisms and breeding of crops- typical examples of self and cross pollinated plants.
6. Techniques of Emasculation and hybridization.

Suggested Readings:

1. D. Peter Snustad, Michael J. Simmons. 2002. Principles of Genetics. John Wiley & Son, USA.
2. Peter J. Russell 2009. iGenetics A Molecular Approach. Pearson Ltd. USA.
3. Daniel L. Hartl, Elizabeth W. Jones. 1997. Genetics: Principles and Analysis. Jones and Bartlett Publishers Inc. USA.
4. Singh B.D. 2015. Plant Breeding principles and Methods. Kalyani Publishers. India
5. Tamarin, R. H. 2004. Principles of Genetics. McGraw-Hill Higher Education. USA
6. Phundan Singh, 2010. Essentials of Plant Breeding. Kalyani Publishers, New Delhi.
7. Hartwell, et al. 2004 : Genetics:From Genes to Genomes**.** McGraw-Hill Higher Education. USA
8. Pierce, B. A. (2012). Genetics: A conceptual approach. WH Freeman. USA.
9. George Acquaah. 2012. Plant Genetics and Breeding. Wiley-Blackwell. USA.
10. Karvita B. Ahluwalia. Genetics.1985. Wiley Eastern Limited. India.
11. P K Gupta.2010. Genetics. Rastogi Publications. India.
12. P.S.Verma and V.K.Agarwal. 2010. Genetics. S. Chand Publishing. India.
13. V.K.Khanna. 2017.Fundamentals of Genetics Laboratory Manual. Kalyani Publishers. India.
14. Gardner and Simmons Snustad, 2005. Principles of Genetics, John Wiley and Sons, Singapore.

15013 - Biology and Diversity of Algae, Bryophytes, Pteridophytes and Gymnosperms

Unit- I: Algae

General characters, Algae in diversified habitat (terrestrial, aquatic-freshwater and marine, Unusual habitat of algae). **Thallus organization:** unicellular motile, unicellular non-motile, colonial, filamentous, heterotrichous, siphonous, parenchymatous, psedo parenchymatous, special thallus. Cell structure. **Reproduction** (vegetative, asexual and sexual). **Criteria for classification of algae**: algal pigments, reserve food, algal flagella. Fritsch classification. General account of Cyanophyta, Chlorophyta, Charophyta, Xanthophyta, Bacillariophyta, Phaeophyta and Rhodophyta. **Economic importance of algae**: algae as food, fodder, fertilizers, medicines, and uses in industry, algal blooms.

Unit- II: Bryophytes

General characters, Morphology, Structure, **Reproduction**: vegetative and sexual methods and life history. Classification of Bryophytes; General account and classification of Marchantiales, Anthoceratales, Sphagnales and Polytrichales; Diversity and Evolution of Sporophyte in Bryophytes, **economic and ecological importance**: peat, medicines, food, pollution indicators, conservation, rock builders. Distribution of bryophytes in India;

Unit – III: Pteridophytes

General characters, **Habitat of Pteridophytes:** terrestrial, aquatic, xerophytic. **Morphology:** sporophyte and gametophyte. Structure and Reproduction, Sporne classification. Origin of pteridophytes, stellar evolution in Pteridophytes, heterospory and origin of seed habit. Apospory and Apogamy. Evolution of sporophyte: telome theory. General account and classification of Psilopsida, Lycopsida, Sphenopsida and Pteropsida. Fossils of Pteridophytes. **Economic importance**: food, construction material, as horticultural plants, biofertilizers, medicines. Distribution of Pteridophytes in India.

Unit – IV: Gymnosperms

General characters, **Morphology**: vegetative and reproductive organs. **Reproduction** (vegetative and sexual), and Sporne classification. Distribution of gymnosperms in India, **General account and affinities of living gymnosperms:** Cycadales, Ginkgoales, Coniferales, and Gnetales. **Sailent features and affinities of fossil gymnosperms** - Pteridospermales, Cycadeoidales and Cordaitales. **Economic importance**: wood, resins, food, oils, medicines, fibre, paper, ornamental.

Suggested Practicals:

1. Examination of vegetative and reproductive morphology of various algae from Cyanophyta, Chlorophyta, Charophyta, Xanthophyta, Bacillariophyta, Phaeophyta and Rhodophyta.
2. Morphological study of representative members of all groups using whole mount preparations and sections.

3. Study of morphology and anatomy of vegetative structures of Bryophytes, Pteridophytes and Gymnosperms.
4. Study of fossils from Pteridophytes and Gymnosperms

Suggested Readings:

1. Bhatnagar, S.P. & Alok Moitra (1997) : Gymnosperms, New Age International (P) Ltd., Publisher, New Delhi.
2. Bilgrami, K.S., & L.C. Saha (1996) : A text Book of Algae, CBS Publishers & Distributors (P) Ltd., New Delhi.
3. Chapman, V.J., & Chapman, D.J., (1973) : The Algae (2nd Edition), ELBS & MacMillan
4. Chopra, R.N. & Kumara, P.K. (1988) : Biology of Bryophytes, Wiley Eastern Ltd., New Delhi. Coulter, J.M.& C.J. Chamberlain (1964) : Morphology of Gymnosperms, Central Book Depot, Allahabad
5. Datta, S.C. (1984) : An Introduction to Gymnosperms, Kalyani Publishers, New Delhi
6. Kumar, H.D. (1990) : Introductory Phycology, Affiliated East West Press (P) Ltd., New Delhi. Prem Puri (1981) : Bryophytes: Morphology, Growth and differentiation, Atma Ram & Sons., Delhi, Lucknow.
7. Parihar, N.S. (19) : An Introduction to Embryophyta Vol.II Pteridophyta, Central Book Depot., Allahabad.
8. Rashid, A. (1998) : An Introduction to Bryophyta, Vikas Publishing House (P) Ltd., New Delhi
9. Rashid, A. (1999) : An Introduction to Pteridophyta, Vikas Publishing Co., New Delhi,
10. Round, F.E. (1973) : Biology of the Algae (2nd Edition), Edward Arnold, London.
11. Sharma, O.P. (1990) : Textbook of Pteridophyta, MacMillan India Ltd., Delhi.
12. Sharma, O.P. (1990) : Text Book of Algae, Tata McGraw Hill Publishing Co., Ltd., New Delhi.
13. Smith, G.M. (1955) : Cryptogamic Botany (Vol. I Algae, Fungi, & Lichens), McGraw-Hill Book Co., New York
14. Sporne, K.R. (1970) : The Morphology of Pteridophytes, (The Structure of Ferns and Allied Plants), Hutchinson University Library, London
15. Sporne, K.R. (1971) : The Morphology of Gymnosperms (The Structure and Evolution of Primitive seed Plants), Hutchinson University Library, London
16. Sundara Rajan, S. (1994) : Introduction to Pteridophyta, New Age International Publishers Ltd., Wiley Eastern Ltd., New Delhi
17. Venkateswarlu, V. (1970): A Text Book of Algae, Maruti Book Depot, Gunter, Hyderabad, India. Wynne, M.J. (1978) : Introduction to the Algae: Structure & Reproduction, Prentice Hall of India, New Delhi.

15014 - Taxonomy of Angiosperms

Unit- I: Plant Classification and Phylogeny

History of Plant taxonomy, **Plant taxonomy**-scope and significance; brief history of plant classifications-natural and phylogenetic; salient features and classifications of Bentham and Hooker, Cronquist and Angiosperm Phylogeny Group; APG classification-primitive angiosperms; concept of monophyly and polyphyly; Phylogeny: Origin and evolution of angiosperms.

Unit- II: Identification and Nomenclature

Plant collection and specimen preparation, **methodology**-collection, processing and preservation of plant specimens; important world and Indian herbaria; Botanical Survey of India (BSI), Plant identification-taxonomic keys; **taxonomic literature**-floras, journals and computer database. **Plant Nomenclature**: Botanical Names and Phylocode; International Code of Botanical Nomenclature-principles, rules and recommendations-ranks of taxa, typification, rule of priority, concept of names and author citation; effective and valid publication.

Unit- III: Selected Families of Angiosperms and Trends in Taxonomy

Systematic position (APG-IV), key characters, representative taxa and economic importance of the angiosperm families: Magnoliaceae, Fabaceae (Faboideae, Caesalpinioideae and Mimosoideae), Asteraceae, Apocynaceae, Solanaceae, Acanthaceae, Lamiaceae, Amarnathaceae, Euphorbiaceae, Orchidaceae, Araceae, Poaceae. **Trends in Taxonomy** – Chemotaxonomy, Numerical Taxonomy and Molecular Taxonomy.

Unit- IV: Phytogeography

Principles of Phytogeography-static and dynamic; patterns of plant distribution-continental drift theory and endemism; endemic plants of India; biogeographical zones of India, climate and vegetation types in Himalayas, Western Ghats, Deccan Peninsula (Eastern Ghats) and North-East India; flora and vegetation types of Andhra Pradesh.

Suggested Practical's:

1. Field trips minimum of 3 each with 2-3 days to acquaint with local flora. Submission of a report on field trips.
2. Study of about 50 wild taxa representing different families and identification to species level.
3. Preparation of 50 herbarium specimens of common wild plant taxa.
4. Study of flora of the college campus.
5. Construction of taxonomic keys.
6. Nomenclatural exercise.

Suggested Readings:

1. O.P. Sharma, 2016. Plant Taxonomy
2. Gamble & Fischer 1915-1935. Flora of Presidency of Madras. 3 vols.BSMS, Dehradun.
3. Heywood, V.H., RK Brummitt, A. Culham, O. Seberg 2007. Flowering Plant Families of the World. Firefly books Ltd. New York.
4. Judd, W.S, Christopher S. Campbell, Elizabeth A. Kellogg, Peter F. Stevens, and Michael J. Donoghue. 2007. Plant Systematics: A Phylogenetic Approach, 3rd ed. Sinauer.
5. Lawrence, G.H.M 1951. Taxonomy of Vascular plants. McMillan, New York.
6. Naik, V.N. 1992. Taxonomy of Angiosperms. 2nd Edn. Tata Mc.Graw Hill.
7. Pullaiah, T. 2005. Taxonomy of Angiosperms. Regency publications, New Delhi.
8. Pullaiah, T. et al 1997. Flora of Andhra Pradesh. 4 vols. Scientific Publishers, Jodhpur.
9. Radford. A.E.et.al., 1974. Vascular plant systematics. Harper & Row. New York.
10. Ravi Prasad Rao, B. 2007. Plant Name Directory. ABCD, Planographers. Hyderabad.
11. Simpson, Michael G. 2006. Plant Systematics. Elseiver& Academic Press.
12. Singh, Gurucharan. 2005. Plant Systematics. Oxford & IBH. New Delhi.
13. Sivarajan, V.V.1991. Introduction to principles of Plant Taxonomy. Oxford & IBH.

25011 - Plant Developmental Biology

Unit- I: Morphogenesis and Organogenesis in plants

Organization of Shoot Apical Meristem (SAM) and Root Apical Meristem (RAM), Shoot and root development, Leaf development and phyllotaxy. **Dermal tissue system** - types of trichomes and stomata. **Vascular tissue system** - types of vascular bundles. Primary growth of root and stem, secondary growth in dicot stem, root and monocot stem. **Anomalous secondary growth** - abnormal position and activity of cambium, intraxylary and interxylary phloem, Wood anatomy, wood development in relation to environmental factors

Unit- II: Hormonal regulation of plant development

Overview of plant harmones. **Auxins**: discovery, structure, biosynthesis, developmental role and mode of action. **Gibberellins**: discovery, structure, biosynthesis, developmental role and physiological effects (effects on growth and development). **Cytokinins**: structure, types and biological roles of cytokinins. **Abscisic acid**: occurrence, chemical structure and physiological effects. Ethylene, brassinosteroids, polyamines, jasmonic acid and salicylic acid.

Unit- III: Envirnomnetal regulation of plant development

Structure, function and mechanism of action of phytochrome, cryptochrome and phototropins; scotomorphogenesis and photomorphogensis. **Ecological anatomy**: Adaptations in Hydrophytes, mesophytes and xerophytes, anatomy in relation to taxonomy: Hairs, stomata, epidermal cells, **microchemistry**: crystals, cystoliths, laticiferous tissue. Bicollateral vascular bundles, wood.

Unit-IV: Programmed Cell Death and Senescence

Concept of PCD, categories of cells undergo PCD during vegetative and reproductive stages, mechanism of PCD, developmental and stress induced PCD. Overview of plant senescence, patterns of senescence, **physiological changes during senescence**: photosynthesis, respiration, nitrogen fixation, protein and nucleic acids, environmental, biochemical, and molecular aspects of senescence. Environmental influence on senescence.

Suggested Practical's:

1. Study of important fossil (pteridophytes and gymnosperms) from prepared slides and specimens.
2. Study of T.S. of stem, root and leaf
3. Study of secondary growth in angiosperms
4. Study of anomalous structures in angiosperms
5. Study of dermal tissue system and vascular tissue system
6. Wood anatomy, T.S, T.L.S, and R.L.S

Note: Every student has to submit at least five permanent slides at the time of practical examination.

Suggested Reading:

1. Buchanan BB, Grissem W, Jones RL (2000): Biochemistry and molecular biology of plants, I.K. International Pvt. Ltd, New Delhi.
2. Cutter, E.G. (1978) : Plant Anatomy Part: I: Cells & Tissues (2nd Edn.) Plant Anatomy Part II: Experiments & Interpretations Edward Arnold, London-1
3. Eames, A.J., & Mc Daniels, L.H. (1979) : An Introduction to Plant anatomy, Tata-McGraw-Hill Publishing Co., (P) Ltd., Bombay
4. Esau. K. (1980) : Plant Anatomy, (2nd Edition), Wiley Eastern Ltd., New Delhi.
5. Fahn, A. (1997) : Plant Anatomy, Pergamon Press, Oxford
6. Foster, A.S. (1960) : Practical Plant anatomy, Van Nostrand & East –West Press, New Delhi.
7. Pandey, B.P. (1989): Plant anatomy, S. Chand & Co., New Delhi
8. Singh, V., Pandey, P.C. & Jain, D.K. (1987): Anatomy of Seed Plants, Rastogi Publications, Meerut, India
9. Stewart, W. N. and Rathwell, G. W. 1993. Paleobotany and the Evolution of Plants. Cambridge University Press.
10. Taiz L., Zeiger E (2003). Plant Physiology, Panima Publishing Corporation, Bangalore.
11. B.P.Pandey. Plant Anatomy 2015. S. Chand and Company Ltd, New Delhi.

25012 - Plant Reporduction

Unit- I: Flower developement

Reporductive strtagies in higher plants and their significance, sexual and non-sexual modes (vegetative propagation), shoot apex and phase change, flower evocation, floral meristems and floral organ development, biochemical mechanisms involved in flowering (plant hormones and carbohydrates), regulation of flowering by light (photoperiodism) and temperature (vernalization), role of circadian rhythms, endogenous clock, Genetic and molecular analysis of flower development, homeotic mutants in plants (*Arabidopsis* and *Anthurium*), sex determination in plants.

Unit –II: Male and female gametophytes

Anther differntiation, structure of anthers, tapetal development, microsporogenesis, pollen development, Structure of pollen wall and features, molecular perspective of male gametophyte development, elements of palynology: aperture, NPC system, chemical composition of pollen and pollen allergy, male germ unit, male sterility. Ovule development, megasporogenesis, female gametophyte development, organization of embryo sac, structure of embryosac cells.

Unit-III: Pollination and Fertilization

Anther dehiscence, pollination, pollen germination, pollen-stigma interactions, path of pollen tube, double fertilization. **Self incomapatibility**; biological significance and mtehods to overcome incompatibility - irradiation, bud pollination, stump pollination, hot water treatment, somatic hybridization. Structure, development, types and function of endosperm, endosperm haustoria.

Unit-IV: Seed and Fruit Development

Embryogenesis, physiological and gentic control of embryogenesis, embryogeny in dicots and monocots, **polyembryony** - causes, types and applications. **Apomixis** - causes, types and applications. Seed development, events associated with seed maturation, factors regulating seed dormancy, seed germination, mechanisms of mobilization of food resreves during seed germination; stages of fruit development and their regulation, fruit ripening.

Suggested Practicals

1. Study of microsporogenesis and gametogenesis in anther sections
2. Examinations of anthers dehiscence and collection of pollen grains for microscopic examination (maize, grasses, Cannabis sativa, Crotalaria, Tradescantia, Brassica, Petunia, Solanam melongene etc.)
3. Tests for pollen viability using stains and in vitro germination-pollen germination using hanging drop and sitting drop culture, suspension cultures and surface culture.
4. Study of pollen grains by acetolysis method
5. Study of ovules in cleared preparations. Study monosporic, bisporic and tetrasporic embryo sac development through examination of permanent stained serial sections.
6. Dissection and mounting of endosperm and embryo showing developmental stages and haustoria.

Suggested Readings

1. Mahswari, P. An Introduction to Embryology of Angiosperms, 2014. Surjeet Publications, New Delhi.
2. Shivanna, K.R. and Johri, B.M. The Angiosperm Pollen structure and Function, Wiley Eastern Ltd. Publications, 1989.
3. Bhojwani, S. and Bhatnagar, S.P. Embryology of Angiosperms (4 th Revised and enlarged Edition), 2000.
4. Raghavan, V. Molecular Embryology of Flowering Plants Cambridge: Univ. Press, 1997.
5. Pullaiah, T., K. Lakshminarayana and B. Hanumantha Rao 2001. Textbook of Embryology of Angiosperms. Regency Publications, New Delhi
6. Pullaiah T., K.Lakshminarayana and B. Hanumantha Rao 2009. Plant Reproduction. Scientific Publishers, Jodhpur.
7. Raghavan, A. 1986. Embryogenesis in Angiosperms A developmental and Experimental study. CUP, New York
8. Buchanan BB, Grissem W, Jones RL (2000): Biochemistry and molecular biology of plants, I.K. International Pvt. Ltd, New Delhi.

25013 - Plant Ecology and Environment

Unit- I: Ecology and Environment

Definition, Scope and History of Ecology; climatic and topographic factor; physical environment and plant life- light, temperature and fire factors and biotic environment; Ecosystem-structure and function; energy flow in ecosystems-concept of productivity, types of food chains; Biogeochemical cycling- global carbon cycle, sulphur and water cycle; Ecosystems of the world-terrestrial (tropical forests-seasonal and rainforests; grasslands) and aquatic ecosystems.

Unit- II: Plant Communities and Classification

Characteristics of plant communities; analytic-qualitative (life forms, phenology), and quantitative (abundance, density, frequency, basal area); synthetic-species dominance and species diversity. Methods of study of plant communities- quadrats and transects; Importance Value Index, dominance index, similarity index, species diversity indices; community succession-process and modeling; concept of climax. Ecological adaptations.

Unit- III: Populations and Individuals

Characteristics of plant populations-density, dispersion, natality, mortality and survival, age structure and biotic potential; population growth patterns; population regulation; concept of metapopulation; Population dynamics. Species interactions: plant-plant (inter-specific competition) and plant-animal (pollination ecology and plant defense against herbivores); concept of ecological niche.

Unit- IV: Environmental Challenges

Natural resources, Classification of natural resources. Energy resources: Renewable energy resources-solar energy, wind energy, hydeal energy, thermal energy, bio energy. Non-renewable energy resources-fossil fuels; coal, natural gas, petroleum. Environmental pollution; sources, effects and control measures of air pollution, water pollution, soil pollution and noise pollution. Global warming-greenhouse gases, impacts on global environment and biodiversity; Ozone layer depletion; El Nino Southern Oscillation, La Nino; Earth Summit – 1992 (RIO DE JANERIO) and 2002 (JOHANNESBURG) and its outcome. Bioremediation. Environmental Impact Assessment (EIA).

Suggested Practical's:

1. Determination of texture of different soil samples.
2. Determination of organic matter in soil samples.
3. Determination of salinity in soil and water samples.
4. Estimation of dissolved oxygen in water samples.
5. Determination of minimum size of quadrates.

6. Determination of minimum number of quadrates.
7. Determination of quantitative characters of plant community.
8. Determination of species-wise IVI in plant community.
9. Determination of species diversity indices of plant communities.

Suggested Readings:

1. Alan beebay & Anne-Maria Brennan. 2008. First Ecology. 3rd ed. Oxford University Press.
2. Begon Michael, Colin Townsend & John L. Harper. 2005. Ecology, From Individuals to Ecosystems. 4th ed.Black well Publishing, Oxford.
3. Brower, J., Jerold Zar and Carl von Ende. 1989. Field and laboratory methods for General Ecology. Wm. C. Brown Publishers.
4. Chapman, J.I. & M.J. Reiss. 1992. Ecology-Principles and applications. OUP.
5. Cunningham, W.P. & M.A.Cunningham 2007. Principles of Environmental Science-Inquiry and applications. Tata Mc GrawHill Pub.New Delhi.
6. Dash, M.C.2009. Fundementals of Ecology. Tata Mc GrawHill Pub.New Delhi.
7. Girard, James. 2005.Principles of Environmental Chemistry. Jones & Barlett. Sudbury.MA, USA.
8. Harborne, H.B. 1998. Introduction to Ecological Biochemistry. Academic Press.
9. Kormondy, E.J.1996. Concepts of Ecology. PHI. New Delhi.
10. Mackenzie, A., A.S. Ball & S.R.Virdee. 2001. Instant Notes in Ecology. Viva Books.New Delhi.
11. Molles, M.C. 2005. Ecology-concepts and applications. Mc GrawHill. Boston
12. Moore, P.D. & S.H.Chapman. 1986. Methods in Plant Ecology. Blackwell, Oxford.
13. Odum.E.P. 1971. Fundamentals of Ecology. W.B.Saunders, Phiadelphia.
14. Odum.E.P. & Gary W.Barrett. 2005. Ecology.Tomson Brooks/Cole, Singapore.

25014 - Cell Biology and Cytogenetics

Unit- I: Cell Membrane and Cell wall structure and function

The Cell: Discovery, Cell theory and exceptions to the cell theory. An Overview of Eukaryotic and Prokaryotic Cells and their compartmentalization. **Plant Cell wall** - structure-primary and secondary cell walls, function and biogenesis. **Cell Membrane**: Historical models of membrane structure. Functions of Cell Membrane-Protein diffusion, osmosis, ion channels, active transport, membrane pumps, mechanism of sorting and regulation of intracellular transport, and electrical properties of the membrane**. Plasmodesmata**: Structure, role in macro molecule transport.

Unit-II: Structural organization and function of intracellular organelles

Cytoskeleton - Structure and functions of microtubules, microfilaments and intermediate filaments. Role of microtubules and microfilaments in the motor movements; implications in flagellar and other movement. **Endoplasmic Reticulum**: Structure and functions**. Lysosomes:** Structure and functions. **Peroxisomes:** Structure and functions**. Mitochondria**-structure, genome, organization, functions and biogenesis. **Chloroplast** -structure, genome organization and functions. **Golgi Bodies**: Structure and functions. **Lysosomes**: Structure and functions. **Vacuole**: structure, function and significance of vacuoles in plants.

Unit-III: Nucleus and Chromosomes

Nucleus - structure of nuclear envelope, nuclear pore complex, nucleolus and functions of nucleus. **Chromatin structure**: Histones, DNA, nucleosome morphology and higher level organization; Functional states of chromatin and alterations in chromatin organization
Chromosome: Metaphase chromosomes: centromere and kinetochore, telomere and its maintenance; Holocentric chromosomes; Heterochromatin and euchromatin. **Giant chromosomes**: Polytene and lampbrush chromosomes.

Unit-IV: Cell cycle, Cell division and Meiosis

Cell Cycle: Overview of cell cycle, **Mitosis**: Mechanism of cell division mitotic apparatus, chromosome alignment and separation, cytokinesis. **Regulation and control of cell cycle**; role of cyclins and cyclin dependent kinases in cell cycle regulation. **Meiosis**: Meiotic process – stages, chromosome pairing, chiasma formation and gene conversion, synaptonemal complex. Comparison of mitosis and meiosis. Significance of meiosis.

Suggested Practical's:

1. Determination of mitotic index.
2. Study of Chromosomal Behavior during Mitosis in root tips of Onion.
3. Study of chromosomal behavior during meiosis with special emphasis on Prophase –I using flower buds of Onion.
4. Study on the effect of Colchicine on Mitosis.
5. Study of Polygene chromosomes using Chiranomus larvae.
6. Study on Structural hybrids in Rhoeo discolor.

Suggested Readings:

1. Cooper Geoffrey,M. 2000. The Cell-a molecular approach. 2nd Edn. ASM Press. Washington.
2. Alberts B, Johnson A, Lewis J, Raff Martin, Roberts K and Walter P. (2007) Molecular Biology of the Cell. Garland Publ., New York.
3. Sharma AK & A Sharma. 1980. Chromosome techniques: Theory & Practice. Batterworth.
4. De Robertis EDP & EMF De Robertis. 2001. Cell and Molecular biology. Lippincott Williams & Wilkins.Bombay.
5. Freifelder D. 1990. Molecular biology. Narosa publication house, New Delhi
6. Harvey Lodish et al , Molecular Cell Biology, (W. H. Freeman; Sixth Edition edition)
7. Lewin B (2008). Genes IX, Jones and Barlett Publish ers
8. Hardin, Jeff; Bertoni, Gregory Paul; Kleinsmith, Lewis J. (2009) Becker's World of the Cell, Benjamin Cummings.
9. P.S.Verma and V.K.Agarwal.2016. Cell Biology (Cytology, Biomolecules And Molecular Biology). S. Chand Publishing
10. P.K.Gupta. 2005. Cell and Molecular Biology. Rastogi Publications

SEMESTER - II: ELECTIVE - I (Non-core): Plants and Society

Unit-I: Introduction to Plant Life

Introduction - Why to study plants**. Plant Kingdom** – Brief introduction of Non-flowering plants - thalophyta, bryophyta and pteridophyta and flowering plants - spermatophyta. **Plant Tissues**: Brief introduction of Meristems, Dermal Tissues, Ground Tissues and Vascular Tissues. **Plant Organs**: Brief introduction of Root, Stem and Leaf. **Plant life cycle** – Brief introduction of Flowers: Floral Organs, Male Gametophyte Development, Female Gametophyte Development. **Pollination and Fertilization**: Animal Pollination, Wind Pollination and fertilization.

Unit-II: Systemic classification and uses of plants to society

Plant Systematics – history of classification, identification, nomenclature and classification of plants. **Plants as source of food** – Cereals (Rice), Millets (Sorghum), Pulses (Bengal gram), Vegetables (Tomato), Fruits (Banana and Mango). C**ommercial products -** stimulating beverages (coffee, tea), spices (cinnamon, cloves, nutmeg, ginger, vanilla), **Materials -** fibre, paper and wood. **Human health** – history of plants in medicine, medicinal plants (Aswagandha, Belladona, Holy basil, nux-vomica, sarpagandha), psychoactive plants (opium, marijuana), poisonous and allergy plants, oil plants, gums and resins.

Unit-III: Plant Cell and Physiology

The Plant Cell: Brief introduction of Cell wall; Membrane and Cell organelles. **Plant Genetics**: Introduction, Monohybrid cross and Dihybrid cross, Mendelian principles. **Principles of Plant Physiology** – **transport systems in plants -** transpiration, water absorption from soil, translocation. **Metabolism** – Photosynthesis - brief introduction, overview, Light reactions and types of carbon fixation pathways. Respiration - Glycolysis, Krebs cycle.

Unit-IV: Plants and Environment

The principles of ecology: The ecosystem, food chain and food web, ecological pyramids. Ecological succession. **Plant Biodiversity** - levels of biodiversity and threats to biodiversity. **Conservation of biodiversity**: *In situ* and *ex situ* conservation of biodiversity. **Human effects on plants and nature**: deforestation, climate change, pollution, loss of habitat and species.

Suggested Reading:

1. Estelle Levetin and Karen McMahon (2012). Plants and Society 6th Edition. The McGraw-Hill Publication, New York.
2. Hill.,A.W. (1952) : Economic Botany, McGraw Hill Book Co., New York.
3. Ashok Bendre& Ashok Kumar (1998-99) : Economic Botany, Rastogi Publications, Meerut, India
4. Pandey, B.P. (2000) : Economic Botany, S. Chand & Co., New Delhi
5. Krishnamurthy, K.V. (2004). An advanced text book of biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
6. Ambasht, R.S. (1974) : Text book of Plant Ecology (3rd Edn.,), Students & Friends Co., Varanasi - Odum E.P. (1975) : Ecology, Holt, Rinert& Winston

7. Kormandy, E.J. (1978): Concepts of Ecology (2nd Edition), Prentice Hall of India (P) Ltd., New Delhi.
8. Sharma, P.D. (2000): Ecology & Environment, Rastogi Publications, Meerut, India.

35011 - Ethnobotany and Pharmacognosy

Unit- I: Ethnobotany

Ethnobotany, its history, scope, importance and various sub disciplines; Methods and literature in ethnobotany; Recent ethnobotanical works in India; Main world centres and workers of ethnobotany; Different aspects related to tribes of Andhra Pradesh. Wild medicinal plants and their therapeutic values with reference to tribes of Eastern Ghats.

Unit- II: Phytomedicine and Systems of Medicine

Complementary/Alternative medicine; Different systems of indigenous medicine; Ayurveda - Origin and understanding of Ayurveda; Siddha - Origin and understanding of Sidha; Unani - History and principles of practices and perspectives of Unani; Homeopathy - History and principles of practices and perspectives of Homeopathy. Phytopharmaceuticals: inventory, taxonomic validation and evaluation of sources.

Unit- III: Analytical Pharmacognosy

Introduction, history, scope and applications of Pharmcognosy. Photopharmacy: constitution, identification of different constituents; Classification of drugs; analytical methods-drug adulteration, drug evaluation; phytochemical analysis of crude drugs.

Unit- IV: Pharmacological analysis and Utilization

Drugs of alkaloids, coumarins, tannins, terpinoides and glycosides; Natural pesticides, antibiotics, and poisonous plants. Antimicrobial assay: antibacterial and antifungal screening. Potential drug yielding plants and their marketing. Intellectual Property Rights (IPR) and patenting of active principles.

Suggested Practicals:

1. Recording Medicinal Practices and Herbal Formulations of Tribal Medicine.
2. Study of important medicinal plants used in drugs.
3. Field trip to study and identify locally occurring Medicinal plants.
4. Qualitative analysis of crude drugs for different phytochemicals
5. Quantitative estimation of secondary metabolites: Phenolic compounds and alkaloids.
6. Antimicrobial studies to determine MIC and MBC of different solvent extracts

Suggested Readings:

1. Cotton, CM. 1996. Ethnobotany: principles and applications.
2. Dey, A.C.1988. Indian Medicinal Plants and Ayurvedic preparations, Bishen Singh, M. Singh.
3. Gibbs, R.D. 1974. Chemotaxonomy of flowering plants. Montreal & London.
4. Kokate, CK., AP. Purohit & SB. Gokhale. 2000. Pharmacognosy. Nirali Prakashan Publ.

5. Kokate,CK, Khandelwal, SB Gokhale 1996. Practical Pharmacgnosy. Nirali Prakashan, Pune.
6. Manitto, P. 1981. The biosynthesis of natural products. Ellis Horwood, Chichester.
7. Martin, G.J. 1996. Ethnobotany. A methods manual. Chapman&Hall. London
8. Ramachandran, S.P. 1991. Recent Advances in Medicinal, aromatic and spice crops.
9. Trease, GE and WC Evans. 2002. Pharmacognosy. Saunders. New York.
10. Tyler, V.E., Brandy, L.R. and Robbers, J.E. 1988. Pharmacognosy. 9th edition. Lea and Febiger.Philadelphia. USA.

35012 - Plant Physiology

Unit-I: Transport and translocation of water, ions and solutes

Laws of diffusion and permeability, water potential in soil and root; water uptake (root pressure, apoplast and symplsat pathways, transmembrane pathway); transport through xylem (Cohesion-tension theory, surfcase tension theory), transpiration, stomatal types, stomatal movement, SPAC, antitranspirants; solute and ion transport, active and passive transport, Nernst Equation, transport across membrane (membrane pumps, carriers, ion channels, aquaporins); phloem mechanism of loading and unloading of photoassimilates.

Unit-II: Mineral nutrition, nitrogen and sulfate assimilation

Mineral nutrition; essential elements, deficiency symptoms and plant disorders, treating nutritional disorders. Nitrogen: Overview of nitrogen fixation, symbiotic and asymbiotic nitrogen fixation, legume-rhizobium symbiosis, nodule formation, mechanism of nitrogen fixation, ammonia uptake and transport, nitrate uptake and reduction, nitrate and nitrite reductions.
Sulfur: sulfur chemistry and function, sulfate uptake, transport and assimilation pathways.

Unit-III: Signal transduction

Signal transduction: Overview, receptors and G-proteins, phospholipid signaling, role of cyclic nucleotides, calcium-calmodulin cascade, diversity in protein kinases and phosphatases, specific signaling mechanisms, e.g. two-component sensor-regulator system in plants, sucrose-sensing mechanism.

Unit-IV: Stress physiology

Kinds of environmental stresses, morphological, physiological and biochemical responses of plants to abiotic stresses, mechanism of abiotic stress tolerance, water defecit, osmotic stress, osmotic adjustment, stress proteins and genes (HSPs, LEAs, osmotins, dehydrins); salinity (ion toxicity and exclusion), heavy metal stress, chilling and high temperature stress (HSPs), oxidative stress and ROS scavenging system.

Suggested Practicals:

1. Determination of cell permeability by using Beet root tissues.
2. Determination of stomatal index and frequency in leaves.
3. Determination of the water potential of the tissue.
4. Estimation of calcium
5. Extraction and Estimation of Chlorophyll pigments.
6. Determination of viability of different seed material.
7. Estimation of IAA by Solkowski's method.
8. Determination of membrane stability and chlorophyll stability index of stressed plants
9. Estimation of free Proline in stressed plants sample

Suggested Readings:

1. Buchannan et al 2001. Biochemistry and Molecular Biology of Plants.
2. C. M. Wiltmer & M. Fricker. 1996. Stomata. 2nd Ed. Chapman Hall. U. K.

3. Delvin, R. M. 1969. Plant Physiology. Affiliated East West, New York.L.
4. Taiz & E. Zeiger. 1998. Plant Physiology. Second Edition. Sinauer Associates Inc, Publishers, Massachusetts, USA.
5. Salisbury F. B. & C. W. Ross 1992 Plant Physiology. 4 th Edn. Wadsworth Publishing Co., Belmout, California.
6. Thomas C. Moore.1992. Biochemistry and Physiology of Hormones.Narosa.
7. Hopkins, W. 1998. Introduction to Plant Physiology. ELBS & Longman, Essex., England.

35013 - Tools and Techniques in Plant Science and Biostatistics

Unit-I: Microscopic, histochemical and radioisotope techniques

Microscopy: Principles and application of light, phase contrast, fluorescence, scanning and transmission electron microscopy. **Microtomy and staining**: Microtomy and double staining of plant sections. **Radioisotope Techniques:** Types of isotopes, radioactive decay. **Detection and measurement of radioactivity**- GM counter, scintillation counter, autoradiography. Isotopes used in biology, safety methods in handling radioisotopes.

Unit-II: Electrophoresis and Centrifugation methods

Polyacrylamide gel Electrophoresis: Native-PAGE, SDS-PAGE. **2D-Electrophoresis**: Isoelectricfocusing, 2D Electrophoresis. **Agarose Gel Electrophoresis**: Preparation, separation and determination of molecular size of DNA, denaturing agarose gel electrophoresis and their applications. **Centrifugation types**: differential centrifugation, density-gradient, analytical, and ultracentrifugation and their applications

Unit-IV: Spectroscopy and Chromatography Techniques

Spectroscopy: Laws of light absorption: Beer and Lamberts, **Instrumentation and applications**: UV- visible spectrophotometer, NMR and ESR spectroscopy, Mass Spectroscopy. **Chromatography: Principle, instrumentation, practical procedure and applications of**: Paper chromatography, thin-layer chromatography, gas-liquid chromatography, High-performance liquid chromatography (HPLC).

Unit-IV: Biostatistics

Introduction, role of statistics in botanical research, collection of data, tabulation. Statistical tools: **Variables:** qualitative variables and quantitative variables, measurement of variables. Frequency distribution, **Measures of Central Tendency:** Arithmetic mean, Median, Mode, Average, Percentage. **Measures of Dispersion:** Mean Deviation, Variance and Standard deviation, Coefficient variation. **Probability**; measures of probability, laws of probability. **Probability Distributions**: Binomial, Poisson, Normal and 't' distribution. Regression and Correlation, The Chi-Square test, Analysis of Variance (ANOVA). Non-Parametric statistics: Advantages and disadvantages of Non-Parametric statistics.

Suggested Practical's:

1. Micrometry- calibration of microscope using stage and ocular micro meters
2. Preparation of plant material for microtome sections and double staining
3. Separation of proteins by PAGE
4. Separation of nucleic acids by Agarose gel electrophoresis
5. Absorption spectra of amino acids, Proteins and nucleic acids
6. Isolation and spectrophotometric characterization of plant pigments
7. Verification of Beer's law
8. Statistical problems

Suggested Readings:

1. Upadhyay, Upadhyay, Nath, 2002.Biophysical Chemistry-Principals and Techniques (3rd edition). Himalaya Publishing House.
2. P.K. Bajpai (2012).Biological Instrumentation & methodology (Tools and Techniques of Biology) S Chand & Company Pvt Ltd.
3. Wilson & Walker 2000. Practical biochemistry: Principles & Techniques. Cambridge Univ. Press, New York
4. Williams and Wilson, K. 1991. A Biologist's guide to principles and techniques of practical biochemistry, 2nd ed. Edward Arnold.
5. Lain, D. Campbell and Raymond A. Dwek Biological Spectroscopy Benjamin/Cumming Pub. Co., California, London.
6. Cantor, C.R. and Schimmel, P.R. Biophysical Chemistry by, W.H. Freeman & Co.,
7. Glasel, A and Deutscher, M.P. 1995. Introduction to Biophysical Methods for Protein and Nucleic Acid Research. Academic Press.
8. R.N. Curnow, A.H. Hasted. 1993. Statistical methods in Agriculture and Experimental biology. 2nd ed.. R. Mead, Panima Publication. Bangalore
9. R.N. Forthafter and E.S. Lee. 1995. Introduction to Biostatistics. Academic Press. PP
10. P.S.S.Sundar Rao and J. Richard, 2014. Introduction to Biostatistics and Research Methods. PHI Learning Pvt. Ltd. New Delhi.

35014 - Molecular Biology of Plants

Unit- I: Genetic material structure, DNA replication and repair

Genetic material: Experimental evidences for genetic material- Fred Griffith, Avery, Hershey Chase experiments. Chemical and molecular structure of DNA and RNA. **DNA Replication**: Models for DNA replication- semi-conservative, conservative and dispersive models; Modes of replication- theta, rolling circle and linear mode, Replication origin and replication fork, enzymes involved in DNA replication-helicases, topioisomerases, SSB, DNA ligases, primases, DNA polymerases, mechanism of replication in prokaryotic and Eukaryotic organisms. **DNA damage and repair**: DNA damage and repair mechanisms.

Unit-II: RNA synthesis and processing

Components for Transcription: Template DNA, RNA polymerases-prokaryotic and eukaryotic, Promoters, Transcription factors. **Mechanism of transcription in prokaryotes and eukaryotes**-, Initiation, elongation and termination of RNA synthesis. **Post transcriptional modifications of RNA**: capping, Polyadenylation. **RNA splicing-** introns. Splicing mechanisms and alternate splicing. **RNA Editing**: Mechanism of RNA editing, **RNA Transport**: Mechanism of transport of RNA to Cytoplasm.

Unit-III: Protein Synthesis and processing

Genetic code -codon degeneracy, Wobble hypothesis, Universality of genetic code, **Ribosomes**: structure and composition of prokaryotic and eukaryotic ribosomes, **Structures-** mRNA and tRNA, **Translation process in prokaryotic and Eukarotic organisms**: events in protein synthesis-amino acid activation, initiation, elongation and termination. **Inhibitors of protein synthesis**: Antibiotics. **Post translational modification of proteins**-protein sorting and targeting, molecular chaperons, protein folding and protein degradation.

Unit – IV: Regulation of Gene Expression

Stages of gene regulation: DNA level, transcriptional, post transcriptional, translational and post translational. **Regulation of gene expression in prokaryotes**: organization of prokaryotic genes-Lac operon, Trpoperon, negative and positive gene regulation. **Regulation of gene expression in eukaryotes**: housekeeping genes, constitutive genes and regulatory genes, role of transcription factors, role of chromatin, DNA Methylation, miRNA/small RNAs in gene expression and gene silencing.

Suggested Practicals:

1. Estimation of DNA by diphenylamine method.
2. Estimation of RNA by orcinol method.
3. Isolation of genomic DNA from plant tissues by CTAB method.
4. Determination of purity of DNA and quantification of DNA by UV absorption method.
5. Separation of genomic DNA on Agrose gel electrophoresis
6. Isolation of total RNA from Plant Tissues using LiCl2 method
7. Determination of purity of RNA and quantification of RNA by UV absorption method.
8. Separation of genomic RNA on formaldehyde Agrose gel electrophoresis
9. Determination of Tm point of DNA isolated from plant tissue

10. Isolation of proteins from plant tissues
11. Estimation of proteins by Lowry's method.
12. Separation of proteins by SDS-PAGE.

Suggested Readings:

1. B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D.Watson , Moleucular Biology of the Cell. (Garland Publishing , New York and London)
2. D.Freifelder, Molecular Biology. A Comprehensive Introduction to Prokaryotes and Eukaryotes, (Jones and Bartlett, USA)
3. Donald Voet and Judith Voet ,Biochemistry - (John Wiles and sons)
4. Benjamin Lewin, Genes VIII. (2003) (Benjamin Cummings; United States Ed edition)
5. James D. Watson et al, Molecular Biology of the Gene , (Benjamin Cummings; 5 edition)
6. Lehninger , Principles of Biochemistry (W. H. Freeman; 4 edition)
7. Harvey Lodish et al , Molecular Cell Biology, (W. H. Freeman; Sixth Edition edition)
8. P. Turner , Instant Notes in Molecular Biology (BIOS Scientific Publ; 3rd edition)
9. David P. Clark, Lonnie Dee Russell (1997). Molecular Biology: Made Simple and Fun. Cache River Press,
10. Robert Weaver (2007). Molecular Biology.McGraw-Hill Companies,Incorporated
11. Geoffrey M. Cooper, Robert E. Hausman (2007). The Cell: A Molecular Approach. ASM Press
12. Bruce Alberts, Dennis Bray, Karen Hopkin, Alexander D. Johnson, Julian Lewis, Keith Roberts (2014). Essential Cell Biology. Garland Science.
13. John Wilson, Tim Hunt (2002). Molecular Biology of the Cell: A Problems Approach. Garland Science.
14. Rene Fester Kratz (2009). Molecular and Cell Biology For Dummies. Wiley.
15. Hardin, Jeff; Bertoni, Gregory Paul; Kleinsmith, Lewis J. (2009) Becker's World of the Cell, Benjamin Cummings.
16. Benjamin Lewin, Jocelyn Krebs, Stephen T. Kilpatrick, Elliott S (2011). Goldstein. Lewin's GENES X. Jonnes and Bartlet Publishers
17. Peter J. Russell (2009). iGenetics A Molecular Approach. Pearson Ltd. USA.
18. R.W. Twyman (1998). Advanced Molecular Biology: A concised reference. Bios Scientific Publishers.
19. Lizabeth A. Allison (2011). Fundamental Molecular Biology, Wiley.

SEMESTER - III: ELECTIVE - II: (Non-core) Herbal Medicine

UNIT – I: Ethnobotany

Introduction, history, scope and importance, Inter disciplinary approaches in Ethnobotany. Study of Medicinal, Edible and Miscellaneous plants used by the Tribes. **Breif account on Indian medicine:** Ayurveda, Homeopathy, Unani and Siddha. Study of locally available medicinal plants and their thereupetic values (*Adathoda*, *Gymnema*, *Andrographis*, *Rauvolfia*, *Ocimum*).

UNIT – II: Pharmacognosy

Introduction, history and scope of Pharmacognosy. Drugs of alkaloids, glycosides, phenolics, antibiotics, psychoactive and poisonous plants. **Study of important medicinal plants**: Amla, Aswagandha, Aloe, Brahmi, Kesar. **Classification of drugs** - Alphabetical, Morphological (Organized and unorganized), Taxonomical, Chemical, Pharmacological, Chemotaxonomical and **drug evaluation** - morphological, microscopic, physical, chemical and biological evaluation. Genetic engineering of medicinal plants.

UNIT III: Herbal Cosmetics

Uses of herbal cosmetics like emulsifiers (fixed oils, waxes, butters), moisturizing agents, colours, perfumes, and fragrances, bleaching agents, preservatives, antioxidants, chelating agents, skin lotions, sunscreens, dyes, anti aging creams, deodarants, nail polishes, hair oils, soaps, shampoos, nail polishes and lipsticks.

UNIT IV: Medicinal plants

Formulation and standardization of various herbal cosmetic products, Henna, Turmeric, Sandalwood, Neem, Coconut, Rice, Holy basil, Red sandal wood, Camphor, Jaboba. Drugs for digestive disorders – *Withania somnifera*. Memory stimulants – *Centella asiatica*, *Bacopa monnieri*. Drugs for dissolving kidney stones – *Musa paradisiaca*. Antiinflammatory drugs – *Cardiospermum*. Anticancer drugs – *Catharanthus roseus*.

Suggested Readings:

1. Harborne, J. B. 1948. Phytochemical Methods (Ed.) Chapman and Hall, London.
2. Khare, C. P. 2000. Indian Herbal Therapies. Delhi Book Co., M-Connaught, Circus, New Delhi.
3. Kokate, C. K. Purohit, A.P. Gauchely, S.B. 1990. Pharmacognosy, Narial Prakashan, India.
4. Jain, S.K. 1995. Mannual of Ethnobotany, Scientific Publishers, Jodhpur.
5. Wallis, T. E. 1999. Text Book of Pharmacognosy, (5th Ed.) CBS Publishers & Distributions, New Delhi.
6. Singh, M. P. and Panda, Himadri 2005. Medicinal herbs with their formulations. Volume 1 & 2. Daya Publishing House, Delhi.
7. Herbal cosmetics, hand book By H. Panda
8. Kumar, N.C. (1993). An Introduction to Medical botany and Pharmacognosy. Emkay Publications, New Delhi.
9. Rao, A.P. (1999). Herbs that heal. Diamond Pocket Books (P) Ltd., New Delhi.
10. Gokhale, S.S., C.K.Kokate and A.P. Purohit (1994) Pharmacognosy. Nirali Prakashan. Pune.
11. Tyagi, Dinesh Kumar (2005) Pharma Forestry. Field Guide to Medicinal Plants. Atlantic Publishers and Distributors, New Delhi.

12. Faroogi, A.A., and B.S. Sreeramu (2004). Cultivation of Medicinal and Aromatic Crops. University Press (India) Pvt. Ltd., Hyderabad.
13. Singh & Jain (1985) Taxonomy of Angiosperms. Rastogi Publications, Meerut.

45011 - Plant Tissue Culture

Unit- I: Basics of plant tissue culture technique

Historical aspect and landmarks in plant tissue culture, concept of cellular totipotency and cellular differentiation, basic techniques in plant tissue culture, formulation of media for plant tissue culture, cultural conditions, physiological, biochemical and molecular role of mineral, carbohydarte and growth regulators in differention of organs under *in vitro* conditions.

Unit-II: Pathways of *in vitro* regeneration (Vegetative explants)

In vitro regeneration methods: Micropropagation, organogenesis (direct and indirect), somatic embryogenesis; Problems of tissue culture: contamination, phenolics, recalcitrance; Genome reorganization induced *in vitro*, somaclonal and gametoclonal variations; problems in establishment of regenerated plants in nature, hardening of plants.

Unit- III: Pathways of *in vitro* regeneration (reproductive explants) and protoplast culture

Gametic embryogenesis (androgenesis and gynogenesis), doubled haploids, culturing of ovary, ovule, nucellus, embryo, embryo rescue, triploid production, somatic hybridization; protoplast isolation, fusion and culture, hybrid selection and regeneration, possibilities, achievements and limitations of protoplast regenerants.

Unit- IV: Application of Plant Tissue Culture

Meristem culture for production of virus free plants, artificial seeds, production of secondary metabolites from cell suspension culture and hairy root culture, elicitors, plant cell reactors-bio reacters culture of isolated single cell, role of tissue culture in gene transfer, cryopreservation and germplasm storage.

Suggested Practicals

1. Preparation of different types of Media
2. Callus induction from carrot cambial explants or any other source. Callus cytological studies
3. Induction of Somatic Embryogenesis
4. Suspension Cultures
5. In vitro rooting of cultures
6. Culture of anthers for production of haploids
7. Induction of multiple shoots
8. Preparation of artificial seeds by sodium alginate.

Suggested Readings

1. Razdan, M.K. 2014. Introduction to Plant Tissue Culture (Second edition). Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Bhojwani, S.S. 1990. Plant Tissue Culture Applications and Limitations: Elsevier, New York
3. Bhojwani, S.S. and M.K.Razdan 1996. Plant Tissue Culture. Theory and practice (rev. ed) Elsevier Science Publishers, New York.

4. Collins, H.A. and S. Edwards 1998. Plant Cell Culture. Bios Scientific Publishers Oxford, UK.
5. Kalyan Kumar De. 1997. Plant Tissue Culture. NCB Agency, Kolkata.
6. Pullaiah, T. 2009. Plant Tissue Culture. Scientific Publishers, Jodhpur.
7. Vasil, I.K and T.A. Thorpe 1994. Plant Cell and Tissue Culture. Kluwer.

45012 - Genetic Engineering of Plants

Unit-I: Genetic Engineering Tools

Introduction to Genetic Engineering**. Enzymes used in genetic engineering:** Restriction endonucleases, types, properties and applications, DNA ligases, polynucleotide kinase, alkaline phosphotases, S1 nuclease, terminal transferase, topoisomerases, methylases and gyrases. **Cloning Vectors** – Characteristic features of desired vectors, E.coli based vectors (plasmids, bacteriophage derivatives, cosmids, BACs), yeast (YACs, shuttle vectors). **Gene Isolation methods**: Genomic DNA and cDNA libraries and their applications. **Gene manipulation tools**: Polymerase chain reaction - Principle, types and applications. **Sequencing of nucleic acids** – Maxam –Gilbert chemical degradation and Sanger's dideoxy chain termination methods. **Blotting methods**: Southern, Northern and Western blotting.

Unit-II: Advanced Methods in Genetic Engineering

Microarrays: Principle, Various Types, Methodology and Applications. **Proteomics**: Protein microarrays and their applications. **Advances in sequencing technology:** next-generation sequencing' (NGS) technology and applications. **RNA interference (RNAi)**: Mechanism of RNAi in plants, Pathways of biogenesis of miRNA, siRNA and their role in crop improvement. **Genome Editing Technologies**: CRISPR technology principle, methodology and applications in crop improvement.

Unit-III: Marker Assisted Breeding

Molecular Markers: Different kinds of molecular markers - Morphological markers, Biochemical markers, molecular markers- RFLP, RAPD, SCARs, SSRs, AFLP, ISSRs, CAPs, SNPs- Principle, Methodology and their merits and demerits. **Marker Assisted Breeding**: Potential use of Marker assisted selection (MAS) in crop improvement *i.e* Submergence tolerance in rice; Blast disease resistance in rice; drought tolerance in rice.

Unit-II: Plant transformation and Transgenic Plants

Introduction to transgenic plants**. Plan transformation Methods**: Agrobacterium-mechanism of T-DNA transfer and its integration into plant genome, basis of tumor formation, role of virulence gene, use of Ti and Ri plasmids as vectors, electroporation, microinjection, particle bombardment method and Chloroplast transformation, selection of transformants. **Applications of Transgenic plants**: Herbicide Resistance, Male sterility, Insect resistance (Bt transgenics), Virus resistance, Pest Resistance, Fungal resistance. Genetic engineering of plants for nutritional quality improvement (Vitamin A-Golden rice; Vitamin E), transgenic plants for extended shelf life of fruits, manipulation of flower colour, Abiotic stress tolerance, Edible vaccines. **Concerns and risks of transgenic plants**: Possible Ecological concerns and risks of transgenic crops.

Suggested Practicals:

1. Preparation of E.coli growth curve by turbidimetric method
2. Preparation of E.coli competent cells by CaCl2 method
3. Setting up a ligation reaction
4. Bacterial transformation by heat shock method

5. Isolation of plasmid DNA by alkaline lysis method and separation by agarose gel electrophoresis
6. Restriction digestion of plasmid DNA
7. Polymerase Chain reaction (PCR)
8. RAPD
9. Demonstration of Agrobacterium mediated plant transformation method

Suggested Readings:

1. Surinder Chopra, Shelby J. Fleischer, Agnès Ricroch (2014). Plant Biotechnology: Experience and Future Prospects. Springer Publications, Singapore.

2. Suresh Kumar Gahlawat, Raj Kumar Salar, Priyanka Siwach, Joginder Singh Duhan, Suresh Kumar, Pawan Kaur (2017). Plant Biotechnology: Recent Advancements and Developments. Springer Publications, Singapore.

3. Malik Zainul Abdin, Usha Kiran, Kamaluddin, Athar Ali (2017). Plant Biotechnology: Principles and Applications. Springer Publications, Singapore.

4. Adrian Slater, Nigel W. Scott and Mark R Flower (2012). Plant Biotechnology: the genetic manipulation of Plants. Oxford University Press, UK.

5. Sudhir K. Sopory, Ashwani Kumar (2008). Recent Advances in Plant Biotechnology and its Applications. I K International Publishing House, New Delhi.

6. H.S.Chawla (2017). Introduction to Plant Biotechnology (3/e). CRC Press.

7. P.S. Srivastava, Alka Narula, Sheela Srivastava (2005). Plant Biotechnology and Molecular Markers. Kluwer Academic Publishers, New Yark.

8. T. A. Brown (2016). Gene Cloning and DNA Analysis: An Introduction, 7th Edition. Wiley-Blackwell.

9. Christopher Howe (2007). Gene Cloning and Manipulation. Cambridge University Press.

10. U.Satyanarayana (2008). Biotechnology. Books & Allied Ltd.

45013 - Plant Metabolism

Unit- I: Bioenergetics and Enzymes

Energy transformation in living systems, laws of thermodynamics, free energy, standard free energy changes; Phosporyl group transfers, biological energy transducers; Enzymes, principles, nomenclature, claissifictaion, enzyme regulation, enzyme kinetics (Michaelis-Menten equation, and Reversible reactions), coupled reaction, biocatalysts, isozymes and ribozymes.

Unit- II: Biomolecules

Overview of amino acids, peptides and proteins, overview of protein structure (secondary, tertiary and quarternary structures, Ramachandran plot), protein denaturation and folding. Carbohydrates: monosaccharides, disaccharides, hetero and homopolysaccharides; synthesis and degradation of sucrose and starch (hexose phosphate pool, triose phosphate/pentose phosphate metabolite pools and their intercations); gluconeogenesis, Lipids: storage and structural lipids, functions of lipids, fatty acid biosynthesis and catabolism (β-oxidation).

Unit –III: Photosynthesis and Photorespiration

Photosynthesis: Overview, light absorption and energy conversion, light harvesting complexes, photoprotective mechanisms, electron transport pathways in chloroplast membranes, photophosphorylation. Carbon fixation pathways - C_3, C_4, CAM pathways and C_3-C_4 intremediates. Photorespiration - biochemical basis of photorespiration, photorespiratory pathway, role of photorespiration in plants.

Unit- IV: Secondary metabolites

Overview, Primary metabolites vs. secondary metabolites. Structure, biosynthesis, biological and economic importance of Alkaloids, Terpenoids (monoterpenes, sesquiterepenes, polyterpenes, volatile oils), Phenols (phenolic acids, coumarins, flavonoids, lignins).

Suggested Practicals:

1. Determination of total chlorophyll content and a/b ratio in leaves.
2. Separation of chloroplast pigments into two and four groups. Recording of their absorption spectra.
3. Comparative anatomy of C3, C4 and CAM leaves
4. Determination titrable acidity (TAN) in leaves of C3 & CAM plants.
5. Estimation of proteins in plant samples by Biuret or Lowry's method.
6. Estimation of reducing sugars in plant samples by Nelson's method.
7. Determination of amylase activity in germinating seeds.
8. Estimation of Amino acids by ninhydrin method...
9. Determination of Catalase activity in germinating seeds.
10. Reaction of amino acids and sugar.
11. Isolation of some natural products; caffeine, eugenol

Suggested Readings:

1. Govindjee, ed. 1982-83. Photosynthesis. Vol. I & II. Academic Press Inc. New York
2. S Raghavendra. 1988. Photosynthesis; A Comprehensive Treatise. Cambridge University Press, Cambridge, U. K.
3. Dey and Horborne. 1998 Plant Biochemistry, Academic Press.
4. D.T. Dennis, D.B. Layzell, D.D. Lefebyre & D. Turpin. 1997. Plant Metabolism. 2nd ed.. Addison-Wesely Pub. Co. New York.
5. Buchnan Gruissen & Jones. 2001. Biochemistry and Molecular Biology of Plants.
6. H.W. Keldt. 1997. Plant Biochemistry and Molecular Biology. OUP.
7. Lehninger, A.L. 2001. Biochemistry. Kalyani Publishers. Ludhiana.
8. Wilkins, M.B.(ed) 1987. Advanced Plant Physiology. ELBS & Longman. Essex., England.
9. Thomas C. Moore. 1992 II Eds. Biochemistry and Physiology of Plant Hormones.Narosa Publishers
10. Horton HR , Moran LA , Ochs RS et al., 2001.Principles of Biochemistry, III edn. Prentice Hall.
11. Matthews CK, Van Holde KE & Ahem KG 2000. Biochemistry III edn. Sanfransisco. Benjamin Cummings.

45014 - Biodiversity Conservation and Management

Unit- I: Biodiversity

Perception and History; Biodiversity and its components, genetic, species and ecosystem diversity. Magnitude and distribution of biodiversity; global biodiversity hotspots- hotspots in India; India-a mega diversity center-floristic richness and Centers of Plant Diversity of India; Agro diversity - vavilov centers of crop plants; Exotics and Invasive species.

Unit- II: Biodiversity values

Direct use value; food, medicinal value, industrial values, ecotourism; Indirect value: biological control, environmental modulation, ecological services; Economic importance of fiber, medicine, yielding gums and resins and essential oils, timber and non-timber forest products and aromatic plants.

Unit- III: Conservation Practice

History of Conservation**,** Principles of conservation; the process of extinction; threats to biodiversity; IUCN red list categories; threatened plants of India; *in situ* conservation of biodiversity: natural protected areas-biosphere reserves, wildlife sanctuaries, national parks and sacred groves with reference to India; *ex situ* conservation- significant botanical gardens of the world and India, and gene banks.

Unit- IV: Management of Biodiversity

Global strategy for plant conservation (GSPC); Brief account on national and international conservation organizations- WWF, UNEP, IUCN; Biodiversity laws; Biological diversity act, 2002 ; Brief account on International agreements on biodiversity conservation-CBD, CITES, RAMSAR; Joint Forest Management; Biodiversity Registers; Bio-security in India; Concept of sustainable development; Biodiversity and Biotechnology.

Suggested Practical's:

1. Study of local crops, each one from cereals/ millets/pulses/fruits/vegetables/oil seeds/fibre.
2. Visit to any protected area-documentation of biodiversity and their utility.
3. Determination of species diversity Indices.
4. Mapping of endemic and threatened taxa of Andhra Pradesh.
5. Project work- student has to work any local biodiversity issue and submit a report.

Suggested Readings:

1. Alan beebay & Anne-Maria Brennan. 2008. First Ecology. 3rd ed. Oxford University Press.
2. Ashish Kothari.1997. Understanding biodiversity-Life sustainability and equity. Orient Longman

3. Christian Leveque, Jean-claude Mounolou and Vivien Reuter. 2004. Biodiversity. John Wiley
4. Cunningham, W.P. & M.A.Cunningham 2007. Principles of Environmental Science-Inquiry and applications. Tata Mc GrawHill Pub.New Delhi.
5. Dash, M.C.2009. Fundementals of Ecology. Tata Mc GrawHill Pub.New Delhi.
6. Gary A. Krupnick and W. John Kress (Eds.). 2005. Plant Conservation: A Natural History Approach. University of Chicago Press.
7. Given, D.R.. 1995. Principles and practice of plant conservation. Timber Press, Oregon.
8. Jensen, John R. 2007. Remote Sensing of the Environment: An Earth Resource Perspective. 2nd ed., Upper Saddle River, NJ: Prentice Hall
9. Krishnamurthy, K.V. 2004. Advanced Textbook On Biodiversity: Principles And Practice. Oxford
10. Lillesand. T.M. & R.W.Kiefer. 2000. Remote Sensing and Image Interpretation. John Wiley
11. Molles, M.C. 2005. Ecology-concepts and applications. Mc Graw Hill. Boston
12. Rao, R.R. 1994. Biodiversity in India. Bishen Singh & Mahendra Pal Singh, Dehra Dun.
13. Rao, Ravi Prasad B. 2005. Biodiversity. In Pullaiah, T (ed.) Taxonomy of Angiosperms. Regency publications, New Delhi. Pp. 287-317.
14. Ricklefs, R,E. &Gary L. Miller. 2000. Ecology. 4th ed. W.H. Freeman and Company. New York.
15. Sabins, 1997. Remote Sensing-principles and interpretation. 3rded.W.H.Freeman&Co., New Delhi
16. Sharma, P.D. 2009. Ecology and Environment. 10th ed. Ratogi Publications, Meerut.
17. Stiling, P. 2002. Ecology. Prentice-Hall of India, New Delhi.

YOGI VEMANA UNIVERSITY: KADAPA
M.Sc. BOTANY

(MODEL QUESTION PAPER FOR INTERNAL EXAMINATION)

Time: 1 Hour **Max. Marks: 25**

Section- A

Answer ALL short answer questions **2 x 2.5 = 05 Marks**

1. a) Short answer question
(or)
b) Short answer question

2. a) Short answer question
(or)
b) Short answer question

Section- B

Answer ALL Essay questions **2 x 10 = 20 Marks**

3. (a) Essay question
(or)
(b) Essay question

4. (a) Essay question
(or)
(b) Essay question

YOGI VEMANA UNIVERSITY: KADAPA

M.Sc. BOTANY

(MODEL QUESTION PAPER FOR SEMESTER END (EXTERNAL) EXAMINATION)

Time: 3 Hours **Max. Marks: 75**

Part- A

Write short notes on any **FIVE** of the following **5 x 3 = 15 Marks**
Each question carries **THREE** marks

1)
2)
3)
4)
5)
6)
7)
8)

Part- B

Answer **ALL** the following questions **4 x 15 = 60 Marks**
Each question carries **FIFTEEN** marks

9. Essay question
(or)
10. Essay question

11. Essay question
(or)
12. Essay question

13. Essay question
(or)
14. Essay question

15. Essay question
(or)
16. Essay question

(Note: Syllabus consists of Four (4) Units. Paper setters are requested to ask minimum two questions from each Unit)

List of Question paper Setters / Examiners / Adjudicators / Experts

1	Dr. M.Vijayalakshmi Professor Department of Botany Acharya Nagarjuna University, Guntur-522 510 Cell: 9440870026 Email: muvvavl@yahoo.co.in	8	Dr. R. Saigopal Professor Department of Virology Sri Venkateswara University Tirupati- 517502 Cell: 9849615634
2	Dr. Ch. Ramesh Professor Department of Botany Karnatak University Dharwad – 580003 Karnataka	9	Dr. B. Sujatha Professor Department of Botany Andhra University Visakhapatnam-530003 Email: sujathaau@yahoo.co.in
3	Dr. R. R.Venkata Raju Professor Department of Botany S.K. University Anantapur-515003 Cell: 9440289488 Email: rrvenkataraju@yahoo.com	10	Dr. T. G. Umesh Professor Department of Botany Bangalore University Bangalore-560056 Phone: 080-22961322 Email: drtgumesh@gmail.com
4	Dr. Chinta Sudhakar Professor Department of Botany S.K. University Anantapur-515003 Cell: 9440030464 Email: chintasudhakar@yahoo.com	11	Dr. N. Savithramma Professor Department of Virology Sri Venkateswara University Tirupati -517502 Cell: 9885223773 Email: prof.savithri@gmail.com
5	Dr. B. Ravi Prasada Rao Professor Department of Botany S. K. University Anantapur-515003 Cell: 09440705602 Email: biodiversityravi@gmail.com	12	Dr. G. Sudarsanam Professor Department of Botany Sri Venkateswara University, Tirupat - 517502 Cell: 9989053632 Email : sudarsanamg@gmail.com
6	Dr. Thimma Naik Professor Department of Botany S.K. University Anantapur-515003 Cell: 9440732428 Email: stnaik_rsrs2002@yahoo.co.in	13	Dr. N. Yasodamma Professor Department of Botany Sri Venkateswara University, Tirupati -517502 Cell: 9440860045 Email: npalli_yasoda@yahoo.co.in
7	Dr. R. Usha Professor Department of Biotechnology Sri Padmavathi Mahila University,	14	Dr. C. Maya Professor Department of Botany Bangalore University

	Tirupati -517502 Cell: 09704704646		Bangalore -560056 Cell: 9036944783 Email: mrmvk@rediffmail.com
15	Dr. T. Vijaya Professor Department of Botany Sri Venkateswara University Tirupati-517502 Cell: 9291600612 Email: vijayasvu@yahoo.in	20	Dr. (Mrs) Niranjana Suneel Chavan Professor Department of Botany Shivaji University, Kolhapur-416004 Maharashtra. Phone : (R) 0231-2609157 Email: niranjanac_2006@yahoo.com
16	Dr. B.Subba Rao Professor Department of Botany Andhra University Visakhapatnam - 530 003 Cell: 98488 57598 Email: bsr_botau@yahoo.co.in	21	Dr. Nirmala Babu Rao Professor Department of Botany Osmania University Hyderabad – 500007 Email: nirmalababurao@gmail.com
17	Dr. Y. Venkateswara Rao Professor Department of Botany Andhra University Visakhapatnam - 530 003 Phone : (O) 0891-2844562, (R) 0891-2713094 Email: raovyechuri@yahoo.co.in	22	Dr. A. Arundhati Professor Department of Botany Andhra University Visakhapatnam - 530 003 Phone: 0891-2844561 Email: atluru_arundati@yahoo.com
18	Dr. R. Suvaranalatha Professor Department of Applied Microbiology Padmavathi Mahila University, Tirupati-517502 Cell: 91-8374820199 Email: drsuvarnapallipati@gmail.com	23	Dr. K. Uma Devi Professor Department of Botany Andhra University Visakhapatnam - 530 003 Phone : (O) 0891-2844563, (R) 0891-2553554 Email: umadevikoduru@gmail.com
19	Dr. N.P. Eswar Reddy Professor Department of Plant Pathology S. V. Agricultural College Tirupati - 517502 Cell: 9848480544	24	Dr.V. Ramakoti Reddy Professor Department of Botany Bharathiar University Coimbatore - 641 046 Tamil Nadu Cell: 0944-291-8370 E-mail : drvrkreddy@yahoo.com
25	Dr. S. Leelavathi Professor Department of Botany University of Mysore Mysore – 570006 Cell: 821- 2419769	31	Dr. H. R. Raveesha Professor Department of Botany Bangalore University Bangalore - 560056 Cell: 9880615519

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DEPARTMENT OF CHEMISTRY

CURRICULUM (CBCS) – MSc (ORGANIC CHEMISTRY)

(With effect from the academic year 2018-19, for the M. Sc. Previous)

M.Sc. Previous

Sl. No.	Paper Code	Title of the paper	Allotted per Week (Hours)		Uni.Exam Duration(Hours)		Distribution of Marks						No of Credits
I-SEMESTER			L	P	T	P	IE	TE	PE	R	V	TOTAL	
1	15031	Inorganic Chemistry	4	-	3	-	25	75	-	-	-	100	4
2	15032	Organic Chemistry	4	-	3	-	25	75	-	-	-	100	4
3	15033	Physical Chemistry	4	-	3	-	25	75	-	-	-	100	4
4	15034	GeneralChemistry	4	-	3	-	25	75	-	-	-	100	4
5	15031P	Inorganic Chemistry Practical	-	9	-	3	-	-	75	10	15	100	4
6	15032P	Organic Chemistry Practical	-	9	-	3	-	-	75	10	15	100	4
7		Seminar	2	-	-	-	-	-	-	-	-	-	-
		Total Hours/Week	18	18	-	-	Total Marks/credits					600	24

Sl. No.	Paper Code	Title of the paper	Allotted per Week (Hours)		Uni.Exam Duration(Hours)		Distribution of Marks						No of Credits
II-SEMESTER			L	P	T	P	IE	TE	PE	R	V	TOTAL	
1	25031	Inorganic Chemistry	4	-	3	-	25	75	-	-	-	100	4
2	25032	Organic Chemistry	4	-	3	-	25	75	-	-	-	100	4
3	25033	Physical Chemistry	4	-	3	-	25	75	-	-	-	100	4
4	25034	Chromatography and Natural products	4	-	3	-	25	75	-	-	-	100	4
5	25031P	Organic Chemistry Practical	-	7	-	3	-	-	75	10	15	100	4
6	25032P	Physical Chemistry Practical	-	7	-	3	-	-	75	10	15	100	4
7	25035 NC	Basics of Chemistry		4	3	-	25	75				100*	-
8		Seminar	2										
		Total Hours/Week	18	18	-	-	Total Marks/credits					600	24

***Students need to pass the Non-Core paper but marks will not be added to grade points**

NC: non-Core L: Lecture P: Practical T: Theory IE: Internal Examination

TE: Theory Examination PE: Practical Examination R: Record V: Viva-Voce

M.Sc. Final

Sl. No.	Paper Code	Title of the paper	Allotted per Week (Hours)		Uni.Exam Duration(Hours)		Distribution of Marks						No of Credits
III-SEMESTER			L	P	T	P	IE	TE	PE	R	V	TOTAL	
1	35031	Inorganic Chemistry	4	-	3	-	25	75	-	-	-	100	4
2	35032	Organic Chemistry	4	-	3	-	25	75	-	-	-	100	4
3	35033	Physical Chemistry	4	-	3	-	25	75	-	-	-	100	4
4	35034	Spectroscopy	4	-	3	-	25	75	-	-	-	100	4
5	35031P	Multistep Synthesis of Organic Compounds	-	7	-	3	-	-	75	10	15	100	4
6	35032P	Estimations	-	7	-	3	-	-	75	10	15	100	4
7	35035 NC	Drug Discovery, Design and Development		4	3	-	25	75				100*	-
8		Seminar	2										
		Total Hours/Week	18	18	-	-	Total Marks/credits					600	24

*Students need to pass the Non-Corepaper but marks will not be added to grade points

Sl. No.	Paper Code	Title of the paper	Allotted per Week (Hours)		Uni.Exam Duration(Hours)		Distribution of Marks						No of Credits
IV-SEMESTER			L	P	T	P	IE	TE	PE	R/D	V	TOTAL	
1	45031	Reagents in Organic Synthesis	4	-	3	-	25	75		-	-	100	4
2	45032	Designing and Modern Topics of OrganicSynthesis	4	-	3	-	25	75		-	-	100	4
3	45033	Chemistry of Heterocyclic Compounds	4	-	3	-	25	75		-	-	100	4
4	45034	Medicinal Chemistry and Natural products	4	-	3	-	25	75		-	-	100	4
	45031P	Spectral Identification of Organic Compounds		9		3			75	10	15	100	4
5	45032P	Project Work	-	9	-	3	-	-	50	35	15	100	4
6		Seminar	2	-	-	-	-	-		-	-	-	
		Total Hours/Week	18	18	-	-		Total Marks/credits				600	24

NC: non-Core L: Lecture P: PracticalT: Theory IE: Internal Examination
TE: Theory Examination PE: Practical Examination R: Record V: Viva-VoceD: Dissertation

FIRST SEMESTER

15031:INORGANIC CHEMISTRY

UNIT – I: Metal-ligand Bonding Theories
UNIT – II: Metal-ligand Equilibria in Solution and Theory of HSAB
UNIT – III: Reaction Mechanisms of Complexes
UNIT – IV: Carbonyl and NitrosylComplexes, and Metal Atom Clusters

UNIT – I: Metal-ligand Bonding Theories 15 Hrs

Crystal Field Theory (CFT) for bonding in transition metal complexes, crystal field splitting of 'd'-orbitals in octahedral, tetrahedral, tetragonal and square planar fields. Crystal Field Stabilization Energy (CFSE) and its calculation in six and four coordinated complexes, Spectrochemical series with reference to ligands and metal ions. Factors affecting the magnitude of Δ_O in octahedral complexes, Jahn-Teller effect and its consequences. Shortcomings of CFT; Covalency: Evidence for covalency, Nephelauxetic effect; Molecular orbital theory: Concept of Ligand Groups Orbitals (LGOs), MO diagrams for octahedral, tetrahedral and square planar complexes, MO treatment of π-bonds.

UNIT – II: Metal-ligand Equilibria in Solution and Theory of HSAB 15 Hrs

(A)Metal-ligand Equilibria in Solution
Stepwise and overall formation constants and their interrelationship, Trends in stepwise formation constants, Factors affecting the stability of metal complexes, Chelate effect, Determination of binary formation constants by p^H-metry and spectrophotometric methods.

(B) Theory of HSAB
Hard and soft acids and bases, Classification, Acid-base strength and hardness, Symbiosis, Electronegativity and hardness, Application of HSAB: Biological functions and toxicology of metals, and medicinal applications.

UNIT – III: Reaction Mechanisms of Complexes 15 Hrs

Reactivity of metal complexes, Inert and labile complexes, Kinetics and mechanisms of substitution reactions, Kinetics of substitution reactions in octahedral complexes, Acid hydrolysis, Factors affecting acid hydrolysis, Base hydrolysis, Conjugate base mechanism, Anation reactions, Substitution reactions in square planar complexes, Trans effect, Mechanism of trans effect, Electron transfer reactions, Inner sphere and outer sphere mechanisms, Marcus theory.

UNIT – IV: Carbonyl and NitrosylComplexes, and Metal Atom Clusters 15 Hrs

(A) Metal Carbonyl and Nitrosyl Complexes
Metal carbonyls: Preparation of metal carbonyls of Mn, Fe, Co and Ni, Bonding in carbonlys, EAN and 18-electron rule in carbonyls, π-Bonding in carbonyls, Terminal and bridging carbonyls, Measurement of **π**-bond strength in carbonyls, Structures of mononuclear, binuclear, trinuclear and tetranuclear carbonyls; Metal nitrosyls: Chemistry of linear and bent nitrosyls, Nitrosylsas NO^+ and NO^- donors, Analytical uses of nitrosyl complexes.

(B)Metal Atom Clusters
Cage structures, Higher boranes, Carboranes, Metal-metal bonds in carbonyl cluster, LNCCs and HNCCs, Isoelectronic and isolobal relationships, Hetero atom in metal atom clusters, Electron counting schemes for HNCCs,

HNCCs of Fe, Co, Ni, Ru, Rh, Pd, Os, Ir and Pt, Lower halide and chalcogenide clusters, Triangular clusters, Solid state extended arrays.

Books suggested:

1. Advanced Inorganic Chemistry, F. A. Cotton, G. Wilkinson , M. Bochmann and R. N. Grimes, 5th Ed. (John Wiley& Sons Inc.).
2. Inorganic Chemistry: Principles of Structure and Reactivity, J. E. Huheey, E. A. Keiter and R. L. Keiter, 4th Ed. (Prentice Hall).
3. Inorganic Chemistry:G.Wulfsberg (University Science Books).
4. Introduction to Ligand Fields, B. N. Figgis (Krieger Pub Co.).
5. Concise Inorganic Chemistry, J. D. Lee, 5th Ed. (Wiley-Blackwell).
6. Modern Inorganic Chemistry, W. L. Jolly, 2nd Ed. (McGraw-Hill).
7. Coordination Compounds, S. F. Kettle (Springer).

15032: ORGANIC CHEMISTRY

UNIT – I:Electronic EffectsandCriteria of Aromaticity
UNIT – II:Reaction Mechanism and Reactive Intermediates
UNIT – III: Substitution Reactions
UNIT – IV: Stereo Chemistry

UNIT – I:Electronic Effects and Criteria of Aromaticity 15Hrs

(A) Electronic Effects

Electronic effects: Inductive effect, mesomeric effect (Resonance), hyperconjugation, steric effect, tautomerism;hard and soft acids and bases, acidity and basicity of organic molecules.

(B) Criteria of Aromaticity

The energy, structural and electronic criteria for aromaticity; relationship among energetic, structural and electronic criteria;Huckle`s rule and molecular orbitaltheory, aromaticity in benzenoid, non-benzenoid compounds; aromaticity in charged ring fused-ring systems;heteroaromaticsystems;annulenes: cyclobutadiene, benzene,1,3,5,7-cyclooctatetraene, [10] annulenes-1,3,5,7,9-cyclodecapentaene isomers, and [12]-, [14]-, [16]- and [18]-annulenes; azulenes; fulvenes; fullerenes; ferrocene; anti-aromaticity; homo-aromaticity.

UNIT – II: Reaction Mechanism and Reactive Intermediates 15Hrs

(A) Reaction Mechanism

Types of bond cleavage; general classification of organic reactions; potential energy diagrams;thermodynamicrequirements; kinetic requirements; kinetic and thermodynamic control;Hammond and Marcus theories; linear free energy relationships – Hammett equation;generalmethodsof determination of mechanism.

(B) Reactive Intermediates

General methods of generation, geometry, stability and reactivity ofcarbocations, carbanions, freeradicals,carbenes, nitrenes and arynes.

UNIT – III: Substitution Reactions **15 Hrs**

General introduction, classification of substitution reactions.

(A)Nucleophillic Substitutions

(i) Aliphatic NucleophillicSubstitutions:

$S_N1$and S_N2 reactions: mechanism, energy profile diagram and stereochemistry, SET, Border line (mixed $S_N1$and S_N2) and S_Ni mechanisms, neighbouring group participation, factors influencing nucleophilic substitution reactions: structure of the substrate, solvent, nucleophile and leaving group.

(ii) Aromatic Nucleophilic Substitution

Introduction,S_NAr, and benzyne mechanisms, Von Richter, Sommelet-Hauser and Smiles rearrangements.

(B) Electrophilic Substitutions

Introduction, The arenium ion mechanism-S_E2 reaction, orientation and reactivity, energy profile diagram, ipso substitution, orientation in disubstituted benzenes, diazonium coupling, Vilsmeier reaction, Gattermann-Koch reaction, Pechman reaction, Reimer-Tiemann reaction.

UNIT – IV: Stereo Chemistry **15Hrs**

(A) Molecular Representation of Organic Molecules

Wedge, Fischer, Newman and Sawhorse formula, their description, inter conversion.

(B) Molecular Symmetry and Chirality

Definition and classification of stereoisomers, enantiomer, diastereomer, invertomer, homomer, epimer, anomer, configuration and conformation, D-,L- and *R*, *S* nomenclature, chiral manifestation.

(C) Geometrical Isomerism

Cis-trans, *E*-, *Z*- and Syn-anti anti-nomenclature, methods of determining configuration of geometrical isomers using physical, spectral and chemical methods, Stability, *cis*-*trans* inter conversion.

(D) Stereoisomerism in Molecules without Chiral Center

Axial chirality: Allenes, alkylidenecycloalkanes, spiranes, nomenclature.

Atropisomerism: Biphenyl derivatives, nomenclature

Planar Chirality: Ansa compounds, paracyclophanes, *trans*-cyclooctene, helicity.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and structure, Jerry March, 6th Ed. (John Wiley & Sons).
2. Organic Chemistry, Paula YurkanisBruice, 4th Ed. (Printice Hall)
3. Organic chemistry-Clayden J. (Oxford)
4. Organic Chemsitry, Wade, L.G. Jr. 5th Ed. (Pearson)
5. Advanced Organic Chemistry: Reactions and mechanisms, Miller Bernard & Other, 2nd Ed. (Pearson)
6. Mechanism and Theory in Organic Chemistry, Thomas H. Lowry, Kathleen S. Richardson, Harper & Row, (Publishers, Inc.).
7. Stereochemistry to Organic Compounds, E.L. Eliel (John Wiley).
8. Stereochemistry to Organic Compounds, D. Nasipuri, 2nd Ed. (New Age International).
9. Stereochemistry, P.S. Kalsi, 5th Ed. (New Age International).
10. Organic Chemistry Structure and Reactivity, EgeSeyhan, 3rd Ed. (AITBS)

15033: PHYSICAL CHEMISTRY

UNIT – I : Quantum Chemistry-I
UNIT – II: Chemical Dynamics-I
UNIT – III: Thermodynamics-I
UNIT – IV: Electrochemistry-I

UNIT – I : Quantum Chemistry-I **15 Hrs**

(A) Introduction to Exact Quantum Mechanical Results

Operator algebra, Eigen values and Eigen functions, Operators for momentum and energy, Linear combination of Eigen functions of an operator. The Schrodinger wave equation and the postulates of Quantum Mechanics, Discussion of solutions of the Schrodinger equation to some model systems, viz., particle in a box, harmonic oscillator, rigid rotor, hydrogen atom. Application of the spectra of conjugated molecules.

(B) Approximate Methods

The Variation Theorem, Linear variation Principle, Perturbation Theory (first Order and non-degenerate), Application of Variation Method and Perturbation theory to the Helium atom.

UNIT – II: Chemical Dynamics-I **15 Hrs**

(A) Theories of Reaction Rates

Collision theory, steric factor. Theory of Absolute Reaction Rates-Reaction coordinate, activated complex and the transition state. Thermodynamic formulation of reaction rates, Arrhenius Equation

(B) Unimolecular Reactions

Lindemann, Lindemann-Hinshelwood, and RRKM theories.Termolecular reactions. Complex reactions-Rate expressions for opposing, parallel and consecutive reaction (all first order type)

(C) Chain Reactions

Dynamic chain, hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane, photochemical reactions- H_2-Br_2, H_2-Cl_2 reactions, Autocatalysis, H_2-O_2 reaction, explosion limits, rate expressions for chain reaction.

UNIT – III: Thermodynamics-I **15 Hrs**

(A) Brief Review of Thermodynamic Concepts

Enthalpy, entropy, free energy. Concept of Entropy - Entropy as a state function - Entropy change in reversible process and irreversible process - Temperature -Entropy diagrams - Entropy change and Phase change - Entropy of mixing -Entropy and disorder.

(B) Classical & Statistical Thermodynamics

Partial molar properties: their significance and determination of partial molar volume, fugacity and its determination. Concept of distribution, thermodynamic probability and most probable Distribution, Ensemble averaging, Postulates of ensemble averaging, canonical, grand canonical and micro-canonical ensembles, partition functions, translational, rotational, vibrational and electronic partition functions, Gibbs-Duhem equation, calculation of thermodynamic properties in terms of partition functions, Heat capacity, chemical equilibria and equilibrium constant in terms of partition functions, Entropy of monatomic gases (Sackur-Tetrade equation).

UNIT – IV: Electrochemistry-I **15 Hrs**

(A) Strong Electrolytes

Effect of dilution on equivalent conductance-Inter ionic attraction, Debye-Huckel-Onsager treatment, derivation of Debye-Huckel-Onsager equation, Verification and limitation of Onsager equation, Bjerrum treatment of electrolytes, Debye-Falkenhagen and Wien effects.

(B) Activity and Activity Coefficients

Relation between different types of activity coefficients, Determination of mean ionic activity coefficients by solubility and EMF methods, Debye-Huckel Limiting law and its verification (qualitative).

(C) Reversible electrochemical cells

Chemical cells and concentration cells-Types of reversible electrodes-Electrode potentials. Reactions in reversible cells - Nernst equation- thermodynamic and kinetic derivation-Concentration cells with and without transference. Liquid junction potential and its determination.

Books suggested

1. Physical Chemistry, P. W. Atkins (ELBS)
2. Introduction to quantum Chemistry, A. K. Chandra (Tata McGraw Hill)
3. Quantum Chemistry, Ira N. Levine (Prentice Hall)
4. Atomic Structure and chemical bond, Manas Chandra.
5. Chemical Kinetics, K.J.Laidler (McGraw Hill)
6. Kinetics and Mechanism of chemical Transformations, J. Rajaraman and J. Kuriacose (Mcmilan)
7. Thermodynamics for Chemists, S. Glasstone
8. Chemical Thermodynamics, I. M. Klotz
9. Statistical Thermodynamics, M. Dole
10. Modern Electrochemistry, vol. I & II, J. O. M. Bockris and A. K. N. Reddy (Plenum)
11. An Introduction to Electrochemistry (3rd ed.), S. Glasstone (A fffilated East-West)

15034: GENERAL CHEMISTRY

UNIT – I: Symmetry and Group Theory
UNIT – II: Errors and Statistics
UNIT – III: Microwave Spectroscopy, Infrared Spectroscopy and Raman Spectroscopy
UNIT – IV: Spectrophotometry, Flame Photometry and Atomic Absorption Spectroscopy

UNIT – I: Symmetry and Group Theory **15 Hrs**

Symmetry Elements and Symmetry operation, Definitions of a group, sub-group, Relation between orders of a finite group and its sub-group, Conjugacy Relation and classes-point symmetry group, Schonflies symbols, Representation of groups by matrices (representation for C_{n9} C_{nv9} D_{nh9} etc. groups to be worked out explicitly), character of a representation. The great orthogonality theorem (without proof), Character tables and their use in spectroscopy.

UNIT – II: Errors and Statistics **15 Hrs**

Classification of errors; accuracy; precision; minimization of systematic errors; mean and median values; absolute error; relative error; mean deviation and relative mean deviation; standard deviation and relative standard deviation; variance; range; confidence interval; comparison of results: F-test and student's t-test (i. comparison of mean and

true value, ii. comparison of two means and iii. comparison of more than two means - ANOVA); Dixon's Q-test; Gaussian distribution of random errors; correlation and regression; linear-least-square fitting; significant figures and rules for computations.

UNIT – III: Microwave Spectroscopy, Infrared Spectroscopy and Raman Spectroscopy 15Hrs

(A) Microwave Spectroscopy

Classification of molecules, rigid rotor model, effect of isotopic substitution on the transition frequencies, intensities, non-rigid rotor, stark effect.

(B) Infrared Spectroscopy

Review of linear harmonic oscillator, vibrational energies of diatomic molecules, zero-point energy, force constant, bond strengths, anharmonicity, Morse potential energy diagram, vibration-rotation spectroscopy, PQR branches, Vibrations of simple polyatomic molecules (CO_2, H_2O etc.), Selection rules, exclusion principle.

(C) Raman Spectroscopy

Classical and quantum theories of Raman effect, pure rotational, vibrational and vibrational – rotational Raman spectra, selection rules.

UNIT–IV: Spectrophotometry, Flame Photometry and Atomic Absorption Spectroscopy 15 Hrs

(A) Spectrophotometry

Beer-lambert law, Photometric accuracy, Deviations from Beer-lambert law, Block-diagram of a spectrophotometer, simultaneous spectrophotometric determination of metals, Determination of ratio of metal complexes: Job's method of continuous variation, slope ratio methods.

(B) Flame Photometry

Theory and instrumentation, Interferences, background correction, applications.

(C) Atomic Absorption Spectroscopy

Theory and instrumentation, Sources if radiation (HCL and EDL), Interferences, background correction, applications.

Books Suggested

1. Symmetry and Spectroscopy molecules –K. Veera Reddy, New Age Publications, New Delhi.
2. Chemical Applications of Group Theory by Bhattacharya
3. Vogel's Text Book of Quantitative Chemical Analysis, J. Mendham, R. C. Denney, J. D. Barnes and M. J. Thomas, 4^{th}& 6^{th} Ed.(Pearson Education Asia).
4. Analytical Chemistry by Robert Drills
5. Quantitative Analysis by R. A. Day and A. L. Underwood.
6. Analytical Chemistry, G. D. Christian
7. Instrumental Methods of Analysis, H. W. Willard, L. L. Merritt and J. A. Dean (Affiliated East-West)
8. Principles of Instrumental Analysis, D. A. Skoog and D. M. West (Holt, Rinehart and Wilson)
9. Physical Methods in Chemistry, R. S. Drago (Saunders).
10. Introduction to molecular Spectroscopy, G. M. Barrow (McGraw Hill)
11. Basic principles of Spectroscopy, R. Chang (Mc Graw Hill)

15031P:INORGANIC CHEMISTRY PRACTICALS

1. Preparation and Purification of Inorganic Complexes

a) Chloropentamminecobalt(III)chloride
b) *Bis*(oxalate)cuprate(II)dehydrate
c) *Tris*(oxalato)ferrate(III)
d) Hexaamminenickel(II)chloride

2. Complex Analysis

a) Estimation of cobalt present in chloropentamminecobalt(III)chloride
b) Estimation of copper present in *bis*(oxalate)cuprate(II)dehydrate
c) Estimation of iron present in *tris*(oxalato)ferrate(III)
d) Estimation of nickel present in hexaamminenickel(II)chloride

15032-P: ORGANIC CHEMISTRY PRACTICALS

1. Separation of a binary organic mixture

Identification of method of separationof binary mixture consists of acid and neutral, acidic and neutral, base and neutral etc.

2. Preparation (single step) and purification of organic compounds

Preparation, recrystallization, and determination of melting point & yield of the following compounds: (i) nerolin, (ii) chalcone, (iii) *p*-nitro acetanilide, (iv) *m*-dinitrobenzene, (v) phthalimide, (vi) hippuric acid, (vii) 7-hydroxy-4-methylcoumarin, (viii) 2,3-diphenylquinoxaline, and (ix) Diels-Alder adduct.

Books Suggested

1. Vogel's Text Book of Quantitative Chemical Analysis, J. Mendham, R. C. Denney, J. D. Barnes and M. J. Thomas,4^{th}& 6^{th} Ed. (Pearson Education Asia).
2. Vogel's Text Book of Practical OrganicChemistry,B.S. Furniss, A.J. Hannaford, P.W.G. Smith, A.R. Tatchell, 5Ed. (Longman Scientific & Technical).
3. Advanced Medicinal Chemistry, M. Raghu Prasad and A. Raghuram Rao (Pharma Med Press).

SECOND SEMESTER

25031: INORGANIC CHEMISTRY

UNIT – I: Organometallic Chemistry
UNIT – II: Transition Metalπ-Complexes
UNIT – III: Electronic Spectra of Complexes
UNIT – IV: Magnetic Properties of Transition Metal Complexes

UNIT – I: Organometallic Chemistry 15 Hrs

(A)Organometallic Reagents in Synthesis
Stoichiometric reactions in catalysis, Homogeneous catalytic hydrogenation, Hydroformylation(oxoreaction), Isomerisation, Zeigler-Natta polymerization of olefins, Oxopalladation reactions, Activation of small molecules by coordination.

(B) Fluxional Organometallic Compounds
Fluxionality and dynamic equilibria in compounds such as η^2-olefin, η^3-allyl and dienyl complexes.

UNIT – II: Transition Metalπ-Complexes 15 Hrs

Transition metal **π**-complexes with unsaturated organic molecules such as alkenes, alkynes, allyl, diene, dienyl, arene and trienyl complexes, General methods of preparation, Properties, Nature of bonding and structural features, Important reactions relating to nucleophilic and electrophilic attack on ligands.

UNIT – III: Electronic Spectra of Complexes 15 Hrs

Free Ion Terms and Energy Levels: Configurations, Terms, States and Microstates. Calculation of Microstates for p^2 and d^2 configuration, L-S (Russell-Saunders) Coupling Schemes, J-J Coupling scheme, derivation of terms for p^2 and d^2 configuration. Hole Formulation, Energy ordering of terms (Hund's Rules), Selection rules: Laporte orbital selection rule, spin selection rules. Splitting of energy levels and spectroscopic states, Orgel diagrams of d^1 to d^9 metal complexes. Interpretation of electronic spectra of aquo complexes of Ti(III), V(III), Cr(III), Mn(II), Fe(II), Fe(III), Co(II), Ni(II) and Cu(II). Calculation of interelectronic and spectra parameters for d^8 metal complexes. Tanabe-Sugano diagrams for d^2 and d^6 octahedral complexes. Charge transfer (L $\rightarrow$ M and M $\rightarrow$ L) spectra of metal complexes.

UNIT – IV: Magnetic Properties of Transition Metal Complexes 15 Hrs

Diamagnetism,paramagnetism, orbital and spin contributions, spin-orbit coupling, Hund's third rule and energies of J levels, Curie law and Curie-Weiss law, ferromagnetism and antiferromagnetism, temperature independent magnetism, magnetic susceptibility and determination of magnetic susceptibility by Gouy method, paramagnetism and crystalline fields – Ti^{3+}, V^{3+}, VO^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Co^{2+}, Ni^{2+} and Cu^{2+}, magnetic exchange in copper acetate and other dimers.

Books Suggested:

1. Advanced Inorganic Chemistry, F. A. Cotton, G. Wilkinson , M. Bochmann and R. N. Grimes, 5th Ed. (John Wiley& Sons Inc.).
2. Inorganic Chemistry: Principles of Structure and Reactivity, J. E. Huheey, E. A. Keiter and R. L. Keiter, 4th Ed. (Prentice Hall).

3. Inorganic Chemistry:G.Wulfsberg (University Science Books).
4. Introduction to Ligand Fields, B. N. Figgis (Krieger Pub Co.).
5. Concise Inorganic Chemistry, J. D. Lee, 5th Ed. (Wiley-Blackwell).
6. Modern Inorganic Chemistry, W. L. Jolly, 2nd Ed. (McGraw-Hill).
7. Coordination Compounds, S. F. Kettle (Springer).
8. Magnetochemistry, R. L. Carlin (Springer-Verlag New York).
9. Elements of Magnetochemistry R. L. Dutta and A. Syamal, 2nd Ed. (Affiliated East-West Press Pvt. Ltd).
10. The Organometallic Chemistry of the Transition Metals, R. H. Crabtree, 3rd and 4th Ed. (WileyInterscience).
11. Organometallic Chemistry: A Unified Approach, R. C. Mehrotra and A. Singh, 2nd Ed. (New AgeInternational).
12. Principles of Organometallic Chemistry, P. Powell, 2nd Ed. (ELBS)

25032: ORGANIC CHEMISTRY

UNIT – I:Addition and Condensation Reactions
UNIT – II: Elimination, Esterification and Hydrolysis Reactions
UNIT – III: Conformational Analysis
UNIT – IV: Molecular Rearrangements

UNIT – I:Addition and Condensation Reactions **15 Hrs**

(A) Addition Reactions

Introduction; addition reactions involving electrophiles (Br_2, HBr, HOBr, and H_2O/H_2SO_4);nucleophilic additions (Cannizaro, Michael, Mannich, Grignard and Wittig reactions);free radical additions -Kharash peroxide effect; stereospecificity in addition reactions: bromination, dihydroxylation, hydroboration, hydrogenation and Sharpless asymmetric epoxidation reactions.

(B) Condensation reactions
Introduction; Aldol, Claisen, Dieckmann, Perkin, Knoevenagel, Claisen-Schmidt, Benzoin and Stobbe condensation reactions.

UNIT – II: Elimination, Esterification and Hydrolysis Reactions **15 Hrs**

(a) Elimination Reactions
Introduction; type of eliminations: α-, β- and γ-eliminations; Zaitsev (Saytzeff) and Hofmann rules; mechanism: E1, E2 and E1cB; competition between elimination and substitution;stereochemistry and orientation in E2 eliminations;pyrolyticsynelimination;dehydration of alcohols; dihydro-eliminations of C-C, C-O and C-N; dihalo-elimination;decarboxylative eliminations; molecular rearrangement during elimination; fragmentation reactions.

(b) Esterification Reactions
Reaction between carboxylic acid and alcohol: Fischer,MitsunobuandSteglichesterifications; reaction between acid halide and alcohols; reaction between carboxylic acid and alkyl halides; trans esterification.

(c) Hydrolysis Reactions
General mechanism and applications of ester hydrolysis in acidic and basic conditions; hydrolysis of acid halides; hydrolysis of amides.

UNIT – III: Conformational Analysis **15 Hrs**

(A) Conformations of Acyclic Molecules

Conformations of ethane, propane, n-butane, Physical methods for conformational analysis, 2,3-dimethylbutane, n-propyl chloride, conformation and intramolecular hydrogen bonding: ethylene glycol, Diastereomers and conformation: 2,3-dibromobutane, butane-2,3-diol and amino alcohol.

(B) Conformations of Cyclic Systems

Conformations of cyclohexane, mono and disubstitutedcyclohaxanes, cyclohexene, cyclohexanone, 2-alkyl and 3-alkylketone effect, alkylidene cyclohexane, decalin, 9-methyldecalin, decalone

(C) Conformations of Heterocycles

Conformations of aziridines, piperidine, 1,3-dioxanes.

UNIT – IV: Molecular Rearrangements **15 Hrs**

Introduction, types of molecular rearrangements, migratory aptitude, rearrangements to electron deficient carbon: pinacol-pinacolone, Wagner-Meerwein, Demjanov Arndt-Eistert synthesis and benzil-benzilic acid rearrangements; rearrangements to electron deficient nitrogen: Beckmann, Hofmann, Curtius, Schmidt and Lossen rearrangements; rearrangements to electron deficient oxygen: Baeyer-Villiger and Dakin rearrangements; rearrangements to electron rich carbon: Favorskii and Neber rearrangements.

Books Suggested:

1. Advanced Organic Chemistry-Reactions, Mechanism and structure, Jerry March, 6th Ed. (John Wiley & Sons).
2. Modern Organic Reactions, H. O. House (Benjamin)
3. Structure and Mechanism in Organic Chemistry C. K. Inglod (Comell University Press).
4. Organic Chemistry, Paula YurkanisBruice, 4th Ed. (Printice Hall)
5. Organic chemistry-Clayden J. (Oxford)
6. Organic Chemsitry, Wade, L.G. Jr. 5th Ed. (Pearson)
7. Organic Chemistry, Salmons, P.W. & Others, 8th Ed. (John Wiley & Sons)
8. Advanced Organic Chemistry: Reactions and mechanisms, Miller Bernard & Other, 2nd Ed. (Pearson)
9. Mechanism and Theory in Organic Chemistry, Thomas H. Lowry, Kathleen S. Richardson, Harper & Row, (Publishers, Inc.).
10. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, 6th Ed., (Longman).
11. Reaction Mechanism in Organic Chemistry, P.S. Kalsi, 2nd Ed. (New Age International).
12. Stereochemistry to Organic Compounds, E.L. Eliel (John Wiley).
13. Stereochemistry to Organic Compounds, D. Nasipuri, 2nd Ed. (New Age International).
14. Stereochemistry, P.S. Kalsi, 5th Ed. (New Age International).
15. Organic Chemistry Structure and Reactivity, EgeSeyhan, 3rd Ed. (AITBS)

25033: PHYSICAL CHEMISTRY

UNIT – I: Quantum Chemistry-II
UNIT – II: Chemical Dynamics –II
UNIT – III: Thermodynamics-II
UNIT – IV: Electrochemistry-II

UNIT – I: Quantum Chemistry-II **15 Hrs**

(A) Angular Momentum

Angular momentum, Rotations and angular momentum, Eigen functions and Eigen values of angular momentum, Ladder operator, addition of angular momenta, Spin angular momenta, antisymmetry and Pauli Exclusion Principle, Slater determinant,

(B) Molecular Orbital Theory

Atomic Orbitals, Simple Molecular Orbitals, Hybrid Atomic Orbitals, Shapes and energies of Molecular Orbital Systems of Organic Molecules (Ex: Methane, Acetylene, ethylene, cyanide anion),Hückel theory of conjugated systems, π-bond order and charge density calculations, application to ethylene, butadiene and benzene.

UNIT – II: Chemical Dynamics -II **15 Hrs**

(A) Acid Base Catalysis: Specific Acid Catalysis

General acid catalysis (Hydrolysis of ester and vinyl ether). Specific base catalysis and general base catalysis (the alcohol reaction anD hydrolysis of acetic anhydride). Protolytic and prototropic mechanism.

(B) Homogeneous and Heterogeneous Catalysis

Homogeneous catalysis. Catalysis by transition metal ions and their complexes. Industrially important processes. Supported transition metal complexes as catalysts. Bimolecular reactions. Electronic theories of chemisorption and heterogeneous catalysis.

(C) Introduction to Enzyme Catalysis

Michaeles - Menton kinetics - effect of pH and effect of temperature on the rates of enzyme reactions.

UNIT – III: Thermodynamics-II **15 Hrs**

(A) Phase Equlibria

Equilibrium between two phases of one component. The Clapeyron equation. The ClausiusClapeyron equation. Applications. Integrated form of Clapeyron equation.

(B) Phase Rule

Thermodynamic derivation of phase rule, Solid-liquid equilibria, Thermal analysis, simple eutectic, congruent fusion, incongruent, fusion and systems consisting of both. Application of phase rule to three component system, Stokes and Roozeboom plots. Three component liquid systems, formation of one pair, two pairs and three pairs of partially miscible liquids, two salts and water, no chemical combination, double salt formation, one salt forms hydrate and two salts form hydrates, solid solutions.

UNIT – IV: Electrochemistry-II **15 Hrs**

(A) Irreversible Electrode Phenomenon

Reversibility and irreversibility, Dissolution and deposition potentials, Decomposition voltage, overvoltage, diffusion overvoltage.

(B) Batteries

Batteries Primary and secondary batteries-Fuel cells-Proton exchange membrane fuel cells-Advantage and limitations of fuel cells working principles of UPS and its applications.

(C) Electrochemical Study

General consideration, costing on electrolytic process, electrolysis parameters, principles of cell design and the addition technology of electrolysis process and typical cell design. Cyclic voltammetry and its applications.

Books Suggested

1.Physical Chemistry, P. W. Atkins, (ELBS)
2. Introduction to quantum Chemistry, A. K. Chandra (Tata McGraw Hill)
3. Quantum Chemistry, Ira N. Levine, (prenticxe Hall)
4. Coulson's Valence, R. Mcweeny, (ELBS)
5. Modern Electrochemistry, vol.I& II, J. O. M. Bockris and A. K. N. Reddy (Plenum)
6. An Introduction to Electrochemistry (3rd ed.), S. Glasstone (Affiliated East-West)
7. Micelles, theoretical and applied aspects, V. Moroi (Plenum)
8. A text Book of Physical Chemistry (2nd Ed.), S. Glasstone (Macmilan)
9. Principles of Physical Chemistry, Maron and Prutton
10. Theoretical Electrochemistry, L. I. Antropov.

25034: CHROMATOGRAPHY AND NATURAL PRODUCTS

UNIT – I: Chromatography **15Hrs**

Definition, classification, partition or distribution coefficient, partition ratio, efficiency, resolution, plate height, plate number, theories of chromatography: plate theory, rate theory, band broadening; principle and applications of paper chromatography, thin layer chromatography, column chromatography, size exclusion chromatography, ion exchange chromatography.

UNIT – II: HPLC and GC

(A) High Performance Liquid Chromatography (HPLC): Principle, Instrumentation, isocratic, gradient and stepwise elution, Mobile phase delivery systems, Separation columns, detectors and Applications.

(B) Gas Chromatography (GC): Principle, Instrumentation, GC columns, Detectors and Applications of GC.

UNIT – III: Terpenoids **15 Hrs**

Occurrence, isolation, general methods of structure determination, isoprene rule; structure determination, stereochemistry, biosynthesis and synthesis of camphor, farnesol, zingiberene, cadinene, abietic acid and lanosterol.

UNIT – IV: Alkaloids **15 Hrs**

Introduction, isolation, general methods of structural elucidation and physiological action, degradation, classification based on nitrogen heterocyclic ring, structural elucidation, stereochemistry and synthesis of morphine, papaverine and reserpine, biosynthesis of alkaloids.

Books Suggested

1.Physical and Chemical Methods of Separation, E. W. Berg (McGraw Hill).
2. Separation Process Principles, J. D. Seader and E. J. Henley (John Weily& Sons Inc).
3. Instrumental Methods of Analysis, H. W. Willard, L. L. Merritt and J. A. Dean (Affiliated East-West)
4. Vogel's Text Book of Quantitative Chemical Analysis, J. Mendham, R. C. Denney, J. D. Barnes and M. J. Thomas,4th& 6th Ed. (Pearson Education Asia).
5. Principles of Instrumental Analysis, D. A. Skoog and D. M. West (Holt, Rinehart and Wilson)
6. Natural Products: Chemistry and Biological Significance, J. Mann, R.S. Davidson, J. B. Hobbs, D. V. Banthrope and J. B. Hatrbnome, Longman, Essex.
7. Organic Chemistry, Vol. 2, I. L. Finar, ELBS.

8. Chemistry of Organic Natural Products, O. P. Agrawal, Vols. 1 &2, Goel Pubs.
9. Natural Products Chemistry K. B. G. Torssell, John Wiley, 1983
10. New Trends in Natural Products Chemistry, Atta-ur-Rahman and M.I. Choudhary, Harwood Academic Publisher.
11. Chemistry of Natural products P. S. Kalsi, Kalyani Publishers
12. Biosynthesis of steroids, terpenes and acetogenins, J. H. Richards & J. R. Hendrieson
13. The biosynthesis of secondary metabolites, R. D. Herbert, Chapman & Hall

25031P: ORGANIC CHEMISTRY PRACTICALS

(1)**Isolation and identification of Natural Products:**

(a) Isolation of caffeine from tea leaves
(b) Isolation of eugenol from cloves
(c) Isolation of casein and lactose from milk powder
(d) Isolation of piperine from black pepper
(e) Isolation of lycopene from tomatoes
(f) Isolation of hesperidin from orange peel
(g) Isolation of curcumin from Turmeric powder
(h) Isolation of arachin and conarachin from groundnuts
(i) Isolation of carotenes from carrot

25032P: PHYSICAL CHEMISTRY PRACTICALS

(1) Determination of critical solution temperature of phenol-water system and study the effect ofelectrolyte on CST.
(2) Determination of eutectic composition and temperature of simple eutectic system (Urea-benzoic acid).
(3) Determination of congruent composition and temperature of binary system (diphenylamine – benzophenone system)
(4)Determination of rate constant of acid hydrolysis of an ester and investigate the effect of catalyst concentration, reactant concentration and temperature.
(5) Conductometry.
(a) Determination of cell constant
(b) Verification of Onsager equation
(c) Determination of dissociation constant of a weak acid
(d) Titration of a strong acid with a strong base
(e) Titration of a weak acid with a strong base
(6) Potentiometry
(a) Titration of a strong acid with a strong base
(b) Titration of a weak acid with a strong base
(d) Titration of ferrous ammonium sulphate with potassium dichromate.
(7) Nuclear techniques
(a) Geiger Muller Counter
(b) Gamma Ray Spectrometer

Books Suggested

1. Adapted from Introduction to Organic Laboratory Techniques: A Microscale Approach. Pavia, Lampman, Kriz,and Engel. (1999) Saunders College Publishing.
2. Text book of practical organic chemistry including qualitative organic analysis by A.I. Vogel (Longman).
3. Findlay's Practical Physical Chemistry by J.A. Kitchener, 8th Ed. (Longmans).
4. Ikan, R. Natural Products, A Laboratory Guide, 2nd ed.; Academic Press: New York, 1991.
5. Pharmaceutical drug analysis by Ashutoshkar.
6. Quantitative analysis of drugs in pharmaceutical formulations by P D Sethi.
7. Practical pharmaceutical chemistry part-1 and part-2 by A H Beekett and J B Stenlake.
8. Practical organic chemistry by Mann & Saunders.

9. Text book of practical organic chemistry including qualitative organic analysis by A.I. Vogel (Longman).
10. Advanced Medicinal Chemistry, M. Raghu Prasad and A. Raghuram Rao (Pharma Med Press).

25035N: BASICS OF CHEMISTRY

UNIT – I: Basics of Organic Chemistry
UNIT – II: Basic Parameters in Sample Preparation
UNIT – III:Basics of Bioinorganic Chemistry
UNIT – IV: Basics of Polymer Chemistry

UNIT – I:Basics of Organic Chemistry 15 Hrs

Hybridization in organic compounds; dipole moment; inductive effect; electromeric effect; conjugation and resonance; homolysis; heterolysis; types of organic reactions; isomerism; introduction to reactive intermediates; classification of isomerism; stereochemistry of organic compounds –*E*&*Z* and *R*&*S* nomenclature

UNIT – II: Basic Parameters in Sample Preparation 15 Hrs

Definition and calculation of substance in moles and millimoles; solutions and their concentrations:definition of solution, solute and suspension, weight percentage, volume to volume percentage, mole fraction, mole percentage, molarity, molality, normality; density and specific gravity; conversion of weight/moles to volume using density; compound empirical and molecular formulae.

UNIT – III: Basics of Bioinorganic Chemistry 15 Hrs

Essential and trace elements – role of metal ion in biological process; Na^+/K^+ pump; photosynthesis – structure of chlorophyll, photosynthetic mechanism in bacteria and in green plants (Z-scheme, PS-I & PS-II); respiration (transport and storage of dioxygen) – structure and function of myoglobin, hemoglobin, hemerythrin and model systems.

UNIT – IV: Basics of Polymer Chemistry 15 Hrs

Terminology: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers.
Synthetic methods: Condensation, addition, radical chain, ionic and coordination, copolymerization.
Applications: biomedical and industrial applications

Books Suggested

1. Organic Chemistry, Paula YurkanisBruice, 4th Ed. (Printice Hall).
2. Mechanism and Theory in Organic Chemistry, Thomas H. Lowry, Kathleen S. Richardson, Harper & Row, (Publishers, Inc.).
3. Analytical Chemistry, G. D. Christian, 5th Edition, John Wiley & Sons.
4. Bioinorganic Chemistry, R. W. Hey, Ellis Horwood Ltd.,Chichester, New York
5. Bioinorganic Chemistry, K. Hussain Reddy, New Age International Publisher, New Delhi.
6. Text Book of Polymer Science, F. W. Billmeyer, Jr. (Wiley Inter Science).
7. Polymer Chemistry, Gowarikar.

THIRD SEMESTER

35031: INORGANIC CHEMISTRY

UNIT – I: Electron Spin ResonanceandMössbauer Spectroscopy
UNIT – II: Bioinorganic Chemistry
UNIT – III: Photoelectron Spectroscopy
UNIT – IV: Introduction to Nanomaterials

UNIT – I: Electron Spin ResonanceandMössbauer Spectroscopy 15 Hrs

(A) Electron Spin Resonance Spectroscopy
Introduction, principle, instrumentation, selection rules, g-factor and its significance, hyperfine and super hyperfine coupling, zero-field splitting including Kramer's degeneracy, application of ESR to free radicals and transition metal complexes, evidence for covalence in complexes, ex. Cu(II)bissalicylaldimine, bis-acetylacetanatovanadyl and hexachloroiridium(IV) complexes.

(B) Mössbauer Spectroscopy
Basic principles, isomer shift, quadrupole shift and spectrum display, applications:bonding and structures of Fe^{2+} and Fe^{3+} compounds including those of intermediate spin and Sn^{2+} and Sn^{4+} compounds, nature of metal-ligand bond, coordination number,unequivalentmössbauer atoms.

UNIT–II: Bioinorganic Chemistry 15 Hrs

(A) Transport and Storage of Dioxygen:
Metal complexes as oxygen carriers, heme proteins – structure and functions of hemoglobin and myoglobin, non-heme proteins – hemoerythrin and hemocyanin, model synthetic complexes of iron, cobalt and copper.

(B) Electron Transfer in Biology:
Structure and functions of metalloproteins in electron transfer process, catalase, peroxidase, cytochromes and iron-sulfur proteins, synthetic models.

UNIT–III: Photoelectron Spectroscopy 15Hrs

Photoelectric effect – Koopmans theorem ionization energy, block diagram of photoelectron spectrometer: sources of radiation, monochromator, detectors, shake-up and shake-off features. Ultravoilet photoelectron spectroscopy, application of UPS to O_2 and N_2 molecules, Electron spectroscopy of chemical analysis, Applications of XPES to qualitative analysis-chemical shift-application to surface studies and structural analysis.

UNIT–IV: Introduction to Nanomaterials 15Hrs

Basic chemistry for nanoscience, chemical routes for synthesis of nanomaterials: chemical precipitation and co-precipitation, metal nanocrystals by reduction, sol-gel synthesis, microemulsions or reverse micelles, solvothermal synthesis, microwave heating synthesis, sonochemical synthesis, characterization of nanomaterials: X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM).

Books Suggested

1. Instrumental methods of analysis, H. W. Willard, L. L. Merritt and J. A. Dean.
2. Advanced Inorganic Chemistry, F. A. Cotton, G. Wilkinson , M. Bochmann and R. N. Grimes, 5th Ed. (John Wiley& Sons Inc.).
3. Inorganic Chemistry: Principles of Structure and Reactivity, J. E. Huheey, E. A. Keiter and R. L. Keiter, 4th Ed (Prentice Hall).
4. Inorganic Chemistry:G.Wulfsberg (University Science Books).

5. Concise Inorganic Chemistry, J. D. Lee, 5th Ed. (Wiley-Blackwell).
6. Modern Inorganic Chemistry, W. L. Jolly, 2nd Ed. (McGraw-Hill).
7. Introduction to Photoelectron Spectroscopy, P. K. Ghosh
8. Nanochemistry: A Chemical Approach to Nanomaterials; G.A. Ozin, A.C. Arsenault and L. Cademartiri (RSC, London).
9. Nanocomposite Science and Technology; P.M. Ajayan, L.Z. Schadler and P.V. Brown (Wiley).
10. Characterization of Nanophase Materials; Z.L. Wang (ed.) (Wiley-VCH).

35032: ORGANIC CHEMISTRY

UNIT – I: Pericyclic reactions
UNIT – II: Photochemistry
UNIT – III: Asymmetric Synthesis
UNIT – IV: Green Chemistry

UNIT – I: Pericyclic Reactions **15 Hrs**

Molecular orbital symmetry, frontier orbitals of ethylene, 1,3-butadiene, 1,3,5-hexatriene, allyl system and 2,4-pentadienyl systems, classification of pericyclic reactions, Electrocyclic reactions: Conrotatory and Disrotatory motions in 4n, 4n+2 systems, Cycloadditions: antarafacial and suprafacial additions in 4n (2+2 cyclo addition) and 4n+2 (4+2 cyclo addition) systems, 2+2 addition of ketene, 1,3-dipolar cycloadditions and cheleotropicreactions.Sigmatropic rearrangements – 1,3 and 1,5 suprafacial and antarafacial shifts of H and C, Claisen, Cope and oxy-Cope rearrangements, Ene reaction, FMO and PMO approach, Woodward-Hoffmann Correlation diagrams and Woodward-Hoffmann selection rules of electrocyclic reactions, cyclo addition reactions and sigmatropic rearrangements.

UNIT – II: Photochemistry **15Hrs**

Photochemical energy, Frank-Condon principles, Jablonski diagram, singlet and triplet states, photosensitization, quantum efficiency and quantum yield; Photochemistry of carbonyl compounds: n→π^* and $\pi \rightarrow \pi^*$ transitions, Norrish type-I and Norrish type-II cleavages, Paternò-Büchi reactions, photoreduction, Rearrangementofcyclohexenones,cyclohexadienones; photochemistry of unsaturated systems (olefins): *Cis-trans* isomerization, photochemistry of 1,3-butadienes, Di-π-methane rearrangement,oxa-di-π-methane rearrangement; photochemistry of benzene and its derivatives, photo Fries rearrangement of phenyl estersandanilides;photolysis of nitrite esters: Barton reaction.

UNIT – III: Asymmetric Synthesis **15Hrs**

(A) Introduction and terminology
Topicity in molecules: homotopic, heterotopic (enantiotopic and diastereotopic), prochirality nomenclature; Substitution and addition criteria; Pro-R, Pro-S, Re- and Si-faces; stereoselective reactions: enantioselectivity and diastereoselectivity; optical purity: enantiomeric excess anddiastereomeric excess.

(B) Strategies in Asymmetric Synthesis
(i) Chiral substrate controlled asymmetric synthesis
Nucleophilic additions to chiral carbonyl compounds. 1,2-asymmetric induction, Cram's rule and Felkin-Anh model.

(ii) Chiral auxiliary controlled asymmetric synthesis
α-Alkylation of chiral enolates, azaenolates, imines.Use of chiral auxiliaries in Diels-Alder reaction and Aldol reactions.

(iii) Chiral reagent controlled asymmetric synthesis
Asymmetric reductions using BINAL−H. Asymmetric hydroboration using $(IPC)_2BH$ and $IPCBH_2$.
(iv) Chiral catalyst controlled asymmetric synthesis

Sharpless and Jacobsen asymmetric epoxidations; asymmetric hydrogenations using chiral Wilkinson bisphosphine and Noyori catalyst; enzyme mediated enantioselective synthesis.

UNIT – IV: Green Chemistry **15 Hrs**

Concept of green chemistry, principles of green chemistry and green synthetic methods – organic reactions in aqueous media: advantages and applications in pinacol coupling, Mukaiyama-aldol reaction, and Trost-Tsuji reaction; ionic liquids in organic synthesis: introduction, composition, and application in stereoselective halogenation, Friedel-Craft reaction and hydroformylation; microwave assisted reactions: principle, conditions, advantages over conventional heating, and application in Fischer-indole synthesis, Paal-Knorr pyrrole synthesis, Baylis-Hillman and benzil-benzilicacid rearrangement; phase transfer catalysis: introduction, types of phase transfer catalysts, mechanism of catalytic action, and application in benzoin condensation, Wittig, Wittig-Horner and Michael addition reactions; ultrasound assisted synthesis: advantages, applications in the synthesis of Diels-Alder, hydroboration and Reformatsky reactions.

Books Suggested:

1. Green Chemistry: an introductory text; M. Lancaster; 2nd Ed. (RSC).
2. Organic Synthesis: Special Techniques; V.K. Ahluwalia and R. Aggarwal; 2nd Ed. (Narosa)
3. Advanced Organic Chemistry-Reactions, Mechanism and structure, Jerry March, 6th Ed. (John Wiley & Sons).
4. Guide book to Organic Synthesis, R. K. Machie and D.N.Smith, (ELBS).
5. Advanced Organic Chemistry: Part A & B, F. A Carey and R. J. Sundberg, 5th Ed., Springer, 2007.
6. Click Chemistry: Journal of American Chemical Society (2008); Volume. 130; Pages. 5062 – 5064, and Chemical Society Reviews (2007); Vol. 36; Pages. 1249 – 1262.
7. Handbook of Metathesis; R. H. Grubbs (Wiley).
8. Application of Ionic Liquids in Organic Synthesis; AldrichimicaActa; Volume. 35; No. 3; Pages. 75 – 83.
9. Organic Reactions in Aqueous Media with a Focus on Carbon-Carbon Bond Formation: A Decade Update; Chemistry reviews (2005); Volume. 105; Pages. 3095 – 3165.
10. Fundamentals of Photochemistry, K. K. Raotagi-Mukhergi, (Wiley Eastern).
11. Essential of Molecular Photochemistry, A. Gilbert and J. Baggott (Blackwell scientific Publications)
12. Introduction to Organic Photochemistry, Coyle J D, (Wiley)
13. Synthetic Organic Photochemistry edited by Axel G. Griesbeck and JochenMattay (Marcel Dekker, New York)
14. Stereoselective Synthesis, M. Nógrádi, 2nd Ed., 1995.
15. Asymmetric organic reactions, J. D. Morrison and H. S. Moschcr.
16. Principles of Asymmetric synthesis, R. E. Gawley and J. Aube, 2nd Ed., Elsevier, 2012.

35033: PHYSICAL CHEMISTRY

UNIT – I: Surface Chemistry
UNIT – II: Polymers -Basicsand Characterization
UNIT – III: X-Ray Techniques
UNIT – IV: Nuclear Techniques

UNIT – I: Surface Chemistry **15 Hrs**

Structural and theoretical treatment of liquid interfaces, thermodynamics of binary system, Gibbs equation and verification of Gibbs equation by microtome method and tracer method, spreading of one liquid on anther, states of monomolecular films, the surface area of solids, mixed films, Gibbs adsorption isotherm, the Longmuir adsorption isotherm, BET adsorption isotherm, estimation of surface area (BET equation, theoretical concept), adsorption time. Non equilibrium thermodynamics (entropy production in irreversible process), membrane transport in biochemical reactions.

UNIT – II: Polymers -Basicsand Characterization **15 Hrs**

(A) Basic Concepts
Monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers.

(B) Polymerization Methods
Condensation, addition, radical chain, ionic and coordination, copolymerization, controlled free radical polymerization, viz. ATRP.

(C) Average Molecular Weight Concepts
Number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution, measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods.

UNIT – III: X-Ray Techniques **15 Hrs**

(A) X-ray Diffraction
Bragg conditions, Miller Indices, Laue method, Bragg method, Description of procedure for Debye Scherrer method of X-ray structural analysis of crystals, Index reflections, identification of unit cells from systematic absences in diffraction pattern-structure of simple lattices and X-ray intensities-structure factor and its relation to intensity and electron density.

(B) X-ray Fluorescence Spectroscopy
Principle, energy dispersive X-ray fluorescence (EDXRF), wavelength dispersive X-ray fluorescence (WDXRF), applications.

UNIT – IV: Nuclear Techniques **15 Hrs**

Basic concepts of nuclear chemistry, radioactive decay and equilibrium, nuclear reactions, Q value, cross sections, types of nuclear reactions; radioactive techniques: counting techniques such as G. M. ionization and proportional counter, isotopic dilution, neutron activation analysis, radiometric titration; radiopharmaceuticals: radioimmunoassay, immunoradiometric assay, classification of radiopharmaceuticals, labeled compounds preparation, PET studies.

Books Suggested

1. Physical methods in Chemistry, R. S. Drago (Saunders College).
2. Principles of Physical Chemistry by Samuel H. Maron and Carl F. Prutton. The Mac Million Company, New York.
3. Advanced Physical Chemistry by GurudeepRaj, Goel Publishers House, Meerut.
4. An introduction to Electrochemistry-4th edn: By Samuel Glasstone Affiliated East West Press Pvt. Ltd., New Delhi.
5. Electrochemistry by M. S. Yadav Anmol Publications, New Delhi.
6. Essentials of Nuclear Chemistry, 4th Ed., 1995, H. J. Harnikar (Weily Eastern)
7. Electrochemistry by S. Glasstone.
8. Text Book of Polymer Science, F. W. Billmeyer, Jr. (Wiley Inter Science)
9. Polymer Chemistry, Gowarikar.

35034: SPECTROSCOPY

UNIT – I: UV-Visible and IR Spectroscopy
UNIT – II: Nuclear Magnetic Resonance Spectroscopy (^{1}H NMR)
UNIT – III: ^{13}C NMR spectroscopy and 2D NMR techniques
UNIT – IV: Mass Spectrometry

UNIT – I: UV-Visible and IR Spectroscopy **15 Hrs**

(A) Ultraviolet and Visible Spectroscopy

Various electronic transitions (185-800 nm), effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes and conjugated polyenes.Fieser-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds, Steric effect in biphenyls, polycyclic aromatic compounds.

(B) Infrared Spectroscopy

Instrumentation and sample handling, FT-IR. overtones, combination bands and Fermi resonance, factors influencing vibrational frequencies, Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds).

UNIT–II: ^{1}H NMR Spectroscopy 15 Hrs

Nuclear spin, nuclear resonance, saturation, shielding of magnetic nuclei, deshielding, chemical shifts and its measurements, factors influencing chemical shift, chemical shift values and correlation for protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic) and other nuclei (alcohols, phenols, enols, carboxylic acids, amines and amides), spin-spin interactions, coupling constant (J): Types and classification (ABX, AMX, ABC etc.) of coupling constants, Karplus curve variation of coupling constant with dihedral angle, virtual coupling, chemical exchange, effect of deuteration, hindered rotation, Simplification of complex spectra: nuclear magnetic double resonance (spin decoupling), contact shift reagents, Nuclear Overhauser effect (NOE).

UNIT–III: ^{13}C NMR Spectroscopy and 2D NMR Techniques 15 Hrs

(A) ^{13}C NMR Spectroscopy

CW and FT techniques. Types of ^{13}C NMR spectra: undecoupled, proton- decoupled and off-resonance decoupled (ORD) spectra. ^{13}C chemical shifts, factors affecting the chemical shifts, chemical shifts of organic compounds. Calculation of chemical shifts of alkanes, alkenes and alkynes.Homonuclear (^{13}C-^{13}C J) and heteronuclear (^{13}C-,^{1}H J) coupling. ^{13}C-NMR spectral editing techniques: principle and applications of DEPT.

(B) 2D NMR Techniques

Principles of 2D NMR, classification of 2D-experiments. Correlation spectroscopy (COSY), HOMO COSY (^{1}H-^{1}H COSY), COSY of *m*-dinitrobenzene, isopentylacetate,Hetero COSY (^{1}H,^{13}C COSY) Hetero COSY of isopentyl acetate and 4-methyl-2-pentanol, HMQC, HMQC of codeine, long range ^{1}H,^{13}C COSY (HMBC), HMBC of codeine and NOESY, NOESY of 9-benzylanthracene, 2-D INADEQUATE experiments.

UNIT–IV: Mass Spectrometry 15 Hrs

Introduction, principle, instrumentation, single & double focusing mass spectrometers, ionization methods: EI, CI, FDI, PDI, LDI, FAB, TSI and ESI, mass analyzers: MSA, ESA, QMA, ITA, TOF, FT and tandem, molecular-ion peak, nitrogen rule, base peak, metastable ion, isotopic abundance, high resolution mass spectrometry (HRMS), index of hydrogen deficiency (IHD), general methods of mass spectral fragmentation, Mc. Lafferty rearrangement, ortho effect, factors affecting fragmentation, mass spectral fragmentation patterns of various classes of organic compounds: alkanes, alkenes, alkynes, aromatics, alcohols, alkyl halides, ethers, aldehydes, ketones, carboxylic acids, esters, amines, amides, nitriles, nitro compounds.mass spectral problems with respect to structure determination.

Books suggested

1. Organic spectroscopy, W. Kemp, 5th Ed., (ELBS.2)
2. Spectroscopy of organic compounds, R.M. Silverstein and others, 5th Ed., (John Wiley)
3. Spectrometric Identification of organic compounds, R.M. Silverstein, F.X. Webster and D.J. Kiemle, 7th Ed., (Wiley)
4. Introduction to Spectroscopy, A guide for students of organic chemistry, Donald L. Pavia, Gary M. Lamp man and George S. Kriz, 3rd Ed., (Thomson).
5. Spectroscopic methods in Organic Chemistry, DH Williams & I Flemming, (TMH)
6. Spectroscopy of organic compounds, P. S. Kalsi, (Wiley)
7. Nuclear Magnetic Resonance Spectroscopy An introduction to Principles, Applications and experimental methods, Joseph B. Lambert and Eugene P. Mazzola, (Pearson Education Inc. Prentice – Hall).

8. A Complete Introduction to Modern NMR Spectroscopy, Roger S. Macomber, (John Wiley & Sons, Inc.).

35031P:Multistep Synthesis of Organic Compounds:

1. Benzanilide from Benzophenone
   Benzophenone → Benzophenone oxime → Benzanilide
2. Benzilic acid from benzoin
   Benzoin → Benzil → Benzilic acid
3. *p*-Bromoaniline from Acetanilide
   Acetanilide → *p*-Bromoacetanilide → *p*-Bromoaniline
4. Flavone from *o*-hydroxyacetophenone
   o-hydroxyacetophenone →*o*-benzoyl acetophenone → *o*-hydroxydibenzoylmethane → Flavone
5. 2-Acetylnaphthalene→ 4-(naphthalen-2-yl)thiazol-2-amine

2-Acetylnaphthalene → 2-bromo-1-(naphthalen-2-yl)ethanone → 4-(naphthalen-2-yl)thiazol-2-amine

35032P:Estimations

1. Estimation of glucose
2. Estimation of phenol
3. Estimation of aniline
4. Estimation of aspirin
5. Estimation of paracetamol
6. Estimation of ibubrofen

Books Suggested

1. Modern Organic Synthesis in the Laboratory *A Collection of Standard Experimental Procedures*,Jie Jack Li, Chris Limberakis, Derek A. Pflum
2. Practical organic chemistry by Mann & Saunders
3. Text book of practical organic chemistry by Vogel
4. Spectrometric Identification of organic compounds, R.M. Silverstein, F.X. Webster and D.J. Kiemle, 7th Ed.,(Wiley).

35031N: DRUG DISCOVERY, DESIGN AND DEVELOPMENT

UNIT – I: Basic Principles of Pharmacology
UNIT – II: Lead Discovery and Optimization
UNIT – III:SAR and QSAR Studies
UNIT – IV: Common Drugs

UNIT – I:Basic Principles of Pharmacology **15 Hrs**

Definitions: disease, drug, bioassay, pharmacokinetics and pharmacodynamics, stages involved in drug discovery, formulation, drug dosing, routes of drug administration,
Pharmacokinetics: absorption, distribution, metabolism and excretion of drugs (ADME), drug delivery.
Pharmacodynamics: nature of drug - receptor interactions, theories of drug action: occupancy theory, rate theory, induced-fit theory, macromolecular perturbation theory.
Drug synergism and antagonism, drug toxicity, clinical trials.

UNIT – II: Lead Discovery and Optimization **15 Hrs**

Lead discovery: existing drugs as leads (me too drugs), pharmacophore.Principles of design of agonists e.g. salbutamol, antagonists e.g. cimetidine and enzyme inhibitors e.g. captopril.Drug discovery without lead – serendipity-penicillin and librium as examples.

Lead optimization: Bioisosterism, variation of alkyl substituents, chain homologation and branching, variation of aromatic substituents, extension of structure, ring expansion and ring contraction, ring variation, variation and position of hetero atoms, ring fusion, simplification of the lead, rigidification of lead, conformational blockers, discovery of oxamnquine.

UNIT – III: SAR and QSAR Studies **15 Hrs**

Structure Activity relationship (SAR): SAR in sulfa drugs, benzodiazepines, and taxol analogs, principles of prodrug design

Quantitative Structure Activity relationship (QSAR): Introduction to QSAR, physicochemical properties – lipophilicity: partition coefficient (P) and the lipophilicity substituent constant (π), electronic effects: Hammett constant (σ), steric effects: Traft's constant (E_s), Hanscth analysis, Craig's plot,Topliss scheme, free Wilson approach, Lipenski rule of five.

UNIT – IV: Common Drugs **15 Hrs**

Structure, uses, mechanism of action of antibacterial agents: sulfamethoxazole, penicillin G, antiviral agents: acyclovir, indinavir, anticancer agents: mechlorethamine, methotrexate, antifungal agents: fluconazole, griseofulvin, gastrointestrinal agents: ranitidine, omeprazole, metoclopramide, cardiovascular agents: amrinone, procainamide, captopril, propranolol, mehyldopa, anticoagulants: warfarin, central nervous system agents: paracetamol, betamethasone, chlorpromazine, levodopa, diazepam, phenytion, procaine.

Books Suggested

1. Medicinal Chemistry and Pharmaceutical Chemistry, H. Singh and Kaur.
2. An Introduction to Medicinal Chemistry, 4th Ed., G. L. Patrik.
3. Fundamentals of Medicinal Chemistry, Gareth Thomas.
4. Biochemical Approach to Medicinal Chemistry, Thomas Nogrady.
5. Principles of Medicinal Chemistry, William Foye.
6. Medicinal Chemistry, AshutoshKar.
7. Medicinal Chemistry, R. R. Nadendla.
8. Berger's Medicinal Chemistry, Vols. 1-5, Manfred E. Wolf.

FOURTH SEMESTER

45031: REAGENTS IN ORGANIC SYNTHESIS

UNIT – I: Oxidations
UNIT – II: Reductions
UNIT – III: Non-Metallic Reagents in Organic Synthesis
UNIT – IV: Metallic Reagents in Organic Synthesis

UNIT–I: Oxidations **15 Hrs**

(a) Alcohols to carbonyls: Chromium (VI) Oxidants: dimethyl sulfoxide oxidation, periodate oxidation, Oppenauer oxidation, oxidation with manganese dioxide, DDQ, oxidation with silver carbonate.

(b) Alkenes to epoxide: peroxide induced epoxidations.

(c) Alkenes to diols: oxidation with potassium permanganate, osmium tetraoxide, Prévostoxidation, Woodward modification.

(d) Oxidation of alkyl or alkenyl fragments: selenium dioxide.

UNIT – II: Reductions **15 Hrs**

(a) Nucleophilic metal hydrides: $LiAlH_4$, $NaBH_4$, Red-Al and alkoxy aluminates.

(b) Electrophilic metal hydrides: BH_3, AlH_3 and DIBAL.

(c) Non-metallic reductions: Diimide reduction and Wolf-Kishner reduction.

(d) Dissolving metal reductions: Birch reduction and Clemmensen reduction.

(e) Heterogeneous catalytic hydrogenations.

UNIT– III: Non-Metallic Reagents in Organic Synthesis **15 Hrs**

Electronic structure and bonding in Boron, Phosphorus and Sulphur compounds – Their reactivity and applications in Organic Synthesis.

(A) Boron Reagents
Organoboranes in the formation of C-C bonds, alcohols, amines, halogen and carbonyl compounds, Free radical reactions of Organoboranes: simple boranes and hindered boranes.

(B) Phosphorus Reagents
Formation of C-C double bonds (Wittig reaction, Horner-Wordsworth-Emmons reaction), Functional group transformations, Reactivity as electrophiles and nucleophiles.

(C) Sulphur Reagents
Sulphurylides:stabilized and non-stabilized, Preparation and reactivity, sulphonylcarbanions.

(D) Silicon reagents
Reactions involving β-carbocations and α-carbanions, utility of trimethylsilyl halides, cyanides and triflates.

UNIT– IV: Metallic Reagents in Organic Synthesis **15Hrs**

(A) Organometallic Reagents:
Grignard reagents, organolithium, organozinc, organocopperandorganonickel reagents in Organic synthesis.

(B) Metal Mediated Cross-Coupling Reactions:
Suzuki, Heck, Stille, Sonogishira, Buchwald-Hartwig and Negishi-Kumada coupling reactions.

Books Suggested:

1. Modern Synthetic Reactions, H. O. House, 2nd Ed., (W.A. Benjamin)
2. Modern Methods of Organic Synthesis, W. Carruthers, 3rd Ed., (Cambridge University Press).
3. Principles of Organic Synthesis, R. O. C. Norman and J. M. Coxon, (Blakie Academic and Professional). Advanced Organic Chemistry: Part A & B, F. A Carey and R. J. Sundberg, 5th Ed., Springer, 2007.
4. Guide book to Organic Synthesis, R. K. Machie and D.N.Smith, (ELBS).
5. Principles of organometallic chemistry, P.Powell, (ELBS).
6. Organo transition metal chemistry-Applications to organic synthesis, S.G.Davis, Pergmon.
7. Multi-component Reactions: J. Zhu and H. Bienaymé (Wiley-VCH).
8. Strategies for organic drug synthesis and design By Daniel Ledneicer.

45032: DESIGNING OF ORGANIC SYNTHESIS

UNIT – I: Basics of Organic Synthesis andDisconnection Approach – I
UNIT – II: Disconnection Approach – II
UNIT – III: Disconnection Approach – III and Other Synthetic Strategies
UNIT – IV: Methods in Organic Synthesis

UNIT–I: Basics of Organic Synthesis andDisconnection Approach - I 15 Hrs

(A) Basics in Organic Synthesis

Classification of organic reactions; carbon-carbon single bond formation reactions; carbon-carbon double bond formation reactions; functionalization; functional group interconversion; organic synthesis: reason for organic synthesis and total (complete), partial (semi), formal, linear and convergent synthesis; introduction to synthetic strategies.

(B) Disconnection Approach - I

(i)Introduction: Terminology: retrosynthetic analysis (disconnection approach), target, synthon, synthetic equivalent (reagent), functional group interconversion (FGI), functional group addition (FGA), functional group elimination (removal); synthesis of aromatic compounds: benzocaine, *p*-methoxytoluene, BHT, isobutylbenzene, trifluralin B, phenols, saccharine and *o*-cyanotoluene.

(ii)Protecting groups: Introduction and protective groups for phenols and alcohols, amines, ketones and aldehydes and carboxylic acids.

UNIT–II: Disconnection Approach – II 15 Hrs

(a) Importance of order of events;one group C-X disconnections; chemoselectivity; two group C-X disconnections; reversal of polarity (umpolung); cyclization reactions.

(b) One group C-C disconnections –synthesisof alcohols and carbonyl compounds; regioselectivity; olefin synthesis; use of alkynes in synthesis.

(c) Two group C-C disconnections: Diels-Alder reaction; 1,3-difunctionalized compounds – 1,3-dicarbonyl, β-hydroxy carbonyl and α,β-unsaturated compounds, 1,5-dicarbonyl compounds – Michael addition and Robinson annulation, synthesis 1,2- and 1,4-dicarbonyl compounds – reconnection.

UNIT–III: Disconnection Approach – III and OtherSynthetic Strategies 15 Hrs

(A)Disconnection Approach - III

General strategy; retrosynthetic analysis oftarget molecules: simple targets – ibogamine, salbutamol, propoxycaine, ibuprofen and dinocap, complex targets - longifolene, (+)-disparlureandpenicillin V.

(B) Other approaches to Synthetic Strategies

(i) Biomimetic approach: introduction, Robinson's tropinone synthesis, Johnson polyene cyclization

(ii) Chiral template approach: introduction, synthesis of reserpine

(iii) Retro-mass spectral approach – introduction, Kametani's mass spectral analysis of tetrahydroisoquinoline alkaloids.

UNIT – IV: Methods in Organic Synthesis **15 Hrs**

Enamines – Introduction, generation, Stork enamine reaction, applications of enamines in organic synthesis; Multi component reactions (MCR) – Introduction, Strecker synthesis, Ugi reaction, Mannich reaction, Biginelli reaction, and Hantzsch synthesis; Tandem Synthesis – Definition, advantages, polyene cationic cyclizations, conjugate addition-aldol reaction, Mannich-cation olefin cyclization, Knoevenagal-hetero-Diels-Alder reaction.

Books Suggested:

1. Designing Organic Syntheses: A Programmed Introduction to the Synthon Approach, S. Warren, John Wiley &Sons.
2. Organic Synthesis: Strategy and Control, P. Wyatt and S. Warren, John Wiley &Sons.
3. Organic Synthesis: The Disconnection Approach, 1st& 2ndEd.s, S. Warren and P. Wyatt, John Wiley & Sons.
4. Organic Synthesis: Concept, Methods and Starting Materials, J. Fuhrhop and G. Perzillin, (Verlage VCH) 2nd Ed., 1994.
5. Organic Synthesis, M. B. Smith, 4th Ed., Elsevier, 2017.
6. Advanced Organic Chemistry: Part A & B, F. A Carey and R. J. Sundberg, 5th Ed., Springer, 2007.
7. Some Modern Methods of Organic Synthesis, W. Carruthers, 3rd Ed., (Cambridge Univ. Press).
8. Introduction to Strategies for Organic Synthesis, L. S. Starkey, John Wiley & Sons, 2012.
9. Organic Chemistry, Paula YurkanisBruice, 4th Ed. (Printice Hall).
10. Modern Synthetic Reactions, H. O. House, 2nd Ed., (W.A. Benjamin).
11. Multi-component Reactions: J. Zhu and H. Bienaymé (Wiley-VCH).

45033: CHEMISTRY OF HETEROCYCLIC COMPOUNDS

UNIT – I: Nomenclature, Aromaticity and Reactivity of Heterocyclic Compounds

UNIT – II: Three- and Four-membered Heterocyclic Compounds

UNIT – III: Five-membered Heterocyclic Compounds with Two Heteroatoms

UNIT – IV: Benzofused Five- and Six-membered Heterocyclic Compounds

UNIT – I: Nomenclature, Aromaticity and Reactivity of Heterocyclic Compounds **15 Hrs**

(A) Nomenclature of Heterocycles

Systamaticnommenclature (Hantzsch-Widman system); trivial system; fusion nomenclature system; replacement nommencalture system; Monocycyclic heterocycles, fused heterocycles, spiroheterocycles; bridged heterocycles; bicyclic systems; polycyclic systems; heterocyclic ring assemblies.

(B) Aromaticity of Heterocycles

Chemical behavior of aromatic heterocycles; five and six-membered aromatic heterocycles and mixed aromatic heterocycles; relationship with carbocyclic aromatic compounds; criteria of aromaticity in heterocycles; structural and electronic criteria.

(C) Reactivity of Heteroaromatics

Selectivity and reactivity of heteroaromatic rings: five- and six-membered heteocyclic system.

UNIT – II: Three- and Four-membered Heterocyclic Compounds **15 Hrs**

(A) Three-membered Heterocycles

Synthesis andchemical reactivity of aziridines, oxiranes, oxaziridinesandthiiranes.

(B) Four-membered Heterocycles
Synthesis and chemical reactivityofazetidines, azetidinones (β-lactams), oxetanes, oxetanones (β-lactones) and thietanes.

UNI – III: Five-membered Heterocyclic Compounds with Two Heteroatoms 15 Hrs

Synthesis, chemical reactivityand medicinal applications of pyrazoles, imidazoles, oxazoles,isoxazoles, thiazolesandisothiazoles.

UNIT – IV: Benzofused Five- and Six-membered Heterocyclic Compounds 15 Hrs

(A) Benzofused Five Membered Heterocycles
Synthesis, chemical reactivityand medicinal applications of benzopyrroles, benzofurans, bezothiophenesandbenzimidazoles.

(B) Benzofused Six Membered Heterocycles
Synthesis, chemical reactivity and medicinal applications of quinolines and Isoquinolines.

Books Suggested:

1. Heterocyclic Chemistry Vol.1-3, R. R. Gupta, M. Kumar and V. Gupta, Springer Verlag
2. The Chemistry of Heterocycles, T. Eicher and S. Hauptmann, Thieme
3. Heterocyclic Chemistry, J.A.Joule, K. Kills and G. F. Smith, Chapman and Hall
4. Heterocyclic Chemistry, T.L.Gilchrist, Longman Scientific Technical
5. Heterocyclic Chemistry, Raj.K. Bansal.
6. An Introduction to the Heterocyclic Compounds, R. M. Acheson, John Wiley.
7. Comprehensive Heterocyclic Chemistry, A. R. Katrizky and C. W. Rees, eds,.Pergamon Press
8. Principles of Modern Heterocyclic Chemistry, L. A. Paquett.
9. Enzyme structure and mechanism by Fersht and Freeman.
10. Bio-Organic chemistry by HennanDugas
11. Nucleic acids in Chemistry and Biology by G M Blackbum MI Gait
12. Lehninger Principles of Biochemistry by D L Nelson and M M Cox.

45034: MEDICINAL CHEMISTRYAND NATURAL PRODUCTS

UNIT – I: Basic Principles of Pharmacology
UNIT – II: Drug Design, Lead Modification and SAR
UNIT – III: Steroids and Prostaglandins
UNIT – IV: Flavonoids and Isoflavonoids

UNIT – I: Basic Principles of Pharmacology 15 Hrs

(A) Definitions
Disease, drug, bioassay, pharmacokinetics and pharmacodynamics. Stages involved in drug discovery,Formulation, Drug dosing, Routes of drug administration.

(B) Pharmacokinetics
Absorption, Distribution, Metabolism and Excretion of drugs **(ADME)**, Bioavailability, Drug delivery.

(C) Pharmacodynamics
Nature of drug – receptor interactions, Theories of drug action: Occupancy theory, Rate theory, Induced-fit theory, and Macromolecular perturbation theory. Drug synergism and antagonism, drug toxicity, clinical trials.

UNIT – II: Drug Design, Lead Modification and SAR **15 Hrs**

(A) Drug design

Lead discovery, Existing drugs as leads (me too drugs), Pharmacophore, Principles of design of agonists, antagonists and enzyme inhibitors, Design of salbutamol, cimetidine and captopril. Drug discovery without lead – serendipity- Penicillin and Librium as examples.

(B) Lead modification strategies

Bioisosterism, variation of alkyl substituents, chain homologation and branching, variation of aromatic substituents, extension of structure, ring expansion and ring contraction, ring variation, variation and position of hetero atoms, ring fusion, simplification of the lead, rigidification of lead.

(C) Structure-Activity Relationship (SAR) studies

SAR in sulfa drugs, benzodiazepines and taxol analogs; Structure pruning techniques with morphine as example, principles of prodrug design.

UNIT – III: Steroids and Prostaglandins **15 Hrs**

(A) Steroids

Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry of steroids; isolation, structure determination of cholesterol, structure determination and synthesis of androsterone, testosterone, estrone and progesterone, biosynthesis of steroids.

(B) Prostaglandins

Occurrence, nomenclature, classification, biogenesis, physiological effects and synthesis of PGE_2 and PGF_2.

UNIT–IV: Flavonoids and Isoflavonoids **15 Hrs**

Occurrence, nomenclature and general methods of structure determination; isolation, structure elucidation and synthesis of apigenin, luteolin, kaempferol, quercetin, and daidzein; biosynthesis of flavonoidsandIsoflavonoids: acetate pathway and shikimic acid pathway.

Books Suggested

1. Natural Products: Chemistry and Biological Significance, J. Mann, R.S.Davidson, J. B. Hobbs, D. V. Banthrope and J. B. Hatrbnome, Longman, Essex.
2. Organic Chemistry, Vol. 2, I. L. Finar, ELBS.
3. Chemistry of Organic Natural Products, O. P. Agrawal, Vols. 1 &2, Goel Pubs.
4. Natural Products Chemistry K. B. G. Torssell, John Wiley, 1983
5. New Trends in Natural Products Chemistry, Atta-ur-Rahman and M.I.Choudhary, Harwood Academic Publisher.
6. Chemistry of Natural products P. S. Kalsi, Kalyani Publishers
7. Biosynthesis of steroids, terpenes and acetogenins, J. H. Richards & J. R. Hendrieson
8. The biosynthesis of secondary metabolites, R. D. Herbert, Chapman & Hall
9. The Biosynthesis of Secondary Metabolite, R. D. Herbert, Second edn, Chapman and Hall 1984
10. Medicinal Chemistry and Pharmaceutical Chemistry, H. Singh and Kaur.
11. An Introduction to Medicinal Chemistry, 4th Ed., G. L. Patrik.
12. Biochemical Approach to Medicinal Chemistry, Thomas Nogrady.
13. Principles of Medicinal Chemistry, William Foye.
14. Medicinal Chemistry, AshutoshKar.
15. Medicinal chemistry An introduction by Garreth Thomas.
16. Berger's Medicinal Chemistry, Vols. 1-5, Manfred E. Wolf.

45031P: Spectral Identification of Organic Compounds (UV, IR, ^{1}H- and ^{13}C- NMR and Mass)

Composite spectral problems in three modes, 10 examples in each mode

(A). Propose the structures for compounds that fit the given spectral data and assign the spectral values.

(B). For the given scheme and spectroscopic data, deduce the structure of compounds I, II and III, and assign the data.

(C). Extract data from the given spectra and elucidate the structure from the obtained data with appropriate discussion.

Books Suggested

1. Organic spectroscopy, W. Kemp, 5th Ed., (ELBS.2)
2. Spectrometric Identification of organic compounds, R.M. Silverstein, F.X. Webster and D.J. Kiemle, 7th Ed., (Wiley)
3. Introduction to Spectroscopy, A guide for students of organic chemistry, Donald L. Pavia, Gary M. Lamp man and George S. Kriz, 3rd Ed., (Thomson).

45032 P: Project Work

Students must do a research based project and submit a dissertation for evaluation. Further, a final presentation of dissertation work and viva need to be conducted.

YOGI VEMANA UNIVERSITY
VEMANAPURAM, KADAPA

M. Sc. Environmental Sciences Syllabus
Semester & CBCS pattern
(Effective from 2018)

Department of Environmental Sciences
Yogi Vemana University
Kadapa

M. Sc. ENVIRONMENTAL SCIENCES

I[st] SEMESTER

SI.NO	Paper Title and Code	No. of credits	Hours per week	Max. Marks:100		Exam time (hrs)
				Internal	External	
1	Ecology and Environment-ENV101	4	4	25	75	3 hrs
2	Environmental Chemistry-ENV102	4	4	25	75	3 hrs
3	Environmental Issues-ENV103	4	4	25	75	3 hrs
4	Energy Resources-ENV104	4	4	25	75	3 hrs
5	Practical – I – ENV105 (1 & 4)	4	9	-	100	3 hrs
6	Practical – II- ENV106 (2 & 3)	4	9	-	100	3 hrs

II SEMESTER

SI.NO	Paper Title and Code	No. of credits	Hours per week	Max. Marks:100		Exam time (hrs)
				Internal	External	
1	Natural Resource Management and Disaster Management-ENV201	4	4	25	75	3 hrs
2	Environmental Pollution -ENV202	4	4	25	75	3 hrs
3	Environmental Microbiology and Toxicology -ENV203	4	4	25	75	3 hrs
4	Occupational health and Industrial safety-ENV204	4	4	25	75	3 hrs
5	Practical – III-ENV205 (1&2)	4	6+1	-	100	3 hrs
6	Practical – IV ENV206 (3&4)	4	6+1	-	100	3 hrs
7	Elective : I Basics in Environmental Science-ENV207	4	4	25	75	3 hrs

III SEMESTER

SI.NO	Paper Title and Code	No. of credits	Hours per week	Max. Marks:100		Exam time (hrs)
				Internal	External	
1	Biodiversity and Conservation-ENV301	4	4	25	75	3 hrs
2	Remote Sensing and Geographical Information System-ENV302	4	4	25	75	3 hrs
3	Environmental Biotechnology-ENV303	4	4	25	75	3 hrs
4	Environmental Engineering-ENV304	4	4	25	75	3 hrs
5	Practical – V-ENV305 (1&2)	4	6+1	-	100	3 hrs
6	Practical – VI-ENV306 (3&4)	4	6+1	-	100	3 hrs
7	Elective : II Climate change and Sustainable development-ENV307	4	4	25	75	3 hrs

IV SEMESTER

SI.NO	Paper Title and Code	No. of credits	Hours per week	Max. Marks:100		Exam time (hrs)
				Internal	External	
1	Environmental Policy and Sustainable Development-ENV401	4	4	25	75	3 hrs
2	Environmental Law, EIA and Audit-ENV402	4	4	25	75	3 hrs
3	Instrumentation and Techniques -ENV403	4	4	25	75	3 hrs
4	Biostatistics and Research Methodology-ENV404	4	4	25	75	3 hrs
5	Practical- VII –ENV405 (1,2,3 &4)	4	9	-	100	3 hrs
6	Project Report & Viva voce- ENV406	4	9	-	100	-
	Total for Core Papers	100	128 (excluding seminar hrs)	400	2000	
	Total for Elective Papers	08	08	50	150	
	Grand Total	108	136(excluding seminar hrs)	400 + 50	2000+150	

ENV -101

ECOLOGY AND ENVIRONMENT

UNIT –I

Definition, principles and scope of Environmental Science, Physico - Chemical and biological factors guiding the Environment, Biogeochemical cycles – (C, N, P, and S) and their importance. Earth, Man and Environment Relationship.

UNIT – II

Ecosystem: Definition Types of Ecosystems, Components of Ecosystems – Structure and Function. Trophic levels, Food chain, Food web and Ecological pyramids. Energy flow and Productivity, Biomes.

UNIT – III

Population Ecology: Definition – Characteristics of Population - Population Density, Natality, Mortality. Population Growth, Age distribution of population, Population fluctuations and dispersal.

Human population growth and trends, Impact of human population explosion on environment.

Community Ecology: Ecological Succession –Types and general process of succession Nudation, invasion, competition and Climax Community organization: Ecological Niche, Interaction between species - Mutualism, Commensalism, Competition, Predation, Parasitism and Allelopathy.

UNIT – IV

EARTH: Composition of Lithosphere, Types and Properties of rocks, Soil formation process – Physical, Chemical and biological weathering, soil erosion, Rare earth elements, Hydrosphere and Hydrological cycle.

REFERNCES:

1. Odum, E. P., (1971) Fundamental and Environmental Ecology, III Edition, Prentice Hall.
2. Sharma P. D., (1994) Ecology and Environment, Rastogi Publications, Meerut.
3. Daniel D Chiras., (1994) Environmental Science, The Benjamin/Cummings Publishing Co. Inc.
4. Edward A Keller, (1981) Environmental Geology, III Edition, Charles E Merrill Publishing Co, Ohio.
5. Enger and Smith (2004) Environmental Science, Mc Graw Hill
6. P.S.Varma and V. K.Agarwal (2000) Environmental Biology, Chand & Company Ltd. Ramnagar, New Delhi.

ENV - 102

ENVIRONMENTAL CHEMISTRY

UNIT - I

Atmospheric Chemistry: Structure and composition of atmosphere, Gibb's energy, acid base reactions, Chemical equilibria, Solubility product, Solubility of gases in water, Photochemical reactions in the atmosphere – SO_x, NO_X, Ozone Chemistry–Particles in atmosphere – Types and effects.

UNIT – II

Soil Chemistry: Soil profile, Micro and Macronutrients Pesticides: classification,– degradation, Physico – chemical characteristics of soil , soil air, soil clays, organic carbon, soil humus and mineralization, cation exchange capacity, soil water solution , C/N ratio, soil acidity and salinity.

UNIT – III

Aquatic Chemistry: Sources– Heavy metals – Organic, Biological, Electrochemical theory of corrosion, Properties of water - pH, acidity, alkalinity, salinity, hardness, Concepts of DO, BOD, COD.

Green Chemistry: Introduction - Importance of solvents – Types of catalysts and their role – Applications.

UNIT – IV

Pollutant Chemistry: Chemistry of hydrocarbon decay, effects on macro and microorganisms - Surfactants: Cationic, anionic and non-ionic detergents, modified detergents**,** Pollution due to pesticides and DDT problems, Heavy metals: Toxic effects of Cd, Pb & Hg.

REFERNCES:

1. Environmental Chemistry, Stanley E Manahan., (2001), Lewis Publishers.
2. Environmental Chemistry, Sharma, B. K. Kaur H., (1995) Goel Publishing House.
3. A. Text book of Environmental Chemistry, V. Subramanian. (2011) IK International Publishing House Pvt. Ltd.,New Delhi.
4. A Text book of Environmental Chemistry and Pollution Control. Dara S. S.,
5. Environmental Chemistry Samir K. Banerji (2013) PHI Learning private Ltd.,
6. A text book of Environmental Chemistry, Balaram Pani (2007) IK International Publishing House Pvt. Ltd., New Delhi.

ENV – 103
ENVIRONMENTAL ISSUES

UNIT – I

Global Environmental Issues: Urban air quality, Acid Rain, Ozone depletion, Marine pollution- Loss of coastal areas, Drought-desertification, Water Crises, Conservation of water, Rain water harvesting, Alkaline and Saline soils, Soil erosion, Narmada Dam, Tehri Dam, Almatti Dam, El Nino Phenomenon.

UNIT - II

Climate change, Green house effect, Global warming, Effect of global warming on hydrological cycle, agriculture, livelihoods, Glaciers melting, Sea level rise, Loss of deltas, Wetland conservation. Genesis and future of Kyoto protocol

UNIT – III

Deforestation, Forest role in climate change to earn carbon credits, Mangroves, Utilization of Bioresources and Patents, Biodiversity loss, Hot spots of biodiversity and conservation, Endemic, Endangered and Threatened species, Disasters-Natural disasters, Disaster management initiatives in India, Case studies - Bhopal disaster, Chernobyl accident, Exxon Oil disaster etc.

UNIT – IV

Natural resources depletion/ management, Population growth, Urbanization, Poverty reduction, Food insecurity, Genetically modified organisms, Environmental ethics, Renewable and non-renewable energy, Hazardous waste and waste management, WHO, Ebola, Environmental education and awareness.

REFERENCES

Updated versions of Environmental science books

1. Ecology and Environment, Sharma P. D., (1994) Rastogi Publications, Meerut.
2. Environmental Science, Daniel D Chiras., (1994) The Benjamin/Cummings Publishing Co. Inc.
3. Environmental Chemistry Sharma, B. K. Kaur H., (1995) Goel Publishing House.
4. Environmental Science – A study of Inter relationships. Enger, E. D and Smith, B. E, 5th Ed., W.C.B Publication.
5. A Text book of Environmental Chemistry and Pollution Control. Dara S. S.,
6. Environmental Science Enger and Smith (2004), Mc Graw Hill
7. Encyclopedia of Environmental Sciences – Environmental Energy Resources. Trivedi R. P and Gurudeep Raj (2005).
8. Renewable Energy Resources. Tiwari G. N and Ghosal M. K., (2005) Narosa.
9. Environment and Natural Resources Conservation. Trivedi, R. K. (1994).
10. Forest Ecosystem of the World. Shafi. R. (1992).
11. Disaster Management. Shailendra K Singh, Subhash C Kundu and Shobu Singh (1998) Mittal Publications, New Delhi.

ENV- 104
ENERGY RESOURCES

UNIT – I

Basic Concepts of Energy

Energy – Definition – Forms of energy – Kinetic, Potential, Mechanical, Thermal, Electrical, Chemical and Nuclear energy, Energy production and consumption in India

Energy Sources – Conventional and Non – conventional energy sources, Laws of thermodynamics, Carnot cycle.

Firewood – Fossil fuels – Origin – Coal reserves in India – Petroleum and Natural Gas – Reserves in India.

UNIT – II

Conventional energy sources

Conventional energy sources: Energy from fossil fuels, energy from major hydroelectric power, Nuclear Energy – Sources – Nuclear fission and fusion reactions.

Climatic effects of power production.

- Advantages and disadvantages of conventional energy sources.

UNIT – III

Non Conventional Energy sources:

Different Types and Need for non renewable energy sources

Solar power: Importance – Solar collectors – Concentrations – Flat Plate and parabolic Collectors, Solar towers – Non – convective solar pond, Ocean Thermal Energy Conversion (OTEC). Solar Photovoltaic Systems – semi conductors, Solar PV Panel, Solar PV systems and applications.

Wind Energy: Wind Energy Conversion Systems, Application of Wind energy. 3c. Geothermal Energy: Geothermal Resources in India, small hydro resources in India their advantages, Ocean Energy – Tidal energy, Wave energy.

UNIT –IV

Non conventional energy sources: Emerging technologies and Conservation

Biomass energy – Biomass sources, Biofuels and Biogas –Bio ethanol, Biodiesel production Process - Gasification.

Emerging technologies – Fuel cells, Hydrogen energy

Energy conservation through efficiency and sufficiency measures.

Role of Energy Conservation Act, BEE, Energy for sustainable development.

REFERNCES:

1. Encyclopedia of Environmental Sciences – Environmental Energy Resources. Trivedi R. P and Gurudeep Raj (2005).
2. Renewable Energy Resources. Tiwari G. N and Ghosal M. K., (2005) Narosa.
3. Bioenergy. Desai A. V Wiley Eastern Limited, International Development Research Center, Ottawa, Canada.
4. Non-conventional Energy Sources. Rai G. D., (2001) Khanna Publishers.

ENV – 105: PRACTICAL - I

1. Environmental Inventory Studies – Quadrate Method.
2. Species – Area Curve, Effective population size
3. Wind rose, Energy Budget
4. Examples of energy production problems
4. Estimation of productivity in Grass land
5. Plankton Analysis – Phytoplankton – Zooplankton. Counting – Identification – Primary productivity in water bodies.

ENV – 106: PRACTICAL – II

1. Soil – Physical, Chemical and Biological Properties – Soil texture- Sand, Clay, Silt.
2. To determine the Soil moisture content and Total Organic Carbon of the given soil sample.
3. Soil pH – Conductivity – NPK – Soil bacteria and Fungi.
4. Determination of pH, Conductivity, Turbidity, Total Dissolved solids drinking water and Centrifugation
5. Estimation of Hardness, Alkalinity/ Acidity and Chlorides.
6. Determination of DO, BOD in given water sample.
7. To determine the Sulphates by Barium chloride method of the given water sample
8. Heavy metal stress and it impact on growth

ENV – 201
NATURAL RESOURCE MANGEMENT & DISASTER MANAGEMENT

UNIT – I
Renewable and non- renewable resources classification, Factors that influence scarcity of natural resources. Equitable resource use for sustainable life system.
Water resources of India, Integrated water resources management – Rain water harvesting and Watershed management, Ecological importance and conservation of wetlands in India.

UNIT – II
Food Resources: Sources of food, Changes caused by Intensive agriculture, Overgrazing, Fertilizer and Pesticide problems, Water Logging and Soil salinity.
Forest resources: Forest cover in India, Importance of NTFPs, Implications of deforestation, Community Forest management
Mineral Resources: Uses and Environmental effects of extraction and over exploitation of mineral resources.

UNIT – III
Definition of Hazard, Risk and Disaster, Hazardous effects and impact of earth quakes, land slides, tsunami, cyclones, floods and volcanoes

UNIT – IV
Disaster Management and Mitigation: vulnerability analysis and risk analysis.
Pre disaster Planning - preparedness, forecasting and warning, disaster education.
Post disaster planning – relief measures and rehabilitation.

REFERENCES:

1. Trivedi,R.K.(!994)Environment and Natural Resources Conservation.
2. Shafi. R. (1992).Forest Ecosystem of the World. New Delhi, Nice printers.
3. Singh. B. (1992) Social Forestry for Rural Development. Anmol Publishers, New Delhi.
4. Botkin D. B (1989) Changing the Global Environment. Academic Press, San Diago.
5. Shailendra K Singh, Subhash C Kundu and Shobu Singh (1998)Disaster Management. Mittal Publications, New Delhi.
6. Cuttler S (1994) Environmental Risk and Hazards. Prentice Hall of India, New Delhi.
7. Singh R. B (ed) (2000) Disaster Management. Rawat Publications. Jaipur & New Delhi.
8. Savindra singh(2016)Environmental geography :– Pravallika publication, Allahabad.

ENV – 202
ENVIRONMENTAL POLLUTION

UNIT – I

Pressure, Temperature, Precipitation, Humidity, Atmospheric stability, Inversions and Mixing heights, wind roses, Sources and Classification of Air Pollutants: photochemical smog, Indoor air pollution, Vehicular pollution, Effect of air pollutants on man, plant, animals, materials and on climate.

UNIT – II

Speciation and Complexation. Water pollution - sources and classification of water pollutants, Eutrophication, Ground water pollution, Global discharge of heavy metals into water bodies. Potability of water, Effluent standards, Thermal pollution, Marine pollution.

UNIT – III

Soil Pollution; Sources – organic contaminants of soil, Industrial waste effluents and heavy metals, their interactions with soil components, Soil micro organisms and their functions, Sediment pollution, synthetic fertilizers (N, P & K) and their interactions with components of soil, Soil pollution control measures, Radioactive pollution.

UNIT – III

Solid waste Pollution: Types, sources and consequences. Classification of wastes (Industrial, Municipal, Hospital) Recycle, Reuse, Reduce, Utilization of solid wastes into energy/manure, Disposal methods-non hazardous and hazardous solid waste, Basel Convention on transport of Hazardous Wastes.

Noise Pollution – Sources, measurement of noise and indices, Noise exposure levels and standards. Impact of noise on human health. Noise control and abatement measures.

REFERENCES:

1. Encyclopedia of Environmental Pollution and Control. Trivedy, R. K (1994) Environmedia Publications, Karad.
2. Textbook of Soil Science. 4th Ed., Biswar, T. D and Mukherjee, S. K (1987) McGraw Hill.
3. An Introduction to Soils and plant growth. 5th Ed, Roy I Donalue, Raymond W Miller and John C Shiekluna (1987) Prentice Hall of India.
4. Environmental Noise Pollution and its Control. Chhatwal, G. R., Mehra, M. O., Katyal T., Satake, K Mohan Katyal and Nagahiro, T (1989) Anmol Publications.
5. Water Pollution. Kudesia, V. P., (1985) Pragati Prakashan Publications.
6. Air Pollution. Henry C Perkins, (1974) McGraw – Hill.
7. An Introduction to Air Pollution. Trivedy, R. K and Goel, P. K., (1995) Techno Science Publications, Jaipur.
8. Environmental Pollution Management and control for sustainable development. Khitoliya R. K. (2014) S. Chand and Company Pvt. Ltd., New Delhi.

ENV – 203

ENVIRONMENTAL MICROBIOLOGY AND TOXICOLOGY

UNIT – I

Microbial diversity, Soil microorganisms and their functions, Aeromicroflora, Air borne diseases and allergens, Water borne diseases, Culture media, Types of media, Isolation of pure cultures, Growth curve, Microorganisms as source of food – Single Cell Protein – Fermented foods.

UNIT - II

Introduction to Toxicology, Toxicants, Toxicity, Acute, sub-acute and chronic Dose effect, LD_{50}, LC_{50} and response safe limits, Dose Response relationships, Toxic chemicals in the environment. Biochemical aspects of Arsenic, Cadmium, Lead, Mercury, Carbon monoxide, MIC, Pesticides – Classification, Residual effects, Oceanic pollution by toxic wastes

UNIT – III

Xenobiotics in environment, PCB, Dioxins, Bioindicators, Bioaccumulation, Bioconcentration, Biomagnification, Cell receptors, Cell injury and Apoptosis, Toxicity Testing approaches, Environmental specimen banking

UNIT – IV

Public Health Programmes– Urban and rural health, Sanitation, Case studies with special reference to particular disease-Malarial Control Measure, AIDS, Polio, Chikungunya, Dengue, Cancer, Bacterial, viral and fungal diseases for plants

REFERENCES

1. Leslie collier, Balows Albert and Sussman Max, Topley and Wilson's Microbiology and Microbial infections. Oxford University Press
2. Microbiology, Pelczar MJ Jr, Chan ECS, Krieg NR
3. Introduction to Soil Microbiology, Alexander, M., 1977, 2 ndEdn., Wiley John
4. Introduction to Environmental Toxicology: Impacts of chemicals upon Ecological systems. Landis, Wayne and Hing –ho Yu, Baca Raton, (1995) Lewis Publishers.
5. Environmental Toxicology and Chemistry. Crosby, Donald. G. (1998) Oxford University Press.
6. Ecotoxicology, Schuurmann, G. and Market, G. (1998) A. John Wiley & Sons, Inc.
7. Information Resources in Toxicology: Wexler, Philip et al, (2000) 3rd Ed. Academic press
8. Environmental Biology & Toxicology. Sharma P.D. (1994). Rastogy publications
9. Biotechnology from A to Z 1993. William Bains, IRL Press, Oxford, England PP 358.

ENV204 - OCCUPATIONAL HEALTH AND INDUSTRIAL SAFETY

UNIT-I

Occupation health: Definition and scope. Overview of work place health hazards. Physical, chemical, biological and radiological health hazards. silicosis, asbestosis, pneumoconiosis, siderosis, Byssinosis. Ways to reduce occupational risks.

UNIT-II

Industrial hygiene: Definition, Environmental factors and their effects on Workers health. Hazards at work places. Benefits and goals of industrial hygiene program. Medical facilities in factories, Ventilation and heat stress, Significance of ventilation, Purpose of lighting, Uses of good illumination.

UNIT-III

Personal Protective Equipments (PPEs), Types of PPEs their use care and maintenance. Different air pollutants in Industries, Effect of different gases and particulate matter, acid fumes, smoke, fog on human health.

UNIT-IV

Industrial safety: Importance of Industrial safety, role of safety department, Safety committee and Function principles of safety management, fire prevention, accident prevention, handling of dangerous substances. First aid : Body structure and Functions, Position of causality, the unconscious casualty, fracture and dislocation, Injuries in muscles and joints, Bleeding, Burns, and accidents caused by electricity, Safety activities of the ILO (International Labour Organization) Introduction to OSHAS 18001 and OSHA

REFERENCES:

1.Risk assessment- A Practical Guide, 1993, Institution of Occupational Safety and Health, United Kingdom

2.Industrial safety management By: L.M. Deshmukh Publishers: Tata Megraw Hill ,New Delhi Year: 2006 Edition: First

3. Industrial safety health and environment Management system By: R.K. Jain & Sunil S. Rao Publishers: Khanna Publishers Year: 2008 Edition: Second

4.R.K.Jain and Sunil S.Rao , Industrial Safety , Health and Environment Management Systems, Khanna publishers , New Delhi (2006)

5. Slote.L,Handbook of Occupational Safety and Health, John Willey and Sons, NewYork .

ENV – 205: PRACTICAL – III

1. Measurement of sound by DB meter in silent, Industrial, Residential and Commercial Zones.
2. Chemical Coagulation Test – Jar test apparatus.
3. Estimation of Na and Ca by flame photometry.
4. Drinking Water Treatment (measure of 5 parameters before & after treatment) – pH, Chloride, Nitrate, Phosphate, Total Dissolved Solids).
5. Air quality – SPM – SO_x, - NOx.
6. Spectrophotometer methods of estimation: Phosphate, Nitrate, Chromium.

ENV – 206: PRACTICAL -IV

1. Isolation and identification of fungi and bacteria from the soil
2. Staining techniques – a) Simple staining b) Gram staining
3. Characterization of waste water
4. Determination of total carbohydrates in biological samples.
5. Estimation of protein contents
2. Study of effects of detergents on plants.
3. Observation of the effects of metals on plants.
4. Analysis of some ecological effects of urban pollution on plants.
6. Detection of some organic chlorine chemicals in fruits and vegetables.
7. Noise level survey at workplace using sound level meter.
8. Demonstration of use of portable fire extinguishers.
9. Industrial safety-Case study

ELECTIVE –I SYLLABUS
SEMESTER -II
ENV-207
BASICS IN ENVIRONMENTAL SCIENCE

Unit –I

Ecosystem: Concept, Structure, functions, food chain, food web, Ecological pyramids, Energy flow in ecosystem, Forest ecosystem, grassland, desert and Aquatic (ponds, rivers, estuaries).

Unit – II

Environment: Importance of environmental studies, Natural resources, Forest, Water, Mineral, energy, land, Acid Rain, Ozone depletion, Urbanization, Eutrophication,

Unit –III

Biodiversity and its conservation, Biogeographical classification of India, India as a megadiversity nation, value of biodiversity, Hotspots of biodiversity, Threats to biodiversity, Habitat loss, man –animal conflicts, endangered and endemic species of India.

Unit IV

Air pollution, water pollution, soil pollution, marine pollution, noise pollution, radioactive pollution, thermal pollution.

REFERENCES:

1. Fundamental and Environmental Ecology, III Edition, Odum, E. P., (1971) Prentice Hall.
2. Living in the Environment – Principles, Connections and Solutions, Tyler Miller Jr. G., (1996) Wadsworth Publishing Co., New York.
3. Ecology and Environment, Sharma P. D., (1994) Rastogi Publications, Meerut.
4. Environmental Science, Daniel D Chiras., (1994) The Benjamin/Cummings Publishing Co. Inc.
5. Environmental Pollution Control Engineering, C. S. Rao, (2006) New age International Publishers.

ENV - 301
BIODIVERSITY AND CONSERVATION

UNIT – I

Biological Diversity — Concept, Definition and Scope of Biodiversity, Genetic Diversity, Species diversity and Ecosystem Diversity, Species Inventory. Direct and indirect uses of Biodiversity, Biogeographical zones of India- Global hotspots of Biodiversity, Vavilov centres of origin

UNIT – II

Biodiversity loss, Species extinction – Threats to biodiversity, Invasive species, IUCN categories of threatened species; Extinct, Endangered and Vulnerable species, Red data Book, Measures of biodiversity, Alpha and Beta diversities.

UNIT – III

National and International Organisations associated with Biodiversity Conservation – IUCN, UNEP, WWF, NBAGR, NBPGR, GREEN PEACE, Biodiversity registers.

UNIT – IV

Conservation and Management – National Biodiversity Authority, Current practices in conservation – *in- situ* Conservation - National Parks, Wildlife Sanctuaries and Biosphere reserves; *ex-situ*- Conservation of Threatened Species, National Biodiversity Bill 2002, Convention on Biodiversity.

REFERENCES:

1. Dadhich L. K and Sharma A. P (2002) Biodiversity – Strategies for Conservation, APH Publishing Corporation, New Delhi.
2. Khan, T. I and Dhari N Al Ajmi (1999) Global Biodiversity – Conservation MeasurePointer Publishers, Jaipur.
3. Krishnamurthy, K. V (2003) An Advanced Textbook on Biodiversity – Principles and Practice, Oxford and IBH Publishing, New Delhi.
4. Brian Groombridge (1992) Global Biodiversity – Status of the earths Living Resources, Chapman and Hall, London.
5. Kumar U and Asija M (2006) Biodiversity: Principles and Conservation. 2nd Edition. Agro bios Publication.

ENV – 302
REMOTE SENSING & GIS

UNIT – I

Remote Sensing components, Electromagnetic radiation, Energy interaction in the Atmosphere and Earth's surface

1b. Spectral signatures, Spectral reflectance curve, Atmospheric windows

1c. Spatial, Temporal, Radiometric Resolutions

UNIT – II

2a. Sensors and Platforms classification- Land observation satellites and sensors – LANDSAT, IRS, CARTOSATSPOT

2b. Weather observation satellites/ Sensor–INSAT, NOAA, GOESS

Future Satellite System – ENVISAT.

2c. Features in Image Interpretation, Principles involved in thermal IR image and microwave image interpretation

2d. Applications of different types of images in Agriculture, Land use land planning,, Forestry, water resources, Soils, Disaster management etc.

UNIT - III

3a. Introduction and components Geographical Information Systems,

3b. Map Characteristics, Scale, Topographic and Thematic

3c. Map projections- Geographic Coordinate systems UTM projection, WGS Geodetic system

3d.Fundamentals of Geospatial data – Layers, themes, Raster Model, Vector Model

UNIT – IV

4a. Applications of GIS – Environmental Impact Assessment – Land Degradation, Desertification

4b. Air Pollution Pollution Monitoring —– Industry – Mining – Ground Water –

4c. GIS in coastal management and flood management, Damage Assessment –

REFERENCES:

1. Remote Sensing and GIS for Environmental Planning. Muralikrishna, I. V (1995). Tata – McGraw Hill.
2. Advances in Environmental Remote Sensing. Danson F. M and Plummer S. E (1995).
3. Fundamentals of Remote Sensing. George Joseph (2003). Universities Press (India) Ltd., Hyderabad.
4. Remote Sensing and Image interpretation. Lilles and Keifer (2004) John wiley and sons, New York.
5. Remote Sensing – Principle and Interpretation. Sabins. F. F (1987) Freeman and Co., New York.
6. Environmental Remote Sensing from Regional and Global Scales. Roody G. M and Curran P. J (1994).
7. GIS Fundamentals, Applications and Implications. Elangovan, (2006) NIPA, New Delhi.

ENV – 303
ENVIRONMENTAL BIOTECHNOLOGY

UNIT- I

Environment Biotechnology- Bioremediation, Bioremediation in-situ and ex-situ, Phytoremediation, Biopesiticides, Biopesticides in integrated pest management, Biofertilizers- Rhizobial, Free living N_2 fixers and Phosphate solubilizing bacteria, mycorrhiza, BGA, their importance and practice, Vermicomposting

UNIT- II

Degradation of aliphatic and aromatic hydrocarbons, Degradation of pesticides, Bioindicators of hazardous pollutants, Extremophiles, Fermentation technology, Biofermentors, Major products of microbes- Alcohols, Antibiotics, Aminoacids and Organic acids, Immobilization technology, Methanogenesis

UNIT- III

Environmental stresses, Biotic and abiotic factors-Drought, Salinity, Extreme temperature, Light and Heavy metal stresses, *In vitro* techniques-Plant cell culture, Cloning/Recombinant DNA technology, Genetically engineered microbes, plants and animals, Drought and salt tolerance, Herbicide resistance, Dolly

UNIT- IV

Leaching, Germplasm, Conservation and gene banks, Pearl culture, Sericulture, Biosafety and Bioethics, Environmental risk assessment of genetically modified crop plants, Bt toxin types, Biopiracy and Bioprospecting, Patents

REFERENCES:

1. Environmental Biotechnology-SK Agarwal, APH Pub.1998
2. Microbial aspects of Pollution. Skyes and Skinner.
3. Microbial Biotechnology Glazer and Nikaido 1995.
4. Prescott and Dunns Industrial microbiology. Reed (Ed).
5. Biotechnology 3 rd edition by john E. Smith. Cambridge low price editions.
6. Plant Biotechnology, 1994. Prakash and Pierik. Oxford & IBH Publishing Co.
7. Environmental Risk & Hazards. Cuttler S. (1994). Prentice Hall of India. New Delhi

ENV – 304

ENVIRONMENTAL ENGINEERING

UNIT – I

Design of Pressure Pipes, Pump types, Characteristic curves, General layout of Water Treatment Plant – Aerators – Types, Flash Mixer – Design – Clari–flocculator– Filtration – Rapid sand filter and Pressure sand filter design – chlorine demand, residual chlorine and chlorine dosage, Role of Ozone and UV as a Disinfectant.

UNIT – II

Primary and Secondary Settling Tanks – Activated Sludge Process – Types and modifications – Design of Aeration Tanks and Oxidation Ditch – Diffusers and Mechanical Aerators, Tricking Filters and their Design. Duncan Mara Systems (Waste Stabilization Ponds).

UNIT – III

Sludge Processing and Disposal Methods – Design of Anaerobic Digester and Sludge Drying Bed – Reverse Osmosis – Ion Exchange – Incinerators, Land filling – Composting, Vermicomposting, Fly ash utilization, Case studies: Dyeing, Paper and Pulp, Distillery, Thermal, Tannery.

UNIT – IV

Air Pollution Control - Minimum Stack Height – Plume Rise, Design of Settling Chamber, Cyclones, Fabric filters and Electrostatic Precipitators. Scrubber, Exhaust.

REFERENCES:

1. Introduction to Environmental Engineering and Science. Gilbert M. Masters (2004). Prentice – Hall of India Pvt. Ltd., New Delhi.
2. Wastewater Treatment. Rao M. N. and Datta, A. K (1987). Oxford & IBH Publishing Company Pvt. Ltd., New Delhi.
3. Environmental Engineering. Mackenzie L. Davis and David A. Cornwell (1991). Mc Graw Hill International Editions, New York.
4. Water and Wastewater Technology. Hammer M. J and Hammer Jr. M. J (2001). Prentice – Hall of India Pvt. Ltd., New Delhi.
5. Wastewater Engineering: Treatment and Reuse. Metcalf and Eddy (2003). Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
6. Sewage Disposal and Air Pollution Engineering. Garg. S. K (1990) Khanna Publishers, India.
7. Advances in Industrial Wastewater Treatment. Goel P. K and Sharma K. P (1999). Technoscience Publications, Jaipur, India.
8. Chemistry for Environmental Engineering and Science. Sawyer C. N., Mc Carty P. L., and Parkin, G. F (2003) Tata McGraw – Hill Publishing Company Ltd., New Delhi.
9. Environmental Pollution Control Engineering, C. S. Rao, (2006) New age International Publishers.

ENV – 305: PRACTICAL - V

1. Calculation of Latitudes and Longitudes of given places.
2. Interpretation of Toposheet.
3. Demarcation of land / Land Cover/ Forest cover
4. Water shed/ Drainage basin, paleochannels.
5. Enumeration of local food plants, Medicinal plants
6. Enumeration of local endemic and endangered species
7. Estimation of species diversity. Shannon – Weiner Index, Simpsons Index
8. Georectification by using Arc-GIS.

ENV – 306: PRACTICAL –VI

1. Bioremediation of pollutants (phytoremediation of metals)
2. Enumeration of characteristics of bacterial colonies
3. Serial dilution experiments
4. Cell count by Haemocytometer
5. Preparation of microbial media
6. Antimicrobial experiments
7. *In vitro* techniques
8. Plant tissue culture media
9. Embryo, Axillary bud and Callus culture
10. Isolation of DNA
11. Electrophoresis
12. Genetic transformation
13. Effect of light, heavy metal on *in vitro* seed growth
14. Biosafety, bioethics experiments
15. Environmental risk assessment - plot design and field experiments.

ELECTIVE –II SYLLABUS
SEME STER–III
ENV-307 CLIMATE CHANGE AND SUSTAINABLE DEVLEOPMENT

Unit –I
Structure and composition of Atmosphere, Montreal protocol, El –Nino Phenomenon, Monsoon in India, urban heat island, New weather patterns, water resources, Agriculture.

Unit –II
Green house effect: Global warming – major green house gases, sources of green house gases, possible consequences of a green house warming, ozone layer depletion – stratospheric ozone, climate change: effect on organisms and human.

Unit – III
United Nations frame work convention on climate change (UNFCC), clean development mechanism (CDM), Kyoto Protocol, Intergovernmental panel for climate change (IPCC), Overview of Conference of Parties (CoP).

Unit IV
Sustainable development – Concept and key aspects, Sustainable Management of Water Resources, Food security and GMOS. Energy and sustainable development, Conservation of non- conventional energy resources – efficient use of energy,.

REFERENCES:

1. J. T. Hardy (2003) Climate change causes, effects and solutions, John Wiley and sons.
2. Tyler Miller Jr. G. (1996) Living in the environment – principles, connections and solutions, Wadsworth Publishing Co. New York.
3. Critchfield, Howard J., 1998. General Climatology, Prentice Hall Pvt. Ltd. New Delhi, India.

ENV – 401
ENVIRONMENTAL POLICY AND SUSTAINABLE DEVELOPMENT

UNIT – I (14 Hours)

National Environmental Policy (NEP, 2000) – Goals and Objectives, Environmental Policy Strategies in Pollution Control, National Policy on Climate Change and International Convention on climate change - UNFCCC, IPCC reports. Global Warming Potential.

UNIT -II (8 Hours)

Role of Environment in Economic growth, Ecosystem services and goods – Environmental Valuation, Types of Environmental Values (Values of Biodiversity), Externalities - Methods of abatement of Externalities, Common Property resources, Net present value.

UNIT - III (12 Hours)

Units of Measurement, National Emission Standards for water, Noise, National Ambient Air Quality Standards, Life Cycle Assessment, Cost –Benefit Ratio, Effects of pesticides, Carcinogenic Organic Chemicals, Soil Health indicators, Soil contamination and crust formation.

UNIT – IV (14 Hours)

Sustainable Development: Definition and concept. The emergence Conceptualization of the notion of sustainable development, The Time line calendar of sustainable development, Key aspects and Strategies for Sustainable Development. Guidelines to Campaign for Sustainable Society.

REFERENCES:

1. Environmental Economics in Theory and Practice. Hanley, Nick, Jason F. Shogren and Ben White. (1997) Macmillan New Delhi, India.
2. Handbook of Natural Resource and Energy Economics. Allen V. Kneese and James L. Sweeney. (1985) North Holland.
3. Environmental Economics: An Introduction. Field B. C (1994) McGraw.
4. Environmental Economics: Theory and applications. Katar Singh and Anil Shishodia (2007) Sage Publications India Pvt. Ltd.

ENV – 402
ENVIRONMENTAL LAW, EIA AND AUDIT

UNIT – I

Definition – Purpose of EIA, Objectives of screening Projects;– Writing the Environmental Assessment report, Project Alternatives. Environmental Assessment Procedures. The Environmental Impact Statement Process- limitations EIA guidelines 2006 – Notification of Government of India, Public Participation, Environmental Management Plan ISO14000.

UNIT – II

Article 48 A & 58 A,Power and Functions of Central and State Pollution Control Boards to safeguard environment. Case studies: Land Clearing Projects – Urban localities Dam sites – EIA for Hydel, Thermal, Nuclear, Mining Projects– Highways Projects.

UNIT - III

EIA Methodologies – Adhoc Method – Checklist Methodologies – Matrix methods – Network Methods – Base line information and predictions - land, water, atmosphere, energy and Biota, Environmental audit: Objectives – Scope – Goals - Approach to audit, Kyoto Protocol 1997.

UNIT – IV

Environmental Laws and Acts: Need for Environmental Laws – Role of Indian Judiciary in the protection of Environment - Forest Conservation Act 1980, Wild Life Protection Act 1972, Air (Prevention and Control of pollution) Act 1981, The Water (Prevention and Control of pollution) Act 1974, Motor Vehicle Act 1988, Environment Protection Act 1986, Hazardous Waste (Management and handling) rules 1989, E –waste (management and handling) rules 2016, Biomedical waste rules 2016.

REFERENCES:

1. Environmental Impact Assessment. Canter L. W., (1996) Mc Graw Hill, New York.
2. Environmental Impact Statements. Bregman J.I., (1999) Lewis Publishers, London.
3. Environmental Impact Assessment – A Comprehensive Guide to project and Strategic Planning. Eccleston C. H., (2000) John Wiley and Sons.
4. Handbook of Environmental Laws, Guidelines, Compliances and Standards. Trivedi R. K Vol I and II, B. S. Publications.
5. Environmental Law and Policy in India. Shyam Divan and Armin Rosencranz, (2001) Oxford Uni Press.

ENV 403: Instrumentation and Techniques

UNIT–I

Centrifugation & Separating techniques: General principles of centrifugation, Types of centrifugation, Microcentrifuge, High speed and Ultracentrifuges, Dialysis, Ultrafiltration, Reverse osmosis- Principles of electrophoresis, Agarose electrophoresis, Polyacrylamide gel electrophoresis, SDS-PAGE, 2D PAGE

UNIT–II

Microscopy and Spectroscopic techniques: Principles and applications of light, Phase contrast, Fluorescence, Scanning and Transmission electron microscopy- Titrimetry- Gravimetry- Colourimetry- Beer-Lambert's Law, UV-VIS Spectrophotometry, NMR Spectroscopy, Atomic absorption spectrophotometer (AAS), Flame photometry, X-Ray diffraction, X-Ray florescence

UNIT–III

Chromatographic techniques: Chromatographic techniques and types, Paper chromatography, Thin layer chromatography, Gas chromatography, Gas liquid chromatography, Ion exchange chromatography, High performance liquid chromatography

UNIT–IV

Radiochemical and Nanomaterial techniques: Radioactivity- Detection and measurement of radioactivity- Radioactive isotopes-Applications of radioisotopes in biological sciences- Autoradiography- Nanotechnology processes, Nano materials, Nanoengineering materials for pollution prevention, Nanotechnology products

REFERENCES:

Marr, L.L. and Cresser, M.S. Environmental chemical analysis, International Text Book Company (pub), New York (1983).

Willard, Merritt, Dean and Settle, Instrumental methods of analysis, CBS Publishers, New Delhi (1986)

Lenore S. Clesceri, Arnold E. Greenberg, Andrew D. Eaton. Standard methods for the examination of water and waste water, APHA, Washington (1998)

Keith Wilson and John Walker, Principles and techniques of practical biochemistry, 5th Edition, Cambridge University Press, (2000)

Gurudeep R Chatwal and Sham K Anand, Instrumental methods of chemical analysis, Himalaya (2005)

Murugesan and Rajakumari, Environmental science and biotechnology- Theory and Practice, MJP Publishers, New Delhi (2005)

Keith Wilson, Kenneth H. Goulding, A biologist guide to principles and techniques of practical biochemistry, 3rd ed., ELBS Series. (2006)

Chatwal and Anand, Instrumental methods of chemical analysis, 5th ed., Himalaya Publications, (2006)

Douglas. A., Skoog & West, Fundamentals of analytical chemistry, 8th ed., Harcourt Publications, (2006)

Jo Anne Shatkin, Nanotechnology: Health and Environmental Risk, CRC press, (2008)

Mao Hong Fan, Chin-Pao Huang, Alan E Bland, Z Honglin Wang, Rachid Sliman, Ian Wright, Environanotechnology, Elsevier, (2010)

ENV – 404

BIO-STATISTICS AND RESEARCH METHODOLOGY

UNIT-I

Fundamentals of Statistics: Collection of data, Classification and Tabulation, diagrammatic representation. Measures of central tendency-Mean, Median, Mode, Normal distribution, Skewness, Kurtosis, Measures of Dispersion – Standard deviation, standard error. Statistical hypothesis, Null hypothesis, level of significance,

UNIT-II

Statistical analysis: Statistical tests-Z, t, Chi-square, Contingency test, One-way analysis of variance, Correlation and Regression. Environmental models-Lotka-voltera model, Guassian air pollution model.

UNIT-III

Scope of research in Environmental Science: Definition of research, Characteristics of research, Code of research ethics, Importance of controls and standards, Steps in research process, Selection of research problem, Objectives, Literature collection.

UNIT-IV

Research data generation and Grants: Design, planning and execution of investigation, Presentation and interpretation of research data, Preparation of research articles and review papers for scientific journals, Research thesis writing, Preparation of research proposal for grants.

REFERENCES:

Statistical Methods. Gupta S. P (1996) Sultan Chand & Sons Publications. New Delhi.

Instrumental Methods of Chemical Analysis, Ewing G. W., (1985) 5th Edition McGraw Hill, U. K.

Fundamentals of Bio-Statistics. Khan I. A and Kanum A (1994) Ukaaz Publication, Hyderabad.

Business Mathematics and Statistics. Vittal R. R (1986) Murgham Publications.

Statistics for people who hate statistics. Neil J Salkind (2000) Sage Publications. Inc. New Delhi.

Introduction to Bio-Statistics. Gurumani (2005) MJP Publications, Chennai.

Kothari, C. R. (1980). Research Methodology: Research and techniques, New Delhi: New Age International Publishers

Leedy, P. D. (1980). Practical Research: Planning and design. Washington: Mc Millan Publishing Co., Inc

Research Methodology-Methods and Techniques. Kothari, C.R., (1989), Wiley Eastern, New Delhi. 16.

Introduction to Research Methodology in Agricultural and Biological Sciences, V.Venkatasubramanian (1999), New Century Book House (P) Ltd., Chennai

Wallinman, N. (2006). Your Research Project: A step-by-step guide for the first-time researcher. London: Sage Publications

Kumar, R. (2011). Research Methodology: a step-by-step guide for beginners (3rd edition). London, UK: TJ International Ltd, Padstow, Corwall.

ENV – 405: PRACTICAL – VII

1. Case study analysis for EIA of a major industry/Mining activity.
2. Preparation of Environmental Impact Statement.
3. Solid waste: Collection, Disposal - Composting, Vermicomposting – Bacteriological analysis.
4. To detect the most probable number (MPN) of coliform in the given water sample
5. Determination of zinc and nickel
6. Estimation of the amount of nitrate and fluoride in ground water samples.
7. Water quality Index, Soil Health Card.
8. Microscope and its advantages
9. Paper chromatography
10. Electrophoresis demonstration using DNA or protein sample
11. UV-spectrophotometry for estimation of chemical or biological samples
12. Demonstration of Scanning electron microscope (SEM) function
13. Calculation of mean, median and mode.
14. Calculation of correlation and regression.
15. Application of‘t’ test, ANOVA and correlation
16. Statistical tests by using MS Excel and SPSS

406: PROJECT DISSERTATION & VIVA - VOCE

M.Sc. Environmental Science

(MODEL QUESTION PAPER)

Time: 3 hours Max. Marks: 75

PART-A

Write short notes on any FIVE of the following 5X3 = 15

1)

2)

3)

4)

5)

6)

7)

8)

Part-B

Answer all questions 4X15 = 60

9. a) Essay Question

(or)

b) Essay Question

10.a) Essay Question

(or)

b) Essay Question

11. a) Essay Question

(or)

b)Essay Question

12. a) Essay Question

(or)

b) Essay Question

(Two essay questions from each unit)

YOGI VEMANA UNIVERSITY

Vemanapuram, KADAPA – 516005

M.A. (ENGLISH) SYLLABUS (CBCS) With effect from 2018-2020

Course No. English	Course Title	No. of Hours	No. of. Credits	Univ. Exam. Duration (Hrs)	Univ. Exam	Internal Assessment	Max. Marks
FIRST SEMESTER							
ENG11011	Poetry- I	4	4	3	75	25	100
ENG 11012	Drama –I	4	4	3	75	25	100
ENG 11013	Fiction – I	4	4	3	75	25	100
ENG 11014	Prose – I	4	4	3	75	25	100
ENG 11015	English Language	4	4	3	75	25	100
	Total	20	20	-	375	125	500
SECOND SEMESTER							
ENG :21011	Poetry- II	4	4	3	75	25	100
ENG :21012	Drama –II	4	4	3	75	25	100
ENG :21013	Fiction – II	4	4	3	75	25	100
ENG :21014	Prose – II	4	4	3	75	25	100
ENG :21015	English Language Teaching	4	4	3	75	25	100
NON-CORE-21016	Functional English	4	4	3	75	25	100
	Total:	24	24	--	450	150	600
THIRD SEMESTER							
ENG :31011	Indian English Literature-I	4	4	3	75	25	100
ENG :31012	American Literature-I	4	4	3	75	25	100
ENG :31013	New Literatures in English-I	4	4	3	75	25	100
ENG :31014	Literary Criticism-I	4	4	3	75	25	100
ENG :31015	Elective – I : Short Story Elective – II : Communicative English	4	4	3	75	25	100
31016	Essential Communication Skills in English (Non-Core)	4	4	3	75	25	100
	Total:	24	24	--	450	150	600
FOURTH SEMESTER							
ENG: 41011	Indian English Literature-II	4	4	3	75	25	100
ENG: 41012	American Literature-II	4	4	3	75	25	100
ENG: 41013	New Literatures in Eng. -II	4	4	3	75	25	100
ENG: 41014	Literary Criticism-II	4	4	3	75	25	100
ENG: 41015	Elective – I – Subaltern Literature Elective – II – Diasporic Writings	4	4	3	75	25	100
	Total:	20	20	--	375	125	500

YOGI VEMANA UNIVERSITY

Vemanapuram, KADAPA – 516003

DEPARTMENT OF ENGLISH

FIRST SEMESTER

With Effect From 2018-20 (Under CBCS Pattern)

11011: POETRY - I

UNIT – 1

Background Study

Literary Terms: Ode, Epic, Mock Epic Austin Satire, Elegy, Lyric – Genres – Movements – Ideas – Trends - Concepts.

UNIT – 2

1. Geoffrey Chaucer : The Prologue to the Canterbury Tales (The Knight, The Square, , The Friar)
2. John Donne : The Sun Rising, Holy Sonnet X : Death be not Proud.

UNIT – 3

3. Milton : Paradise Lost, Book I.
4. Alexander Pope : An Essay on Man.
5. Thomas Gray : Elegy Written in a Country Churchyard.

UNIT – 4

6. William Wordsworth : Lines Written a Few Miles Above Tintern Abbey, Ode to Duty
7. Coleridge : The Rime of Ancient Mariner Dejection: An Ode.
8. John Keats : Ode to a Psyche, Ode on a Grecian Urn.
9: P B Shelly : Ozymandias.

****

1. Prof G. Gulam Tariq :
2. Prof. P. Padma :
3. Dr. J. Mercy Vijetha :
4. Dr. N. Ankanna :
5. Dr. RV. Jayanth Kasyap :

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11012: DRAMA - I

UNIT – 1

Background Study

Literary History – Genre – Movements – Ideas – Trends – Concepts

UNIT – 2

1. Christopher Marlowe	:	Dr. Faustus
2. Ben Jonson	:	Volpone

UNIT – 3

3. William Shakespeare	:	King Lear
4. William Shakespeare	:	Twelfth Night

UNIT – 4

5. William Congreve	:	Way of the World
6. Oscar Wilde	:	The Importance of Being Earnest

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11013: FICTION - I

UNIT – 1

Background Study

Literary History – Genres – Movements – Ideas – Trends – Concepts

UNIT – 2

1.	Daniel Defoe	:	Robinson Crusoe
2.	Henry Fielding	:	Joseph Andrews

UNIT – 3

3.	Jane Austen	:	Pride and Prejudice.
4.	George Eliot	:	The Mill on the Floss.

UNIT – 4

5.	Charles Dickens	:	Great Expectations
6.	Thomas Hardy	:	The Mayor of Casterbridge

****

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11014: PROSE - I

UNIT – 1

Background Study

Literary History – Genres – Movements – Ideas – Trends – Concepts

UNIT – 2

1.	Francis Bacon	:	Of Revenge, Of Truth, Of Youth and Age
2.	Joseph Addison	:	The Coverley Papers (Selected Essays) 1. Of the Club 2. Labour and Exercise

UNIT – 3

3.	Jonathan Swift	:	Gulliver's Travels Voyage I and II
4.	Charles Lamb	:	Dream Children, The South-Sea House

UNIT – 4

5.	John Milton	:	Aeropagtlica
6.	Bertrand Russell:	:	The Role of Individuality.

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11015: ENGLISH LANGUAGE

UNIT – 1

Language – Definition – features – Human Language vs. Animal Language- Definition and Scope of Linguistics- Significant Dimensions of Study.

UNIT – 2

Brief history if English Language- features of old English and Middle English – Influences (Latin, French, and Indian) – Standard English- Varieties of English(British and American)

UNIT – 3

Description of Speech Sounds – Speech Mechanism – Stress/ Rhythm – Intonation – Phones – Phonemes – Allophones.

UNIT – 4

Morphology – Morphs – Allomorphs – Word formation processes – Simple, Complex and Compound Words.

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SECOND SEMESTER

21011: POETRY – II

UNIT – I

Background Study

Literary History – Genres – Movements – Ideas – Trends - Concepts - Literary Terms : Dramatic Monologue

UNIT – 2

1.	Robert Browning	:	My Last Duchess, Andrea Del Sarto
2.	G.M. Hopkins	:	The Windhover, God's Grandeur

UNIT – 3

3.	W.B. Yeats	:	The Second Coming, An Irishman Forsees His Death
4.	T.S. Eliot	:	The Waste Land

UNIT – 4

5.	W.H. Auden	:	The Unknown Citizen, In Memory of W. B.Yeats
6.	Ted Hughes	:	The Thought Fox

****

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21012: DRAMA – II

UNIT - I

Background Study

Literary History – Genres – Movements – Idea – Trends – Concepts

UNIT – 2

1.	G.B. Shaw	:	Saint John
2.	T S Eliot	:	The Family Reunion

UNIT – 3

3.	John Osborne	:	Look Back in Anger
4.	Harold Pinter	:	The Birthday Party

UNIT – 4

5.	Samuel Beckett	:	Waiting for Godot
6.	J. M. Synge	:	Riders to the Sea

****

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21013: FICTION – II

UNIT – I

Background Study

Literary History – Genres – Movements – Ideas – Trends – Concepts

UNIT – 2

1.	Sir Walter Scott	:	Ivanhoe
2.	Virginia Woolf	:	Mrs. Dalloway

UNIT – 3

3.	James Joyce	:	The Portrait of an Artist as a Young Man
4.	D. H. Lawrence	:	Sons and Lovers

Unit - 4

5.	William Golding	:	Lord of the Flies
6.	Graham Greene	:	The Power and the Glory

****

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21014: PROSE – II

UNIT – I

Background Study

Literary History – Genres – Movements – Ideas – Trends – Concepts

UNIT – 2

1.	Matthew Arnold	:	Sweetness and Light (From Culture and Anarchy)
2.	John Ruskin	:	Sesame and Lilies

UNIT – 3

3.	Virginia Woolf	:	A Room of One's Own
4.	George Orwell	:	Politics and English Language

UNIT – 4

5.	Albert Einstein.	:	Only Then Shall We Find Courage
6.	Solomon Northup	:	12 Years A Slave

****

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21015: ENGLISH LANGUAGE TEACHING

UNIT – 1

1. Language Acquisition and Second Language Learning
2. Basic Principles of English Language Teaching
3. Problems of Teaching / Learning English as a Second Language in the Indian Context
4. Current Trends of Teaching English in India.

UNIT – 2

Teaching of English Language – Theories of Language Learning (Behavioural, Cognitive and Constructivist) - Concepts-Methods – Direct, Grammar Translation – Bilingual – Desuggestopaedia-Communicative Language Teaching

UNIT – 3

Teaching poetry & Prose from Language Perspective
Teaching LSRW Skills

UNIT – 4

Materials and Tools – Development of Sources for Teaching – News Papers- Advertisements – Magazines – Utility of Language Lab for Teaching and Learning of English.

****

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21016: NON CORE SUBJECT

FUNCTIONAL ENGLISH

Unit-1 : Prounnciation & Listening Skills

1. Letters & Sounds; Consonant & Vowel Sounds of English ; Word Stress & Intonation; Rhythm(Weak forms) in Connected Speech;

2. Types of Listening; Purposes of Listening: to Identify Key Words in Speech ; Identify Specific Information in Normal Speech ; Take notes while Listening .

Unit- II : English For Specific Purposes

English for Specific oral Communication:

3. Language Functions: Greeting, Apologizing, Requesting, Offering Help Inviting, Agreeing /Disagreeing etc.

4. Language and Communication: Sing Language & Body Language, Type of Communication.

Unit- III: Reading and Vocabulary

5. Reading and Vocabulary

6. Word Formation, Idioms & Phrases, Synonyms & Antonyms, One-word Substitutes, Spelling, Contextual Meaning, Reading Comprehension, Use of Dictionary, Skimming, and Scanning.

Unit-IV: Oral Communication

7. Group Discussions, Debates, Interviews.

8. Speaking Extempore, the Art of Public Speaking, and Telephone Etiquette.

****

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THIRD SEMESTER

31011: INDIAN ENGLISH LITERATURE – I

UNIT – 1

Background Study

Literary History – Genres – Movements – Ideas – Trends - Concepts

UNIT – 2

1. Mulk Raj Anand : Coolie

2. R. K. Narayan : The Man-Eater of Malgudi

UNIT – 3

3. Toru Dutt : Sita, Near Hasting, The Lotus

4. Rabindranath Tagore : 1.The Time my Journey Takes is Long
: 2. Keep Me Finally Glad

UNIT – 4

5. Vijay Tendulkar : Silence! The Court is in the Session.

6. Dr. B.R.Ambedkar : On the Way to Goregoan

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31012: AMERICAN LITERATURE - I

UNIT – 1

Background Study

Literary History – Genres – Movements – Ideas – Trends – Concepts

UNIT – 2

1.	Emerson	:	The American Scholar, Bramha , Concord Hymn
2.	H.D. Thoreau	:	Civil Disobedience

UNIT – 3

3.	Walt Whitman	:	Song of Myself, When Lilacs last in the Dooryard Bloomed
4.	Emily Dickinson	:	Much Madness is Divinest Sense, Success is Counted Sweetest

UNIT – 4

5.	Mark Twain	:	The Adventures of Huckleberry Finn
6.	Nathaniel Hawthorne	:	The Scarlet Letter

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31013: NEW LITERATURES IN ENGLISH - I

UNIT – 1

Background Study

Literary History – Genres – Movements – Ideas – Trends – Concepts

UNIT - 2

1.	A.D. Hope	:	Australia, The Death of the Bird
2.	Judith Wright	:	The Old Prison, Lyre Birds

UNIT -3

3.	Gabriel Okara	:	The Mystic Drum, You Laughed, Laughed and Laughed.
4.	Wole Soyinka	:	The Swamp Dwellers

UNIT – 4

5.	Cyprian Ekwensi	:	Jagua Nana
6.	Flora Nwapa	:	Women are Different

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31014: LITERARY CRITICISM - I

UNIT – I

Background Study:

Literary History – Genres – Movements – Idea – Trends – Concepts

UNIT – 2

1.	Aristotle	:	Poetics
2.	Samuel Johnson	:	The Preface to Shakespeare

UNIT -3

3.	Coleridge	:	Biographia Literaria, Chapter XIV
4.	Matthew Arnold	:	A Study of Poetry

UNIT – 4

5.	T.S. Eliot	:	Tradition and the Individual Talent
6.	Cleanth Brooks	:	Irony as a Principle of Structure

****

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3. Dr. J. Mercy Vijetha :
4. Dr. N. Ankanna :
5. Dr. RV. Jayanth Kasyap :

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31015 - Elective I (Core)

(B) : SHORT STORY

BACKGROUND: Tale - Fable - Story - Novelette. Types of Stories: Detective-Social-Allegorical-Magic - Realism. Aspects of the short story: story - plot - characters - narrative techniques - unities - Tone - Setting - dialogue - telling and showing - structure - style.

UNIT-I:

(A) Edgar Allan poe : 1. The Tell Tale Heart
2. The Raven

(B) O. Henry : 1. The Gift of Magi
2. The Last Leaf

UNIT-II:

(A) Anton Chekov : 1. On Marriage

(B) Guy De Mauppasant : 1. The Necklace
2. Vendetta

UNIT-III:

(A) Oscar Wilde : 1. The Selfish Giant
2. The Happy Prince

(B)Washington Irving : 1. Rip Van Winkle
2. Disiree's Baby

Unit-IV:

(A) Chinua Achebe : 1. Civil Peace
: 2. The Voter

(B) Katherine Mansfield : 1.The Dolls House.
: 2. A Cup of Tea.

Unit: V

(A). Mulk Raj Anand : 1. The Thief
2. The Liar.

(B): R.K.Narayan : 1. Father's Help
2. The Blind Dog

****

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3. Dr. N. Ankanna :

4. Dr. J. Mercy Vijetha :

5. Dr. RV. Jayanth Kasyap :

31015 - Elective II (Core)
COMMUNICATIVE ENGLISH

UNIT – I

1. Communication Process- Types of Communication - Verbal and Non-Verbal Communication – Principles - Barriers

2. Listening Process – Types of Listening - Barriers to Listening- Listening Comprehension – Effective Listening Strategies – Listening to Structured Talks – Listening and Note Taking.

UNIT – II

3. The Speech Process – Conversation and Oral Skills. Improving Fluency and Self Expression – Body Language

4. Job Interviews - Group Discussions - Presentation Skills

UNIT – III

5. Reading Process – Reading Strategies - Reading Narratives Critical and Interpretative Reading.
   Introduction to Reading Skills – Understanding the Organization of a Text.

6. Reading Graphs - Reading descriptions, persons, Places and Processes.

UNIT – IV

7. Paragraph Writing, Writing Academic English – Research Papers – Features

8. Professional Writing: Letter Writing Skills, Resume and Job Application – E-mail – Reports.

****

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2. Prof. P. Padma :

3. Dr. J. Mercy Vijetha :

4. Dr. N. Ankanna :

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31016 (Non- Core)
ESSENTIAL COMMUNICATION SKILLS IN ENGLISH

UNIT – I

1. Communication Process- Types of Communication - Verbal and Non-Verbal Communication – Principles - Barriers

2. Listening Process – Types of Listening - Barriers to Listening- Listening Comprehension – Effective Listening Strategies – Listening to Structured Talks – Listening and Note Taking.

UNIT – II

3. The Speech Process – Conversation and Oral Skills.
   Improving Fluency and Self Expression – Body Language

4. Job Interviews - Group Discussions - Presentation Skills

UNIT – III

5. Reading Process – Reading Strategies - Reading Narratives Critical and Interpretative Reading.
   Introduction to Reading Skills – Understanding the Organization of a Text.

6. Reading Graphs - Reading Descriptions, Persons, Places and Processes.

UNIT – IV

7. Paragraph Writing, Writing Academic English – Research Papers – Features

8. Professional Writing: Letter Writing Skills, Resume and Job Application – E-mail – Reports.

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2. Prof. P. Padma :
3. Dr. J. Mercy Vijetha :
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FOURTH SEMESTER

41011: INDIAN ENGLISH LITERATURE – II

UNIT – I

Background Study

Literary History – Genres – Movements – Ideas – Trends - Concepts

UNIT – 2

1.	Aravinda Adiga	:	The White Tiger
2.	Chetan Bhagat	:	Five Point Someone

UNIT – 3

3.	Nissim Ezekiel	:	Night of the Scorpion
		:	The Way I Went.
		:	Goodbye Party for Miss Pushpa T.S
4.	A.K. Ramanujan	:	Self-Portrait, A River ,Of Mothers Among Other Things.

UNIT – 4

5.	Mahesh Dattani	:	Tara
6.	A.P. J. Abdul Kalam	:	1. What Can I Give to The Nation 2.Seven Turning Points of My Life (from Turning Point)

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1. Prof G. Gulam Tariq **:**
2. Prof. P. Padma **:**
3. Dr. J. Mercy Vijetha **:**
4. Dr. N. Ankanna :
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41012: AMERICAN LITERATURE – II

UNIT – I

Background Study

Literary History – Genres – Movements – Ideas – Trends - Concepts

UNIT – 2

1.	Robert Frost	:	Stopping by Woods on a Snowy Evening, Birches
2.	Wallace Stevens	:	Sunday Morning, Peter Quince at the Clavier.

UNIT – 3

3.	Eugene O'Neill	:	Hairy Ape
4.	Tennessee Williams	:	Street Car Named Dezire

UNIT – 4

5.	Earnest Hemingway	:	The Old Man and the Sea
6.	Alice Walker	:	The Color Purple

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1. Prof G. Gulam Tariq :
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41013: NEW LITERATURES IN ENGLISH – II

UNIT – I

Background Study

Literary History – Genres – Movements – Ideas – Trends - Concepts

UNIT – 2

1. Derek Walcott : Far Cry from Africa, A City's Death By Fire
2. Katherine Mansfield : The Garden Party(Short Story)

UNIT – 3

3. Margaret Laurence : A Bird in the House
4. Margaret Atwood : Bodily Harm

UNIT – 4

5. T.M . Aluko : Chief, The Honorable Minister,
6. Buchi Emecheta : The Bride Price

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1. Prof G. Gulam Tariq :
2. Prof. P. Padma :
3. Dr. J. Mercy Vijetha :
4. Dr. N. Ankanna :
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41014: LITERARY CRITICISM – II

UNIT – I

Background Study

Literary History – Genres – Movements – Ideas – Trends - Concepts

UNIT – 2

1. Edmund Wilson : Marxism and Literature
2. Lionel Trilling : Freud and Literature

UNIT – 3

3. Northrope Frye : The Archetypes of Literature
4. Jacques Derrida : Sign, Structure and Play

UNIT – 4

5. Elaine Showalter : Towards Feminist Poetics
6. Ngugi Wa Thingo : Decolonizing the Mind (Chapter I)

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1. Prof G. Gulam Tariq :
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41015: ELECTIVE – II

INDIAN DIASPORIC WRITING

Elective I III Semester

Unit - I:

1. Salman Rushdie : Imaginary Homelands
2. Edward Said : Introduction and The Scope of Orientalism. (From Orientalism)

Unit - II:

3. Uma Parameswran : For Our Sisterhood,
4. Meena Alexander : Childhood, Sometimes I'm in a Garden (From Stone Roots)

Unit - III:

5. Bharati Mukherjee : Jasmine (Short Story) from **The Middleman and other Stories.**
6. Jhumpha Lahiri : A Temporary Matter (from (**The Interpreter of Maladies)**

Unit – IV:

7. V. S. Naipaul : A House for Mr. Biswas
8. Rohinton Mistry : Such a Long Journey

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1. Prof G. Gulam Tariq :
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3. Dr. J. Mercy Vijetha :
4. Dr. N. Ankanna :
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41015: ELECTIVE - I

SUBALTERN LITERATURE

UNIT – I

Background Study: Cultural Reflections, Social Realism in the Regional Literatures, Feminist Concerns, Marginal Literatures.

UNIT – 2- Poetry:

Yogi Vemana	-	A True and Rare Genius (Select Poems)
Sikhamani	-	He is the "Filthy" Human Being
Vimala	-	Kitchen

UNIT – 3- Drama:

Rashid Jahan	–	Aurat (Woman)
Neena Mehta	–	Brides are not for Burning

UNIT – 4 – Fiction:

Shiva Shankar Pilai	-	Chemmeen
Mahaswetha Devi	-	Water (Short Story)

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YOGI VEMANA UNIVERSITY

Vemanapuram, KADAPA – 516003

M.A. (History & Archaeology) SYLLABUS (CBCS) with effect from 2018-2019

Course No. History & Archaeology	Course Title	No. of Hours	No. of. Credits	Univ. Exam. Duration (Hrs)	Univ. Exam	Internal Assessment	Max. Marks
FIRST SEMESTER							
11081	History of Ancient India from Earliest times to A.D.750.	4	4	3	75	25	100
11082	History of Ancient Andhra from earliest Times to A.D.1323	4	4	3	75	25	100
11083	Introduction to Archaeology	4	4	3	75	25	100
11084	History of Medieval India from A.D.1206 to A.D.1526	4	4	3	75	25	100
11085	Principles of Tourism and Travel Management	4	4	3	75	25	100
	Total	20	20	-	375	125	500
SECOND SEMESTER							
21081	History of Ancient India from A.D.750 to A.D.1206.	4	4	3	75	25	100
21082	Archaeological Cultures	4	4	3	75	25	100
21083	History of South India from A.D.1323 to A.D.1670	4	4	3	75	25	100
21084	History of Modern World A.D.1453-A.D.1964	4	4	3	75	25	100
21085	History of Medieval India, A.D.1526 to A.D.1707.	4	4	3	75	25	100
NON-CORE-21086	History of India upto A.D.1947	4	4	3	75	25	100
	Total:	24	24	--	450	150	600
THIRD SEMESTER							
31081	Economic History of India, A.D.1857-A.D.1947	4	4	3	75	25	100
31082	History of Modern India, A.D.1757-A.D.1947	4	4	3	75	25	100
31083	Art History of India	4	4	3	75	25	100
31084	Tourism and Museology	4	4	3	75	25	100

31085	**Rayalaseema Through the Ages**	**4**	**4**	**3**	**75**	**25**	**100**
31086	**World History A.D.1453 to A.D.1964 (Non-Core)**	**4**	**4**	**3**	**75**	**25**	**100**
	Total:	**24**	**24**	**--**	**450**	**150**	**600**
FOURTH SEMESTER							
41081	**History of Indian Architecture**	**4**	**4**	**3**	**75**	**25**	**100**
41082	**History of Modern Andhra, A.D.1757-A.D.2014.**	**4**	**4**	**3**	**75**	**25**	**100**
41083	**Epigraphy and Numismatics**	**4**	**4**	**3**	**75**	**25**	**100**
41084	**Historical Method**	**4**	**4**	**3**	**75**	**25**	**100**
41085	**Elective – I – Women in Modern India** **Elective – II – Non-Brahmin Movement** **Elective- III-Communalism in Modern India** **Elective –IV-Christian Missionaries in Rayalaseema** **Elective –V-Land Mark Archaeological Sites in Rayalaseema** **Elective-VI- Important Tourist Destinations in Rayalaseema**	**4** - - - - -	**4** - - - - -	**3** - - - - -	**75** - - - - -	**25** - - - - -	**100** - - - - -
	Total:	**20**	**20**	**--**	**375**	**125**	**500**

I SEMESTER

1. History of Ancient India from earliest times to A.D. 750.
2. History of Ancient Andhra from earliest times to 1323 A.D.
3. Introduction to Archaeology.
4. History of Medieval India from A.D. 1206 to A.D. 1526.
5. Principles of Tourism and Travel Management.

PAPER –I: HISTORY OF ANCIENT INDIA FROM EARLIST TIMES TO A.D. 750.

Unit I : Impact of Geographical Features on History-Different Races and Tribes-Unity in Diversity.

UnitII : Sources-Archaeological: Monuments, Inscriptions, Coins- Literary Sources: Indigenous, Religious and Secular-Foreign Accounts.

Unit III : Harappa Culture-Characteristic Features-Vedic and Later Vedic Culture-Salient Features, Varna, Jati Formations-Caste System-Rituals and Religious Cultures-Conditions during6th Century B.C.-Dissent Groups, *Lokayata* and *Charavakas*-Emergence of New Religious Sects: Jainism and Buddhism.

Unit IV: Mauryas:Chandragupta Maurya, Bindusara, Ashoka-Kushans : Kanishka-Pushyabhuti: Harshavardhana in the North- Kingdoms-Administration-Society, Caste System, Status of Women-Economy, Trade and Commerce-Religion-Literature-Art and Architecture-Science and Technology.

Suggested Readings

1.D.D.Koshambi, *Introduction to the Study of Ancient Indian History.*
2. D.D.Koshambi, *The Culture and Civilization of Ancient India in Historical Outline*.
3. D.D.Koshambi, *Myth and Reality.*
4. R.S.Sarma, *Perspectives of Social and Economic History of India.*
5. R.S.Sarma, *Sudras in Ancient India.*
6. R.S.Sarma, *Material Culture and Social Formation in Ancient India.*
7.Romila Thapar, *Ancient Indian Social History*.
8. Romila Thapar, *History of India, vol.I.*
9. Romila Thapar, *From Lineage to State.*
10. Romila Thapar, *Interpreting Early India.*
11.A.L.Basham, *A Cultural History of India*.
12. A.L.Basham, *The Wonder That Was India.*
13. K.A.Nilakanta Sastry, *A History of South India.*
14. Noburu Karashima, *History of South India.*
15. Noburu Karashima, *Towards a New Formation.*
16.R.S.Tripati, *History of Ancient India.*

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PAPER –II : HISTORY OF ANCIENT ANDHRA FROM EARLIST TIMES TO 1323 A.D.

Unit I : Sources for the reconstruction of Ancient Andhra History – Archaeological, Literary Sources – Satavahanas, Cultural conditions – Administration – Relation with Western Kshatrapas.

Unit II: Successors of Satavahanas in Andhradesa – Early Pallavas, Ikshavakus – contribution to Buddhism, Vishnukundins, Anandagotras - Cultural conditions and Development of Art & Architecture.

Unit III : Eastern Chalukyas of Vengi – Political History; Cultural conditions and Architectural Development during their period – Relation with Rashtrakutas, Western Chalukyas of Kalyani and Cholas.

Unit IV : Foundation of Kakatiya empire – Early and Prominent Kakatiya rulers – Art & Architecture – Administration – Society- Economy : Irrigation and Maritime Trade- Religion-Literature-Art & Architecture.

Suggested Readings

1.D.D.Koshambi, *Introduction to the Study of Ancient Indian History.*
2. D.D.Koshambi, *The Culture and Civilization of Ancient India in Historical Outline*.
3. D.D.Koshambi, *Myth and Reality*.
4. R.S.Sarma, *Perspectives of Social and Economic History of India.*
5. Romila Thapar, *Interpreting Early India.*
6.A.L.Basham, *A Cultural History of India*.
7. A.L.Basham, *The Wonder That Was India.*
8. K.A.Nilakanta Sastry, *A History of South India.*
9. Noburu Karashima, *History of South India.*
10. P.R. Rao., *Ancient and Medieval History of Andhra Pradesh.*
11. BSL. Hanumantha Rao, *Religion in Andhra.*
12. M.S.Sharma, *History of Reddy Kingdoms*, Waltair.
13. P. Chenna reddy, *Guilds in Medieval Andhradesa, A.D. 1000-A.D. 1500*, Delhi, 1991.
14. M. Krishnakumari, *History of Medieval Andhradesa*.
15. PVP. Sastry, *Kakatiyas,* Warangal.
16. R.Soma Reddy, *Religious Institutions in Medieval Andhra.*

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PAPER –III: INTRODUCTION TO ARCHAEOLOGY

Unit I : i) Definition, Meaning and Scope of Archaeology-Beginning of Scientific Archaeology Archaeology a Science of Art-Value of Archaeology- Archaeology and other subjects- Archaeology and History- Archaeology and Anthropology- Archaeology and other Sciences-Physics and Chemistry-Geology and Geography.

ii) Dating Methods in Archaeology-Relative Dating Method-Absolute Dating Method.

Unit II: Exploration-Chance Finds-Prospecting and Preliminary Survey-Literary Research-Maps -Place Names-Surveying of Ground Level-Electrical Resistance-Surveying-Magnetic Surveying-Sound Wave Surveying-Probe Checking-Drill Method Surveying-Ariel Photography.

Unit III: Excavation Methods–Preliminaries of Horizontal Surveying-Lay out of the Site-Excavation of Tool Site-Excavation of Fortification-Excavation of Cemetery-Excavation of Megalithic Burials-Recording Archaeological Data-Three Dimensional Recording-Drawings and Maps-Photography.

UnitIV: Underwater Archaeology-Traditional Methods-Surveying Aids and Methods-Limitation of Work under water-Recording Data under water-Archaeological Surveying-Chain Surveying-Plane Table Survey-Level Surveying-Stone Age Tool-Early Stone Age-Middle and Late Stone Ages-Neolithic Tools.

Suggested Readings

1. H.D.Sankalia, *The Pre-history and Proto-history of India and Pakistan.*
2. K.V.Raman, *Principles and Methods of Archaeology.*
3. C.B.Memoria, *Geography of India.*
4. A.Gosh, *An Encyclopaedia of Indian Archaeology*.
5. B.Subba Rao, *The Personality of India.*
6. D.N.Wadia, *Geology of India.*
7. MLK. Murthy, *Pre & Proto-Historic Andhra Pradesh up to 500 B.C.*
8. K. Paddayya, *Recent studies in Indian Archaeology.*
9. D.R. Raju, *Stone Age Hunter Gatherers*, Pune, 2004.
10. K.P. Rao, *Deccan Megaliths*, New Delhi, 1988.

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PAPER IV: HISTORY OF MEDIEVAL INDIA,A.D. 1206 – A.D.1526.

Unit I : Sources – Archaeological, Literary and foreign Travelers Accounts-Foundation of Delhi Sultanate-Slave Dynasty: Ibak, Iltutmish, Razia, Balban.

Unit II : Khajli rulers- Jalaluddin Firoz, Allauddin Khilji- Critical Analysis of the Reforms of Allauddin Khilji.

Unit III: Tuglak dynasty:Ghiyasuddin Tuglak, Mohammad bin-Tuglak and Feroz Shah Tuglak – Their Reforms –Invasion of Timur-The Sayyids-Lodis.

Unit IV : Administration and Ruling Classes-Society, Position of Women-Economy: agriculture, industry, trade, commerce and urban centres-Religion-Literature-Art and Architecture.

Suggested Readings

1. Sastry, K.A.N., *History of South India*
2. Satish Chandra, *Medieval India, from Sultanate to the Mughals.*
3. Burton Stein, *Peasant State and Society in Medieval South India.*
4. Rizvi, S.A.A., *The Wonder that was India, Vol. II.*
5. Tripati, R.P., *Rise and Fall of the Mughal Empire.*
6. Kulkarni, A.R., *Medieval Maharashtra.*
7. Pandey, A.B., *Early Medieval India.*
8. Richards, John, F., *Mughal Empire.*
9. Champakalakshmi, *Trade, Ideology and Urbanization: South India, 300 B.C. to 1300 A.D.*
10. Vijaya Ramaswamy, *Textiles and Weavers in South India.*

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PAPER –V: PRINCIPLES OF TOURISM AND TRAVEL MANAGEMENT

Unit I : Definition and Meaning of Tourism- Concepts of Tourism, Forms and types- the Changing Trend- Purpose of Tourism.

Unit II : Tourism - Historical Evolution and Development – Ancient Period -Silk Route - Pilgrimage – Grand Tour- Transition to Modern Tourism - Modern Tourism in India.

Unit III : Tourism System – Concepts – Tourism Impacts – Tourism Industry – Constituents. Tourism Organizations – Government Organizations in India – Private Sector Organizations in India – Role of Travel Agency – Tourist Operators – Guides and Escorts – tourism Information.

Unit IV: Tourism Regulations – Economic Regulations – Law and Order Regulations – Accommodation and Catering Regulations – Environment protection and conservation.

Suggested Readings

1. Suhita Chopra, *Tourism Development in India.*
2. Rob Davidson, *Tourism.*
3. Dharmarjan and Seth, *Tourism in India: Trends and Issues.*
4. Medlik, S., *Dictionary of Travel, Tourism and Hospitality.*
5. David W. Howell, *Passport: An Introduction to the Travel and Tourism.*
6. Pillai, R.N., *Tour and Pilgrimage in India.*
7. Sashi Prabha Sarma, *Tourism Education: Principles, Theories and Practices.*
8. E. SivaNagi Reddy, *Tourism and Challenges in Andhra Pradesh.*
9. P. Chenna Reddy, *Tourism in Andhra Pradesh, Hyderabad, 2014.*

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II SEMESTER

1. History of Ancient India from A.D.750 to 1206 A.D.
2. Archaeological cultures.
3. History of South India from A.D.1323 to A.D.1670 A.D.
4. History of Modern World from A.D.1453 to 1964 A.D
5. History of Medieval India from 1526 to 1707 A.D.
6. History of India upto A.D.1947 (None-Core)

Paper – I: HISTORY OF ANCIENT INDIA FROM A.D. 750 TO 1206 A.D.

Unit I: Pallava and Chalukya contribution to culture – Rastrakutas in the Deccan, Prathiharas and Palas in the Northern India – Their contribution to Administration, Society, Economy, Religion, Literature and Art & Architecture.

Unit II: The Cholas – Rajaraja I and Rajendra I – Administration: Local Government – Society – Economy, Rural Industries, Merchant Guilds – Religion conditions, Saivism, Sri Vaishnavism – Literature – Art & Architecture.

Unit III: The Chalukyas of Kalyani – The Yadavas of Devagiri – Kakatiyas of Warangal – Hoyasalas of Dwarasamudram – Socio-economic conditions – Religion – Literature and Art & Architecture.

Unit IV: Origin of the Rajputs – The Chandellas; The Kalachuris; The Paramaras; The Chalukyas of Gujarat; The Chahamans and The Tomaras – Administration – Society – Economy – Religion – Literature – Art & Architecture – Invasions of Mahmud Ghazni – Invasions of Mahmud Ghuri – Battles of Tarain – Causes for the failure of Indian rulers.

Suggested reading:

1. Basham, A.L. *The Wonder that was India.*
2. Chopra, P.N., Ravindran, T.K., & Subramanian, N., *History of South India*, Vol. I, Ancient period, New Delhi, 1979.
3. Sastry, K.A.N., *History of South India, The Cholas*, Madras, 1975.
4. Yazdani, G., *Early History of the Deccan*, Vol. 1-2, 1964.
5. Burton stein, *Peasant State and Society in Medieval South India.*
6. Y. Subbarayalu, *South India under the Cholas.*

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PAPER II : ARCHAEOLOGICAL CULTURES

Unit I : i) Lower Palaeolithic culture (Punjab Valley)- The Sohan Culture-Pre Sohan-Late Sohan-Narmada Valley- Godavari Valley-Krishna Valley-Nagarjuna Konda.

ii) Middle Palaeolithic Culture-Discovery-Distribution-Technology-The tool types and techniques- Living Pattern-Important Upper Palaeolithic Sites.

Unit II : i) Mesolithic Culture-Important Sites-The tools-Life and Subsistence Pattern- Hunting Methods-Domestication of animals-Agriculture-Structural activity- Pottery-Clothing and Ornaments- Recreation-Burial and Spiritual Aspects- Aesthetic activities-Conclusion.

ii) Neolithic Culture-North Western region-Pottery, Habitations-Burials-Animal burials-Subsistence-Stone tools-Bone tools-Ornaments-Neolithic Art and Hunting Habits-Religion.

Unit III : Megalithic Culture - Types of Megalithic monuments - Stone circles- Burrows - Dolmens- Dolmenoid cists-cist burials-oblong cists- Swastika cists-Menhis-Alignments Avenues- Topikals- Hood stone-Urn Burials- Sarcophagus-Rock-cut Chambers.

Unit IV : i) Indus Valley Civilization – Origin - Chronology – Extent - Town planning - House-Drainage system-the Granary-Town Lay-out- Political organization-Religion-Seals-Script-Material Culture- Contacts with other Countries-the end of Indus Culture.

ii) Chalcolithic Culture – Residences - Subsistence pattern – Pottery – Equipment – Ornaments – Burials - Chronology.

Suggested Readings

1. S.A. Sali, *Stone Age India.*
2. H.D. Sankalia, *The Pre-history and Proto-history of Indian and Pakistan*.
3. A. Gosh, *An Encyclopedia of Indian Archaeology.*
4. F.R. Alichin, *Birth of Indian Civilization.*
5. K.P. Rao, *Deccan Megaliths.*
6. B. Narasimhaiah, *Neolithic and Megalithic Culture's in Tamil Nadu.*
7. K.S. Ramachandran, *Archaeology of South India.*
8. H.N. Singh, *History and Archaeology of Black and Red Ware.*
9. V.V. Krishna Sastry, *The Proto and Early Historic Cultures of Andhra Pradesh.*
10. D.R. Raju, *Stone Age Hunter- Gatherers': An Ethno Archaeology of the Cuddapah Region, South East India.*
11. P. Chenna Reddy, *Exploring the Mind of Ancient Man*, Delhi, 2007.

PAPER –III : HISTORY OF SOUTH INDIA from A.D.1323 to A.D.1670.

Unit I: Musunuru nayakas – Prolayanayaka, Kapayanayaka; Reddy Kingdom of Addanki, Kondavedu & Rajamahendravarm : A Brief Political History – Relation with Vijayanagara rulers –Administration- Society-Economy-Religion-Literature-Art & Architecture.

Unit II : Vijyanagara Empire, Sangama – Saluva – Tuluva, Sri Krishnadevaraya– Araveti rulers - Cultural conditions – Administration, Nayankara system-Society-Economy-Religion- Literature - Art and Architecture – Foreign visitors during the period.

Unit III: Bahamani Kingdom- Relation with the Vijayanagara rulers -Administration- Society – Economy, Trade and Commerce-Religion-Literature- Art and Architecture.

Unit IV : Advent of Europeans, Portuguese, Dutch, Danes, Spanish, British and the French and their early settlements.

Suggested Readings

1.K.A.Nilakanta Sastry, *A History of South India.*

2.Yezdani, *Early History of the Deccan*.

3.Noburu Karashima, *History of South India.*

4.R.S.Sarma, *Perspectives of Social and Economic History of India.*

5.Romila Thapar, *Ancient Social Indian History*.

6.A.L.Basham, *A Cultural History of India*.

7.Bharatia Vidya Bhavan, *History and Culture of Indian People. Vol.I.*

8.R.C.Mazumdar, H.C.Rayachouduri, and K.K.Datta, *An Advanced History of India*.

9.Sastry, K.A.N., *History of South India, The Cholas*, Madras, 1975.

10.Burton stein, *Peasant State and Society in Medieval South India.*

11.Y. Subbarayalu, *South India under the Cholas.*

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Paper –IV: HISTORY OF MODERN WORLD from A.D.1453 to 1964 A.D

Unit I- Geographical Discoveries-Renaissance and Reformation-Emergence of Nation States-French Revolution-Napoleon Bonaparte.

Unit II- Industrial Revolution-Rise of Democratic Movements in Italy and Germany-Imperialism in Africa and Asia.

Unit III - Russian Revolution-First World War-League of Nations-Revolutions in China and Japan.

Unit IV- World between two World Wars: Washington Conferences, Das Plan, Young Plan and Geneva Conferences-Second World War-United Nations Organisations-Cold War.

Suggested Readings

Gordon A.Craig, *Europe Since 1815,* The Dryden Press, Illinois, 1973 (1961).

Chris Harman, *A People's History of the World,* Orient Longman, 2007 (1999).

Jawaharlal Nehru, *Glimpses of World History,* Oxford University Press,1997 (1934-35).

C.D.M.Ketelbey, *A History of Modern Times From 1789,* Oxford University Press, 1992 (1929).

E.H.Carr, *International Relations between Two World Wars, 1919-1939.*

A.J.P.Taylor, *The Struggle for Mastery in Europe, 1848-1918.*

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PAPER V: HISTORY OF MEDIEVAL INDIA from A.D.1526 to A.D 1707

Unit I : Political conditions of India on the eve of Babur invasion- Foundation of Mughal Empire- Babur-First Battle of Panipat.

Unit II: Humayun, Akbar, Jahangir, Nurjahan, Shahjahan and Aurangazeb-Relations between Mughals and Rajputs- Mughal Administration and Institutions, trade and commerce.

Unit III: Social classes-ulema, nobility, artisans, labour -status of women-Religious policy of Akbar and Aurangzeb, and composite culture-literature-Art and Architecture-Decline and disintegration of the Mughal Empire.

Unit IV: Emergence of Maratha power – Relation with the Mughals -Chatrapathi Shivaji and his successors– Administration-Asthapradan System –Society-Economy-Religion-Literature-Art and Architecture.

Suggested Readings

1. Sastry, K.A.N., *History of South India*
2. Satish Chandra, *Medieval India, from Sultanate to the Mughals.*
3. Burton Stein, *Peasant State and Society in Medieval South India.*
4. Rizvi, S.A.A., *The Wonder that was India, Vol. II.*
5. Tripati, R.P., *Rise and Fall of the Mughal Empire.*
6. Kulkarni, A.R., *Medieval Maharashtra.*
7. R.Soma Reddy, *Religious Institutions in Medieval Andhra.*
8. Adapa Satyanarayana, *Early Modern Andhra, Hyderabad and Company rule A.D. 1724-1857.*

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II SEMESTER (Non-Core)

Paper VI – History of India up to 1947

Unit I: Pre-History – Indus Valley Civilization – Vedic Culture – Jainism & Buddhism – Mauryan Empire – Gupta Empire.

Unit II: Delhi Sultanate – Mughal Empire – Maratha Kingdom-Sivaji.

Unit III: Beginning of European Companies – British conquest of India – Company Rule – 1857 Revolt – Socio-Cultural Awakening.

Unit IV: Freedom Struggle – INC – Vandemataram Movement – Home Rule League – Non-Cooperation Movement – Civil Disobedience Movement – Round Table Conferences and Communal Award – Cripps Mission – Quit India Movement – Indian National Army – Achievement of Freedom – Partition of India.

Suggested Reading

1. A.L. Basham, *The Wonder That Was India*.
2. Romila Thapar, *Early India*.
3. K.A. Nilakanta Sastry, *The History of South India*.
4. Satish Chandra, *Medieval Indian History*.
5. Bipan Chandra, *India's Struggle for Independence*.
6. P.R. Rao, *History of Modern Andhra.*

III SEMESTER

1. Economic History of India from A.D.1857 to A.D1947.
2. History of Modern India from A.D.1757 to A.D.1947.
3. Art History of India
4. Tourism and Museology.
5. Rayalaseema through the Ages.
6. History of Modern Andhra from A.D.1757 to A.D. 2014 (None-core)

PAPER I: ECONOMIC HISTORY OF INDIA from A.D.1857 to A.D. 1947

Unit I: Commercialization of Agriculture– stagnation and deterioration of agriculture -British land revenue settlements, permanent settlement, ryotwari and mahalwari – Ruin of the Old Zamindaris- Raise of the New Land Lordism.

Unit II: Condition of peasants: impoverishment of the peasantry, rural indebtedness, poverty and famines – Famine Commissions of 1880, 1898, 1901 and 1944- Famine Relief Policies 1860-1919- Growth of Agriculture during 1860-1947.

Unit III: Colonial Industrial Policy- Economic Changes -Disruption of the Traditional Economy – Ruin of Artisans, Craftsman – De Industrialization – Foreign Capital – Drain of Wealth – Land Relations – Indian Capitalist Development.

Unit IV: Rise of Modern Industry, Railways, Mining & Plantations, Colonial Tariff Policy.

Suggested Reading :

Sumit Sarkar., *Modern India 1885 – 1947.*
Bipin Chandra., *Rise and Growth of Economic Nationalism in India.*
Sharma, P.S., *Indian Feudalism.*
Das., D.R., *Economic History of India*.
Mirris D. Mirris., *Indian Economy in the 19th century.*
S. Gopal., *British Policy in India, 1851 – 1905.*
D. Subramanyam Reddy, *Agrarian Relations and Peasant in Modern Andhra.*

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PAPER II: HISTORY OF MODERN INDIA from A.D.1757 to A.D. 1947

Unit I : Expansion and Consolidation of British Empire – Ideologies, Mercantalism, Orientalism, Utilitarianism and Evangelicism- Tools of Expansion, Wars in : Bengal, Mysore, Maratha - Diplomacy : Subsidiary alliance and Doctrine of Lapse.

Unit II: Colonial Administration and Reforms– Central, Provincial, District and Judicial Administration: Regulating Act of 1773;Pitt's Act 1784; The Charter Act's of 1793, 1813, 1833, 1853, 1862, 1892, 1909, 1919 and 1935 Acts- Rule of Governor and Governor Generals & Viceroys.

Unit III: Resistance to Company's Rule – Peasant and Tribal Revolts-Revolt of 1857: Causes, and results-Socio-Religious Reform Movements-Arya Samaj, Brahma Samaj, Prarthana Samaj, Theosophical Movement- Dayananad Saraswati, Rajarammohan Roy, Govinda Ranade, Annie Besant-Mohammadan Reforms, Mohammad Iqbal.

UnitIV: Resistance to Company's Rule – Peasant and Tribal Revolts & Revolt of 1857: Causes, nature and results-Rise of Nationalism, Causes, Indian National Congress, 1885-Different phases of National Movement, Moderates, Division of Bengal (1905), Vandemataram Movement (1905-1911), Extremists, Swadeshi Movement (1914-16), Revolutionary and Extremist Activities, Entry of Gandhi into Indian Politics, Gandhian Era (1920-1947), Non-co-operation Movement (1920-22), Civil Disobedience Movement (1930-34), Quit India Movement (1942-44)-Attainment of Independence (1947).

Suggested Readings

1. C.A.Bayly, *Indian Society and the Making of the British Emprie*.
2. Bipan Chandra, et.al., *India's Struggle for Independence*.
3. Paul Brass, *The Politics of India since Independence*.
4. A.R.Desai, *Social Background of Indian Nationalism*.
5. Dharma Kumar & Tapan Rayachauduri, ed., *Cambridge Economic History of India*.

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PAPER III- ART HISTORY OF INDIA

Unit I : Beginnings of Rock Art -Indus Valley Art, Maurya, Sunga & Kushana Art, Gandhara & Mathura Art.

Unit II : Art of Amaravathi & Nagarjuna konda, Gupta Art, Art of Pallava, Chola, Kakatiya & Vijayanagara.

Unit III : Paintings – Ajanta, Ellora, Tanjore, Sittanavasal, Lepakshi.

UnitIV : Fundamentals of Hindu Iconography – Vishnu Iconography – Narasimha Iconography – Saiva Iconography – Siva (Some other forms) – Devi Iconography.

Suggested Reading

Sarasvati, S.k., *Indian Sculpture*.
James Harle., *Art and Architecture of India.*
Krishnadeva., *Temples of North India.*
Srinivasan, K. R., *Temples of South India.*
Sivarama Murthy, C., *Indian Painting.*
Brown, C. J., *Indian Painting.*
Benerjee, J. N., *The Development of Hindu Iconography.*
Gopinatha Rao, T. A., *Elements of Hindu Iconography.*
Mehta, N. C., *Studies in Indian Painting.*
Niharanjan Ray., *Maurya and Sunga Art.*
E. Siva Nagi Reddy, *Evolution of Building Technology in Andhra.*
N. Chandramouli, *Rock Art of South India.*

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PAPER IV – TOURISM AND MUSEOLOGY

Unit – I- Development of Means of Transport- Road, Rail, Water & Air – New Policies on Tourism and Civil Aviation-Various types of Accommodation – Tourism Product – Product Design – Media: Meaning and Kinds – Capacity Building & Communication Skills.

Unit–II- Beach & Island Resorts: Kovalam & Lakshadweep – Hill Stations of India: The Himalayan Resorts – Manali & Darjelling; Non – Himalayan Hill Resorts – Mount Abu & Ootacamund (Ooty)– Pilgrimage: Vaishno Devi, Kamakhya & Tirupati – Dance and Music: The Khajuraho Festival – Palace on Wheels – Monuments & Museums.

Unit – III- Definition, Aim and scope of Museums – Museums Movement – Types of Museums' and Museums' Administration – Documentation.

Unit–IV- Museums-Display Techniques and Exhibitions – Conservation and Preservation – ICOM (International Council of Museums) – MAI (Museums Association of India – Study of Selected Museums – National Museum, New Delhi; Indian Museum, Kolkata; Salarjung Museum and A.P.Govt. Museum, Hyderabad, and Government Museum, Madras.

Suggested Readings:

Kaul, R.N., *Dynamics of Tourism: A Trilogy Vol. III Transportation and Marketing*, New Delhi, 1985.

Virendra kaul., *Tourism and the Economy*, New Delhi, 1994.

Shobita Chopra., *Tourism and Development in India*, New Delhi, 1992.

Bhatia, A.K., *Tourism Development Principles and Practices*, New Delhi, 1983.

Gillian Wright., *Introduction to Hill stations of India*, Hong Kong, 1991.

Shobita Punja., *Museums of India*, Hong Kong, 1990.

Nigam, M. L., *Fundamentals of Museology*.

Grace Morley., *Museums Today*, 1967.

Siva Rama Murthy, C., *Directory of Museums in India.*

Mookerji, Ajit., *Museum Studies.*

E. SivaNagi Reddy, *Tourism and Challenges in Andhra Pradesh.*

P. Chenna Reddy, *Tourism in Andhra Pradesh, Hyderabad, 2014.*

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PAPER V – RAYALASEEMA THROUGH THE AGES

Unit I: Nomenclature – Geographical features : Kadapa Basin – Sources – Pre-History – The Nandas – The Mouryas – The Satavahanas – The Pallavas – The Chalukyas of Badami – The Renati Cholas – The Banas – The Vaidumbas – Telugu Chodas – The Kayasthas – Vijayanagara rule –Administration–Socio-Economic, Religious and Cultural conditions.

Unit II: Rayalaseema under the Polygars - Important Forts – Gandikota, Siddhavatam, Gutty, Penugonda, Chandragiri – The Matli chiefs – Socio-Religious reforms: Vemana, Annamayya and Pothuluri Veerabrahmam.

Unit III: Rayalaseema under the Mysore rulers: Hyderali and Tippu Sultan – Ceding of Rayalaseema to the British – Sir Thomas Munro and his reforms – Missionary Activities-Spread of Western Education – Beginning of Nationalism - Ternekallu Revolt (1801) – Revolt of Chittoor Polygars (1804-1805) – Gulam Rasool Khan (1839) – Uyyalawada Narasimha Reddy (1846-47) – Shaik Peer Shah and 1857 Revolt –Famines in Rayalaseema.

Unit IV: The National Movement – Impact of Indian National Congress – Hampanna Episode (1893) –Vandemataram; Home Rule; Non-Cooperation; Civil Disobedience and The Quit India Movements in Rayalaseema – Freedom fighters-Pappuri Ramacharyulu Gadicherla Harisarvothamarao- Koti Reddy-Anantasayanam Iyengar - Separate Andhra Question-Sri Bagh Pact – Formation of Andhra State (1953)-Loss of Ganjam and Bellary Districts – Formation of Andhra Pradesh (1956)-Gentlemen Agreement – Loss of the Capital – Movement for separate Rayalaseema – Rayalaseema Maha Sabha – Rayalaseema Vimochana Samithi – Seema Hakkula Aikya Porata Vedika – Rayalaseema Movement from 2009 –Rayalaseema Vidyavanthula Vedika (2009) and some other Student Organisations- Bifurcation of Andhra Pradesh (2014) – Movements for the Capital; High Court;-Railway Zone and Steel Factory.

Suggested Readings

1. P. Yenadi Raju, *Evolution of Indian Nationalism, Rayalaseema, 1858-1947*.
2. P. Yenadi Raju, *Rayalaseema during Colonial Times, Study of Indian Nationalism, 1858-1947*.
3. K.V. Narayana Rao, *Emergence of Andhra Pradesh.*
4. M.V. Ramana Reddy, *Rayalaseema Kanneeti Gadha* (Telugu).
5. Bhuman, *Charithralo Rayalaseema* (Telugu).
6. Bhuman, *Rayalaseema Mukha Chitram* (Telugu).
7. Imam, *Koti Gonthukala Akrandana* (Telugu).
8. Imam, *Seema Gunde Chappudu; Karuvu Seema Samalochana* (Telugu).
9. *Rayalaseema Swatanthrodhyama Charithra* (Telugu).
10. Y. Gopal Reddy, *Ghanapur Group of Temples.*

III SEMESTER (Non-Core)

Paper VI – History of Modern Andhra

Unit I: Advent of Europeans – Acquisition of Coastal and Rayalaseema Districts by the British – Company Rule-Reforms – 1857 Revolt in Andhra.

Unit II: Socio-Religious Reform Movements – Veeresalingam – Raghupathi Venkataratnam Naidu and Gurajada Apparao – National Movement – Vandemataram, Non-Cooperation, Civil Disobedience and Quit India Movements.

Unit III: Movement for separate Andhra State – Andhra University – Sribagh Pact – Fast of Potti Sriramulu – Formation of Andhra State 1953 – Gentlemen Agreement-Formation of Andhra Pradesh 1956 .

Unit III: Separatist Movements – Mulki Rules and Jai Andhra Movement 1972 – Telangana Movement – 9th December 2009 and its implications – Repercussions in Andhra Pradesh – Agitations for Separate Telangana; Separate Rayalaseema and united Andhra Pradesh – Bifurcation of Andhra Pradesh – Sabotage of the spirit of Sri Bagh Pact.

Suggested Readings

1. K.V. Narayana Rao, *Emergence of Andhra Pradesh*.
2. V. Ramakrishna, *Social Reform in Andhra*.
3. Sarojini Regani, *Highlights of Freedom Movement in Andhra Pradesh*.
4. M. Venkatarangaiah, *Freedom Movement in Andhra*.
5. P.R. Rao, *History of Modern Andhra.*
6. D. Subramanyam Reddy, *Agrarian Relations and Peasant in Modern Andhra.*

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IV SEMESTER

1. History of Indian Architecture.
2. History of Modern Andhra from A.D.1757 to A.D.2014.
3. Epigraphy and Numismatics.
4. Historical Method
5. i) Women in Modern India.
   ii) Non – Brahmin Movement.
   iii) Communalism in Modern India.
   iv) Christian missionaries in Rayalaseema.
   v) Important Archaeological sites in Rayalaseema.
   vi) Important Tourist Destinations in Rayalaseema.

IV SEMESTER
PAPER I-HISTORY OF INDIAN ARCHITECTURE

UNIT – I Ancient Vastu Texts – Terminology – Three styles of Temple Architecture - Nagara, Dravida and Vesara types - Mauryan Architecture -Buddhist-Architecture – Stupas of North India – Bharhut, Sanchi and Saranath – Andhradesa - cave architecture – Vijayawada, Mogalrajapuram, Undavalli, Bhairavakonda–Stupa architecture of Andhra - – Amaravati, Nagarjunakonda and Bhattiprolu.

UNIT – II Early Chalukya – Rock cut Architecture - Structural temples – Aihole, Badami and Pattadakal – Pallava – Rock-cut caves – Monolithic Rathas –Structural temples - Mahabalipuram and Kanchipuram – Rashtrakuta – Greater Kailas temple.

UNIT – III North Indian Structural Temple Architecture – Gupta Architecture – Sanchi, Bhumara, Nachanakutara and Deogarh – Orissan Architecture, Bhuvaneswar, Puri and Konark – Central Indian style – Khajuraho.

UNIT –IV South Indian Architecture – Chola architecture – Tanjore, Gangaikonda Cholapuram - Hoyasala architecture – Belur, Halebid, Somanathpur - Kakatiya - Hanumakonda, Pillalamarri, Palampeta and Warangal - Vijayanagara - Hampi.

SUGGESTED READINGS

1.Percy Brown, *Indian Architecture*, Vol. I, Bombay, 1956.

2.Debaia Mitra, *Buddhist Monuments*, Calcutta, 1971.

3.Srinivasan, K.R., *Temples of South India*, New Delhi, 1971.

4.Krishnadeva, *Temples of North lndia*, New Delhi, 1969.

5.James Harle, *Art and Architecture of India*.

6.Rajendra Prasad, B, *Art of South India, Andhra Pradesh*, Delhi, 1980.

7.Maichael Meister, *Encyclopedia of Indian Temple Architecture.*

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PAPER II– HISTORY OF MODERN ANDHRA from A.D.1757 to A.D. 2014

Unit I: British Paramountcy in Andhra-Occupation of Coastal and *Rayalaseema* Districts Consolidation of the Power-Administrative Reforms-Impact of Industrial Revolution and 1857 Revolt on Andhra.

Unit II: Socio-Religious Reform Movements-Veeresalingam-Raghupathi Venkataratnam Naidu, Gurajada Apparao-Various Phases of National Movement in Andhra-Vandemataram, Non-Co-Operation, Salt Satyagraha and Quit India Movements.

Unit III: Salient Features of Movement for Separate Andhra State, 1953 – Various Factors leading to the Formation of Andhra Pradesh, 1956.

Unit IV: Separatist Movements in Andhra-Separate Telangana, 1969-Jai Andhra Movement,1972- Emergence of TRS-Separate Telangana Movement-Response of Political Parties-9th December 2009 Declaration of UPA Government-Repercussions in Andhra Pradesh.

Suggested Readings

K.V.Narayana Rao, *Emergence of Andhra Pradesh*, Popular Prakashan, Bombay, 1973.
K.V.Narayana Rao, *Telangana-A Study in the Regional Committee of India*, Calcutta, 1972.
V.Ramakrishna, *Social Reform in Andhra*, Delhi, 1983.
Sarojini Regani, *Highlights of Freedom Movement in Andhra Pradesh*, A.P.State Archives, Hyderabad, 1968.
B.Kesavanarayana, *Political and Social Factors in Andhra*, Vijayawada, 1976.
A.V.Raman Rao, *Economic Development of Andhra Pradesh*, 1866-1957, Bombay, 1958.
M.Venkatarangaiah, *Freedom Movement in Andhra*, four volumes, A.P.State Archives, Hyderabad, 1965, 1969, 1975.

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PAPER III- EPIGRAPHY AND NUMISMATICS

Unit I : Epigraphy as Source for the Reconstruction of Indian History – Origin and Antiquity of writing in India – The Brahmi Script & Kharoshthi Script - its Characteristics – Types of Inscriptions – Writing materials.

Unit II : Detailed Study of the Following Inscriptions: 1. Rumindie Pillar Inscription 2. Hathigumpha Inscription of Kharavela (EI. Vol. XX) 3. Allahabad Inscription of Samudragupta (CII, Vol. III) 4. Kalamalla Inscription of Renatichola Dhananjaya (EI. Vol. XXVII) 5. Aihole Inscription of Pulakesi II (EI. Vol.VI) 6. Gaya Inscription of SriKrishnadevaraya (EI. Vol. XXXIII).

Unit III : Origin of the Coins – Importance of the Coins – Coins of Mahajanapadas – Punch Marked Coins – Study of Symbols – Metallurgical Studies.

Unit IV : Coins of Mouryas - Sri Satavahana Coinage – Coins of Local Cheiftains _ Ikshavakus - Eastern Chalukyas – Western Chalukyas – Kakatiya – Vijayanagara Coins.

Suggested Reading:

Bhuler, G., *Indian Palaeography*.
Pandey, R.B., *Indian Palaeography*.
Sircar, D.C., *Indian Epigraphy*.
Sivarama Murthy, C., *Indian Epigraphy and South Indian Scripts*.
Ramesh, K. V., *Indian Epigraphy.*
Krishna Reddy, N., *Sasana Parichayam*.
Bandarkar, D.R., *Lectures on Ancient Indian Numismatics*.
Gupta, P.L., *Coins*, *National Book Trust of India,* New Delhi, 1996.
Kosambi, D.D., *Indian Numismatics*, Oriental Longman, Delhi, 1992.
Sircar, D.C., *Studies in Indian Coins*, Delhi, 1968.

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PAPER IV – HISTORICAL METHODS

Unit I : Meaning and Definition of History–Nature and Scope of History – Uses of History – Whether History is Art or Science – History and other Social Sciences – Sources: Archival (Primary) and Literary (Secondary)-Foreign Travellers Accounts.

Unit II: Historical Methodology – a) Heuristics, b) Criticism (External and Internal), c) Synthesis and d) Exposition. – Causation; Objectivity and Subjectivity in History. – Stages in the preparation of Thesis: Choice of Topic for research – Collection of Data (Source material) – Hypothesis – Footnotes – References – Bibliography – Appendixes.

Unit III: Historical perspective of Historiography – Contributions by the Western Historiographers – Herodotus and Thucidides (Greece) – Livy; Tacitus and St. Agustin (Roman) – Edward Gibbon and Arnold Toynbee (England) – Leopald Von Ranke; Karl Marx and Oswald Spengler (Germany) – Arab historiography-Ibn Khaldun.

Unit IV: Historical tradition in ancient and medieval India – Bana and Kalhana – Zia-Ud-Din-Barani – Modern Indian Historiography – Orientalist-Imperialistic Historiographers: William Jones, James Stuart Mill, and V.A. Smith – Nationalistic Historiographers – Jadunath Sarkar, R.C. Majumdar, R.G. Bhandarkar and K.A. Nilakanta Sastry – Marxist Historiographers – D.D. Kosambi, Romila Thapar, Irfan Habib – Subaltern School – Ranajit Guha and A.R. Desai.

Suggested readings

1. E.H. Carr, *What is History*?
2. B. Sheik Ali, *History: Its Theory and Method*.
3. K. Rajayyan, *History: Theory and Method*.
4. N. Subramanian, *Historiography*.
5. E. Sreedharan, *A Textbook of Historiography, 500 B.C. to A.D. 2000*.
6. K.A.N. Sastry and Ramana, *Historical Method with Special Reference to India*.
7. S.P. Sen, *Historiography*.
8. Romila Thapar, *Past and Prejudice*.

OPTIONAL (ELECTIVE) PAPER
PAPER – V -Women in Modern India

Unit- I

Gender- Patriarchy-Position of Women in Pre-colonial India-Infanticide- Seclusion of Women- Child Marriage- Sati- Celibacy of Widows- Polygamy- Devadasi system- Reforms in Nineteenth Century- Male Social reformers and the state- Abolition of Sati- Measures against Infanticide- Widow Remarriage Act- Age of Consent Bill

Unit- II

Women and Education in Pre- colonial period- Early efforts during the Colonial rule- Christian Missionaries- Savitribai Phule- Pandita Ramabai- Maharani Tapaswini- D.K Karve- Subbalakshmi

Unit- III

Women Organizations- Early Efforts- Women's Indian Association- National Council of Women in India- All India Women Conference- Child Marriage and Sarda Act- Campaigns for Female Franchise- Muthu Lakshmi Reddy

Unit- IV

Women in the National Movement- Madam Cama- Annie Besant- Gandhi and Women- Role of Women in Non-Cooperation Movement, Civil Disobedience Movement and Quit India Movement- Sarojini Naidu- Kamala Devi Chattopadhyaya- Durgabhai Deshmukh, Rajkumari Amrutha Kaur, Usha Mehta and Aruna Asaf Ali- INA and Lakshmi Sehgal.

Suggested Readings

Chandra, Bipin. *India's Struggle for Independence*, Delhi, 1989

Desai Neera and Usha Thakkar, *Women in Indian Society*, New Delhi, 2001

Desai, Neera. *Woman in Modern India*, Bombay, 1977

Forbes, Geraldine, *Women in Modern India*, Cambridge, 1996.

Jones, Kenneth W., *Socio-religious reform movements in British India*, Cambridge, 1989

Kumkum Sangari and Sudesh Vaid, eds., *Recasting Women: Essays in Colonial History*, New Delhi, 1990

Nair, Janaki, *Women and Law in India: A Social History*, Delhi, 1996

Raman, Sita Anantha, *Women in India: A social and cultural history*, Vols. I & II, California, 2009

Ray, Bharati and Aparna Basu, eds., *From Freedom to Independence: Women and Fifty years of Independence*, Delhi, 1999

Ray, Bharati, ed., *Women of India: Colonial and Post-Colonial Periods*, New Delhi, 2005

Taru Susie and K, Lalitha, *Women Writing in India*, Vols. I & II, New York, 1990&1991

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Yogi Vemana University

Vemanapuram:: Kadapa

YSR District, Andhra Pradesh

M.A. Journalism & Mass Communication

Regulations &Syllabus

(Effective from Academic Year 2018-19)

Department of Journalism and Communication

Yogi Vemana University, Vemanapuram, Kadapa

YSR District, Andhra Pradesh - 516005

About the Department & Course

The Department of Journalism &Communication, Yogi Vemana University, was established in 2009. The Department offers Two Years Post Graduate Programme with four semesters in Choice Based Credit System (CBCS) pattern. From the academic year 2015-17 the course nomenclature was changed to "M.A. Journalism and Mass Communication" duly adhering to the guidelines issued by the University Grants Commission, New Delhi.

. The M.A. programme is designed for giving theoretical and practical training to the students for preparing them to different roles in the media. Every semester of the course offers five theoretical and two practical papers emphasizing on the various aspects of electronic and new media. The course gives an insight into the basic writing, reporting and editing skills required for the media apart from giving the students information regarding various theories, laws, ethics and guidelines in the media profession. The course gives theoretical and practical information regarding various media professions like advertising and public relations etc.

The course work is a mixture of classroom theoretical instruction with lectures and practical laboratory sessions. The course aims to create talented and technically skill oriented students to fulfill the job requirements of media industry in particular apart from crating a pool of students for undertaking research on various issues related to media. The Department is committed to academic excellence, and its standards are reflected in the fact that a majority of the students in every semester find good placements in the major media organizations in the State and other relevant professions.

Rules and Regulations

1. Course Nomenclature:

The course **M.A. Journalism and Mass Communication** shall be of two years duration, consisting of four semesters.

2. Eligibility:

Candidates seeking admission into the Course shall be required to have passed

(A) Any Bachelor degree of this university or from any other University recognized by Government of Andhra Pradesh.

(B) He should have passed the entrance test conducted by the Yogi Vemana University and subsequently become eligible for the purpose of admission.

3. The Entrance Examination:

The entrance examination will be conducted as per the procedure adopted by the Yogi Vemana University and shall be according to the rules and regulations prescribed by the University from time to time. The question paper shall include the following broad topics:

I) Current affairs and General knowledge

II) Language and Comprehension skills

III) Reasoning and Mental Ability

4. Academic Requirements:

(A) The two-year study consists of four semesters, covering theory papers and practical papers.

(B) Every student shall be required to attend 75% of theory and practical classes in all the four semesters.

(C) All the students are required to participate in the professional tour of media centers arranged by the department and submit a tour report to the Department.

(D) The students must participate in the Department Seminars wherein they should present oral and written papers on the theme given.

(E) The students in the semester break between the Second and Third Semester must undergo an internship in any media organization for a period of three weeks and produce a Certificate to that effect from the organization concerned

(F) No student shall be allowed to appear for the examinations both the theory and practical unless he/she produces a certificate of completion of all the academic requirements as the case may be.

5. Examination Evaluation:

(A) All the theory papers in the four semesters shall be valued by the external and internal examiners.

(B) The internal examinations will be valued by the internal examiners teaching the subject in the respective semesters

(C) Practical examination papers/assignments (if any) shall be valued by the internal examiners and external the respective semesters.

(D) The oral (Viva-voce) examination shall be conducted by both internal and external examiners.

(E) The medium of instruction and examination will be in **ENGLISH** only.

(F) A candidate shall be declared to have passed the examination he/she obtains not less than 45% of the total marks in all the semesters put together.

(G) A candidate shall be declared to have passed the examination if he obtains not less than 40% in each theory paper and 50% in the practicals.

(H) Candidates who have completed the course in each semester with required attendance after fulfilling other academic requirements shall be permitted to continue the next semester course.

(I) The candidate will be declared to have passed the semester exams only after fulfilling all the conditions and attain marks as prescribed by the rules and regulations of the Yogi Vemana University.

(J) The candidates must adhere to the rules and regulations of Yogi Vemana University in case of fail in any paper of any semester, improvement or any other provisions related to the examinations.

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Department of Journalism and Communication
Yogi Vemana University
Semester wise Syllabus

Semester -1

Paper Code	Paper Title	No of Credits	Hours per Week		Maximum Marks	
			Theory	Practical	Internal	External
101	History of Mass Media	4	6	-	25	75
102	Communication Theory	4	6	-	25	75
103	Print Journalism	4	6		25	75
104	Telugu Journalism	4	6		25	75
105	Computer Applications for Mass Media	4	3	3	25	75
106 P-1	**Practical -1 –** Print Media Reporting and Editing Skills	2		3		50
106 P-2	**Practical -2** – Translation and Language Skills	2		3		50
TOTAL		**24**	**27**	**9**	**125**	**475**

Semester - 2

Paper Code	Paper Title	No of Credits	Hours per Week		Maximum Marks	
			Theory	Practical	Internal	External
201	Radio Journalism	4	4	-	25	75
202	Television Journalism	4	4	-	25	75
203	Media Laws and Ethics	4	6	-	25	75
204	Media Industry and Management	4	6	-	25	75
205	Science and Environment Communication	4	6	-	25	75
206 P-1	**Practical -1 –** Radio Writing Skills	2		3		50
206 P-2	**Practical -2** – Television Writing skills	2		3		50
Non-Core Paper						
207	Film Studies	4	4	-	25	75
TOTAL (Core and Non- Core)		**28**	**30**	**6**	**150**	**550**

Semester - 3

Paper Code	Paper Title	No of Credits	Hours per Week		Maximum Marks	
			Theory	Practical	Internal	External
301	Photo Journalism	4	4	-	25	75
302	Film Studies	4	4	-	25	75
303	Social Media	4	6	-	25	75
304	Advertising and Brand Management	4	6	-	25	75
305	Corporate Communications	4	6	-	25	75
306 P-1	**Practical -1 –** Film writing Skills	2		3		50
306 P-2	**Practical -2** - Advertising and Public Relations Writing Skills			3		50
Non-Core Paper						
307	Basics in Photography and Videography	4	4	-	25	75
TOTAL		**28**	**30**	**6**	**150**	**550**

Semester - 4

Paper Code	Paper Title	No of Credits	Hours per Week		Maximum Marks	
			Theory	Practical	Internal	External
401	Development Communication	4	6	-	25	75
402	International Media Studies	4	6	-	25	75
403	Gender & Human Rights	4	6		25	
404	Political Communication	4	6		25	75
405	Communication Research Methodology	4	6		25	75
406 P-1	**Practical -1 –** Dissertation	2		3		50
406 P-2	**Practical -2** – Internship Report	2		3		50
TOTAL		**24**	**30**	**6**	**125**	**475**

Semester	No of Credits			No of Hours Per Week			Maximum Marks		
	Core	Non-Core	Total	Lecture	Practical	Total	Internal	External	Total
1	24	-	24	27	9	36	125	475	600
2	24	4	28	30	6	36	150	550	700
3	24	4	28	30	6	36	150	550	700
4	24	-	24	30	6	36	125	475	600
Total	**96**	**8**	**104**	**117**	**27**	**144**	**550**	**2050**	**2600**

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SEMESTER I
PAPER -101 – History of Mass Media

Unit -1

Origin of Newspapers in India – Early Journalism in Presidencies of Bengal, Madras and Bombay - Indian Press and Freedom Movement, Growth of Nationalist Press and Anglo-Indian Press - Changes in Indian Media in Post-Independence era - Indian Press and Emergency - History and Development of News Agencies in India

Unit -2

History of Broadcasting in India – Origin and growth of Broadcasting in India – Origin and Growth of Cable T.V, Satellite T.V in India – Origin and Growth of F.M. Radio, Community Radio in India – Important Committees on Radio and Television in India.

Unit-3

Origin and Growth of Internet – Features of Internet, WWW – Web Journalism, Web Portals – Online News Papers – e-Papers – Social Networking Sites – Face book, Twitter

Unit – 4

Contemporary issues of mass media - Growth of Mass media in India, Circulation, TRP's - Impact of new technology on mass media, Sting Operations – Reality T.V – Sensationalism and Breaking news – Violence against Media professionals.

Reference Books:

Nadig Krishna Murthy: Indian Journalism
S. Natarajan: History of Press In India
R. Parthasarathi: Modern Journalism in India
Meher Masani: Broadcasting and the People.
P.C. Chatterji: Broadcasting In India
H.R. Luthra: Indian Broadcasting
J.V. Vilanilam: Mass Communication in India
Keval .J. Kumar: Mass Communication in India
Social Media: Suman Kumar Kasturi & Prof. P. Bobby Vardhan
Rabindranath Manukonda: History of Telugu Journalism, Print & Electronic Media

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SEMESTER I
Paper-102 – Communication Theory

Unit - 1

Communication, Definition, Nature, Process, Elements, Functions, Barriers – Principles of Effective Communication – Types of Communication, Intrapersonal, Interpersonal, Group and Mass Communication, Characteristics - Verbal Communication, Characteristics, Oral, Written Communication - Non- Verbal Communication, Body Language, Space Communication - Semiotics, Signs and meaning.

Unit - 2

Basic Models of Communication - Aristotle, Harold Lasswell, Shannon & Weaver, David Berlo, George Gerbner, Westley and McLean, De Fleur, Osgood and Schramm –Convergence Models.

Unit -3

Media Effects – Hypodermic Needle Model, One Step, Multistep flow, Opinion Leaders, Gate Keeping Models - Psychological and Sociological Theories- Cognitive Dissonance Theory, Selective Perception, Cultivation Theory, Uses and Gratification Theory, Spiral of Silence - Normative Theories - Media Dependency Theory

Unit – 4

Major Schools of Communication Studies, Frankfurt School, Birmingham, Chicago- Role of Ideologies in understanding Mass media, Critical Theory, Multiculturalism, Functionalism, Structuralism - Marshal McLuhan, Medium is the Message, Mc Comb and Shaw Agenda Setting Theory- Jugan Habermas, Public Sphere- Noam Chomsky, Manufacturing of Consent - Walter Lippmann, Public Opinion and Democracy - James Bryce, Diffusion of Innovations - Manual Castles, Network Society and Digital Convergence

Reference books

David Berlo: The Process of communication
Uma Narula: Mass Communication Theory and Practice.
John Fiske: Introduction to communication studies
Mc Quail Dennis: Mass Communication Theory
Defluer and Ball Rockeach: Theory of mass communication
Dennis Mc Quail and Windhal: Mass Communication Models
D.V.R. Murthy, Mass Communication: Concepts and Issues
Rabindranath Manukonda: Communication and New Media

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SEMESTER I –
Paper -103 – Print Journalism

Unit- 1

Definition of News, Concepts, and Components - Types of News - News values – Hierarchy in Reporting, Qualifications & Responsibilities of Reporter - Writing skills, Accuracy, Brevity, Clarity, Readability, Balance & Fairness, Objectivity - Components of News story, Structure of News Story, 5 Ws, H, Inverted Pyramid Style of writing, Glass Hour Style– Kinds of Leads - News Sources, Press Conference, Interviews, Press Releases.

Unit – 2

Writing from Press Conference, Press Release, Writing reports - Interviewing techniques - Specializations in Reporting, Disasters and Accidents Reporting, Speech Reporting, Crime Reporting, Sports Reporting, Legislature Reporting, Budget Reporting, Legal Reporting – Investigative Reporting – Interpretative Reporting

Unit - 3:

Definition of Editing, Principles, Need for Editing - Editorial Desk, Hierarchy - Duties and Responsibilities of Editor, News Editor, Sub Editor –Different Editorial Desks - Editing Process in Print Media, Symbols, Re-writing, Integrating, Updating, Referencing, Translation, Proof Reading - Planning Special Supplements – Page Makeup, Types, Front Page, Layout and Design.

Unit – 4

Editorial writing – Types of editorials – Feature Writing – Human Interest Features - Columns - Headlines: Functions, Types - Writing Captions –Elements of newspaper Designing, Newspaper Formats – Importance of Graphics in designing – Newspaper Printing Technology

Reference books:

M.V. Kamath: Professional Journalism
Patanjali Sethi: Professional journalism
Bruce Westley: News Editing. New Delhi: IBH Publishers.
Frank Barton (1989): The newsroom: A Manual of journalism.
Parthasarathy: Basic Journalism. New Delhi: McMillan
Suman Kumar Kasturi & Prof. P. Bobby Vardhan: Reporting and Feature Writing
T. Shyam Swaroop & M. Rabindranath: News Reporting – Techniques and Trends

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Semester -1

Paper – 104 – Telugu Journalism

Unit-I:

Brief History and Development of Telugu Press - Contribution of Telugu Press to freedom struggle and social reform movement - Pioneers of Telugu Press - Kandukuri Veeresalingam, Mutnuri Krishna Rao, Kasinathuni Nageswar Rao Panthulu, Narla Venkateswara Rao and others.

Unit-II:

Post emergency and Contemporary Telugu press - Study of Content and Design of contemporary Telugu newspapers - Trends in Telugu Journalism, Politicization of Telugu Journalism - Magazines in Telugu

Unit-III:

Brief overview of Telugu Radio Stations and Television Channels- Radio Programming in Telugu – 24 Hours news channels in Telugu – T.V. Programming in Telugu Channels

Unit-IV:

Study of language and style – SVO formula – Punctuation, Sentence Structure – Objectivity – Concision - Translation Techniques – Problems of Translation

Reference Books:

Rayaprolu AnandaBhaskar: Journalism Charitra Vikasam
Pothuri Venkateswara Rao: Telugu Patrikalu - Andhrajathi Akshara Sampada
Narla Venkateshwara Rao: Prabhanda Parijatam
Uma Shankar, Joshi & PandurangaRao: Art of Translation
Rachamallu Ramachandra Reddy: Anuvada Samasyalu
Nagasuri Venugopal: Media Nadi

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SEMESTER I

Paper -105 - Computer Applications for Mass Media

Unit – 1

History and Generation of Computers – Types of Computers – An overview of Computer System – CPU – Memory – Input and Output Device - Storage – Primary and Secondary storage - Software Operating System MS Windows.

Unit – 2

MS Office Word – Word processing, Entering and Editing text, Formatting Text, Tables, Mail merge, Printing Document - MS Power point, Creating a presentation, Formatting slides, Special features of presentation – Presenting slide shows

Unit- 3

Introduction to Photoshop, Applications and Uses – Introduction to Page Maker, Applications and Uses

Unit- 4

Introduction to Quark Express, Corel Draw, Applications and Uses - Introduction to DTP, Applications of DTP, Use of DTP in media

Reference Books

Stutz A. Russell: Office 2000,
Howard, Phillip & Steve Jones: Society Online.
Donald H. sanders: Computers Today
Adobe Photoshop 5 – Classroom Techmedia
Learning Guides to the interne, Techmedia
Best, Samuel J: Internet Data Collection, London
Norton, Peters: Introduction to Computers
Green, Leila: Communication Technology and Society

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Semester I- Practical -106 –P1 – Print Media Reporting & Editing Skills

The Practical – I will be conducted to test the skills of the candidate in Print Media Reporting and Editing. The candidate needs to write a test for 50 marks in a time of one and half hours. The practical examination shall be conducted by the faculty member drawn from interdisciplinary departments of Yogi Vemana University / from other Universities and marks would be awarded by him along with the concerned faculty member of the Department. Students will be asked to write different news stories on specialized reporting areas and edit news items, articles as mentioned below

- Write different types of News Intro's
- Write news items based on Press release and information or data given
- Write news stores on accidents, crime, political and economic issues.
- Editing the information.
- Write different types of Headlines.
- Correct the information for various typographical, grammatical mistakes.

Semester I - Practical –106- P2 – Translation and Language Skills

The Practical –II will be conducted to test the translation and language skills of the candidate. The test will be 50 marks in a time of one and half hours. The practical examination shall be conducted by the faculty member drawn from interdisciplinary departments of Yogi Vemana University / from other Universities and marks would be awarded by him along with the concerned faculty member of the Department. Students will be tested for their language and comprehension skills especially in Telugu & English as mentioned below

- Translate news items from English to Telugu and from Telugu to English
- Write the meaning of various phrases given in English & Telugu with usage
- Correct the sentences for English and Telugu grammatical mistakes
- Correct the English and Telugu words used in different sentences

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SEMESTER-2
Paper 201 – Radio Journalism

Unit-1

Radio - Characteristics of Radio –Objectives of Radio - AIR Code – Structure of AIR - Who is who in Radio – Various divisions of AIR - Status of Community Radio in India, problems and prospects – Status of FM Radio in India, FM Channels in India, problems and prospects – Educational Radio – Radio in today's scenario, Strengths and Weakness

Unit-2

Radio Formats, News Features, Interviews, Special Audience Programmes - Covering Special Events, Festivals, Sports – Radio Bridge – A.M (Medium & Short Wave), F.M Broadcasting – Digital Radio, Internet Radio, Web Radio – Broadcasting Code – Broadcasting Policies

Unit-3

Writing for Radio, Writing for Ear, Conversational Style – Writing Radio News, Radio News Script - Radio News Bulletins, News Presentation – Writing for Bytes, Vox-Pops - Radio Drama – Story treatment, Voicers, Sound bites, Wraps and packages -Radio Jingles – Radio Spots

Unit-4

Radio Programme Production, Recording Studio Operations, Microphones, Audition - Microphone talents, Radio Jockey, Digital Studio Mixer, Recording formats -Audio Editing and Post Production, Editing Software: Sound forge, Pro tools, Cool edit - Outdoor Radio Broadcasting

Reference books

P.C. Chatteji: Broadcasting in India
U.L. Baruah: This is All India Radio.
Mehra Masani: Broadcasting and the People.
H.R. Luthra: Indian Broadcasting.
G.C. Awasthi: Broadcasting in India.
Keval J. Kumar: Mass Communication in-India.

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SEMESTER-2
Paper -202 – Television Journalism

UNIT 1

Characteristics of TV as Medium of Communication –Development of Television in India - Doordarshan, Golden Period (1983-1993) - Growth of Cable T.V - Liberalization, Satellite T.V, Role of MSO's - HITS, DTH, IPTV - Types of TV Programmes - TV News, Panel Discussions, Interviews - Entertainment Programmes, Soap Operas, Sitcoms, Reality T.V - Documentaries – Docu dramas - Educational TV - Diversification of T.V Channels - Public Service TV Broadcasting

UNIT 2

Modern TV News room, Input, Output, Assignment Desks - Duties of the TV Crew, Roles and Responsibilities – News Anchors and Presenters, Qualities of a Newsreader / Presenter - T.V. Studio Layout, operations, Cameras, PCR, Microphones, Lights – Outdoor Broadcasting - Video editing

UNIT 3

TV News Programms - News Bulletin, 24 Hour News, Organizing News Bulletin, Item Selection and News order - Different Formats of TV News, Special News Stories, Voiceovers and Sound Bites, Structure of TV News Story - The Split Screen Format, Piece-To-Camera (PTC), Going Live, Phone in - Breaking News- flash News – Debates - Script Writing for Television - T.V. Script for News, Script Format, Reporter Script, Anchor Script – Script for T.V. Features, Plays

UNIT-4

Television Production- Video Camera Formats and understanding camera: VHS, SVHS, U-Matic, Beta-Cam, Analogue, Digital, HDTV, DVC-Pro, DV Cam, Mini DV 3CCD Camera – Camera Operations, Shutter, Iris, Lenses, Focal Length, Depth of Field, Filters, Viewfinder, White Balance, Exposure, Power Supply, Sound Level, Recording Medium, Mounting, Gain - Monopod, Tripod - Production Planning and Coordination, SNG, DSNG, OB Vans - VSAT, Earth Station and Satellite Uplink

Reference Books

Gerald Millerson: Video camera Techniques
Vasuki Belavadi: Video Production
R. N. Acharya: Television in India. .
P.C. Chatterjee: Broadcasting In India
B. N. Ahuja: Audio-Visual Journalism
Zettl, H.: Handbook of Television Production
Thota Bhavanarayana: Television Journalism

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SEMESTER-2
Paper 203- Media Laws and Ethics

Unit 1

Indian Constitution, Salient Features– Fundamental Rights - Article 19 (1) (a), Freedom of the Press – Cases related to freedom of Press – Restrictions on Freedom of Press before and after Independence.

Unit 2

Laws related to Press – Copy Right Act, Press and the Registration of Books Act 1867, Working Journalists Act, Press Council Act - Laws related to Broadcast Media, Cinematography Act 1952, Censorship, Self-Censorship, Prasara Bharathi Act 1990, Cable T.V. Act 1995, Conditional Access System (CAS) - Convergence Bill - Cyber Laws, Information Technology Act 2000

Unit 3

Restrictions on Media - IPC & Cr.PC sections relevant to media - Prevention of Publication and Objectionable Matter Act, 1955 - Press and Publication (Parliamentary Proceedings) Act, 1976 - Constitutional amendment Article 361 (Protecting the publication of Parliament and Legislature) - Contempt of Court - Indecent Representation of Women Prohibition Act - Drug and Magic Remedies Act- Defamation – Libel and slander - RTI Act 2005, - Intellectual Property rights – Copy right act – Right to Privacy – Data Privacy – Personal Information Security

Unit-4

Defining Media Ethics – Media Ethics in India - Code of ethics in News Profession – T.V. Self-regulation - Press Council of India guidelines – Truth, Fairness and Objectivity in Indian Scenario - Paid News – Ethics in Reality T.V – Ethics related to Sting Journalism – Ethics in Advertising, Public Relations and Social Media.

Reference Books:

Durga Das Basu: Laws of the Press in India
Rayudu C.S.: Communication Laws
Durga Das Basu: Introduction to Indian Constitution
Paranjoya Guha Tahkurta: Media Ethics – Truth, Farness and Objectivity
Phillip Patterson & Lee Wilkins: Media Ethics – Issues and Cases
D.V.R. Murthy: Media and Accountability

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SEMESTER-2

Paper- 204: Media Industry and Management

Unit-I:

Media as an Industry and Profession - Indian Media, Diversity, Growth, Regionalization - Ownership patterns of Print and Electronic Media in India - Foreign equity in Indian Media – Liberalization impact on Indian Media Industry - Ministry of Information and Broadcasting, Various wings and departments

Unit-2

Newspaper Management – Organizational Management, Various Departments in Newspaper Organization - Press Commissions, Finance Management, Wage Boards - Circulation, RNI, IRS, MRUC - Advertising Management, DAVP, I&PR,- Newsprint Management in India, INS- Circulation, ABC - Content Management, Press Ombudsmen, People's Editor- Editors Guild of India

Unit-3

Broadcast Management in India – Organization Management – Various Departments in Radio and Television Organizations - Business and Financial aspects. Audience Research, TRP's, TAM, BARC - Satellite Channels Guidelines, Content and Programming Guidelines, EMMC – Advertisement Guidelines - News Broadcasters Association (NBA) - BCCC, IBF, TRAI – Digitalization, Indian TV Industry, Trends and Issues - Diversification of T.V Channels

Unit-4

Film Management in India – Film Associations - Regulations for Film Certification and Exhibition – Film Policy in India -Social Media Management – Online Advertising – Social CRM – Social Media Integration and value creation - Internet Security and Privacy Policy. Net neutrality, Ethical hacking,

Reference Books

Vanita Kohli- Khandekar: Indian Media Business

George Sylvie: Media Management - A Casebook Approach

Pringle & Starr: Electronic Media Management

Herbert Lee: Newspaper Organization and Management

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SEMESTER-2

Paper – 205- Science and Environment Communication

UNIT-1

Science Communication, Definition, Nature, Scope, Need - History of Science Communication - Key Elements - Science Communication and Development- Progress in Science and Technology in Post- Independence Period

UNIT-2

Introduction to Science Writing, Science Writing in Media - Writing Science News, Writing Science Stories - Scientific Temperament – Science reporting in Radio, Newspapers, Television, Vigyan Prasar – Science Magazines Problems in Reporting science stories – Essential skills for Science reporting

UNIT-3

Environmental Communication, Nature, Scope, Definition – Elements in Environment Communication – Stakeholders - Environmental Movements in World & India - Sustainable Development, Commission on Sustainable Development - Earth summits- UN and Climate Change.

UNIT-4

Media coverage of Environment, Media effects, Agenda-setting - Media Framing of Environment, Cultivation analysis - Environmental Documentaries & Films - Environmental Magazines, Environmental Blogs - Professional Societies for Environmental Journalists - Risk communication, Media Reporting of Risk - Environmental Advocacy, Case studies.

Reference Books

Bertrand Russell: Scientific Outlook.

J V Vilanilam: Science Communication and Development

D. W. Burkett: Writing Science News for Mass Media

Robert Cox: Environmental communication and public sphere

Binod Agarwal: Global Negotiations Vol I & II Centre Science and Environment.

L. Wallack et al. Media Advocacy and Public Health.

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SEMESTER-2

Paper - 206: Practical -1 - Radio writing skills

The students will be tested for their writing skills for Radio programmes. The candidate needs to write a test for 50 marks in a time of one and half hours. The practical examination shall be conducted by the faculty member drawn from interdisciplinary departments of Yogi Vemana University / from other Universities and marks would be awarded by him along with the concerned faculty member of the Department. Students will be asked to write Script as mentioned below.

- Recording and writing Script writing for 2 minute Radio Ads, Jingles, Spots etc.
- Recording and writing Script for a 15 minute News Feature with headlines & news
- Recording and writing script for 15 minutes Radio Documentary.
- Recording and writing script for Radio Interview
- Recording and writing script for a musical or song based programme / satire etc.

SEMESTER-2

Paper - 206: Practical -2 – Television Writing Skills

The students will be tested for their Television writing skills. The candidate needs to write a test for 50 marks in a time of one and half hours. The practical examination shall be conducted by the faculty member drawn from interdisciplinary departments of Yogi Vemana University / from other Universities and marks would be awarded by him along with the concerned faculty member of the Department. The students will be asked to write Script for Television news, T.V. Feature as mentioned below

- Writing Television News Script, Reporter, Anchor Script, T.V Documentary Script
- Shooting and Editing VOX-POP project on any subject for 2-3 minutes
- Shooting & Editing a news bulletin for 15 – 20 minutes in AV, AVO or AVOSOT formats
- Shooting and Editing an Interview for 10-15 minutes.

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SEMESTER-3

Paper – 301 – Photo Journalism

Unit 1

History of Photojournalism - Difference between a Photographer and Photojournalist -Photography for different media- Newspaper, Magazine, Internet - Importance of visuals in Journalism - Types of Photojournalism – Sports, Travel, Still, Science, War and Wildlife Photojournalism

Unit 2

History of Photography -Types of Digital cameras- Key components of DSLR, Lens elements, Mirror, Viewfinder, Sensor, Resolution, Memory cards – Working of DSLR Camera, Basic Principles, Auto Focus , Light controls - Aperture, Shutter, Exposure, Lenses - Zoom, - Use of Lenses – Lighting Methods - Using of Camera Accessories, Filter, Reflector, Lens hood, Tripod

Unit -3

Picture Composition- Rule of Thirds, Symmetry, Geometry, Shape, – Shot, Classification of shot, Effect of Focal length on Perspective and angle of view, Frame, lens angle, Headroom, Nose room - Photo Captions - Photo Editing

Unit -4

Ethical and Legal Issues- Staging versus Truthfulness- Treating subjects with respect- Privacy - Public interest visuals - Photography in the age of new Digital technology - Photo Magazines, Photo freelancing as a profession.

Reference Books

Parrish, Fred S: Photojournalism: An Introduction
Brill, Betsy: Photo Journalism: The Professionals' Approach
Hoy, Frank P: Photojournalism: The Visual Approach.
McCartney, Susan: Mastering the Basics of Photography
Drew, Helen. The Fundamentals of Photography
Chapnick, Howard: Truth Needs No Ally: Inside Photojournalism

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SEMESTER-3

Paper - 302: Film Studies

UNIT-1

A brief history of films, Lumiere Brothers - Silent era – Talkies – Pioneers of Indian Cinema, Dadasaheb Phalke, Hiralal Sen, Raghupathi Venkaiah Naidu – The Golden Age of Indian Cinema, Popular Actors, Directors, Popular Cinema in 1950s – Growth of Studio System – Emergence of Star System – Indian Art Cinema - New Wave cinema – Film Genres – Film Noir- Problems and prospects of Indian film industry

UNIT-2

Contribution of George Melies, D. W. Griffith– Alternative Cinema, Sergei Eisentien, Montage and Soviet Cinema, German Cinema Expressionism, Italian Neo-realism, Jean Luc Godard, French New Wave – Auteur Theory – Film Organizations in India, FTII, NFDC, CBFC, FCAF – Film Censorship in India – Film Committees in India

UNIT 3

Types of Films, Feature Films, Non Feature Films and Documentary Films - Film Narrative Structure, Dramatic Structure - Film Script – Process of Film Script Writing, Idea, Story, Synopsis, Screenplay, Script, Visualization, Shooting Script - Principles of Script Writing for Films, Three Act Structure, Premise and Characterization - Film Review - Film Appreciation – Film Magazines in India. – Film Awards in India

UNIT 4

Film production Techniques - Stages in Film making, Pre-production, Production, Post-production– Direction, Cinematography, Dubbing, Mixing, Sound Recording, Editing, SFX, Animations, Distribution, Exhibition–Emerging trends

Reference Books:

B.W. Welsch: A Handbook for script writers:
Satyajit Ray: Our films and their films:
Kabita Sarkar: Indian cinema today:
Lindgrad: The Art of Film:
James Monaco: How to read a Film:
FerozRangoonwallah75 years of Indian cinema
G.D. Khosla: Film Censorship

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SEMESTER-3

Paper - 303: Social Media

UNIT 1

Social Media – Definition, Characteristics – Concepts of Web 2.0, User Generated Content – Mainstream Media Vs. Social Media – Globalization and Social Media – Social Media as a tool of communication – Use and misuse of Social media.

UNIT 2

Social Media Types - Social Communities - Text Publishing Tools – Micro-blogging Tools - Photo Publishing Tools - Audio Publishing Tools- Video Publishing Tools - Social Gaming Tools- Really Simple Syndication - Theories of Social media – Revisiting Diffusion of Innovation, Social Exchange, Social Penetration, Social Presence

UNIT 3

Social media and their impact on Radio, TV and Newspapers - Public participation and Social Media; Networked Societies - Credibility of information – Social Media impact on Politics and Culture

UNIT 4

New Media and Society - New media and New Audience - Social Change Communication and New Media - Civil Society and New Media - New media and Popular Culture, New media and Networked Activism

Reference books

Leah A. Lievrouw & Sonia Livingstone: The Handbook of New Media
Albarran and Goff: Understanding the Web
Crispin Thurlow, Laura Lengel: Computer Mediated Communication
Balan K.R.: Conspectus for information & Communication
Ghosh, Avik: Communication Tech. & Human Development
Jones, Steve: Doing Internet Research
Albarran, Allan B,Goof .David H: Understanding the web
Neth, Shyama: Assessing the state of Web Journalism
Syed, M.H: Journalism and Information Technology
Hassan, Robert: The information society
Frank Webster: Theories of Information Society

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SEMESTER-3

Paper -304- Advertising &Brand Management

Unit 1

Definitions of Advertising - Functions and Advertising – Relevance of Advertising in Marketing mix – Types of advertising - Various media for advertising Print, Radio, Television, Film, Internet, OOH – Pioneers in Advertising, David Ogilvy, Claude C. Hopkins, A.G.Krihsnamurthy, Piyush Pandey Prasoon Joshi, R. Balakrishnan, Sam Balsara, Prahlad Kakkar

Unit 2

Copy Writing, Idea Generation, Principles, Copy devices - Elements in ad copy, Visualization, Logo, Slogan, Headlines – Planning Advertising Campaigns – Theories of Advertising – Stimulus Response Theory, AIDA, AIDCA, DAGMAR approach– Information Processing Model

Unit-3

Advertising Agencies, Structure and Functions of various departments in Advertising Agency – Professional Advertising Bodies, AAAI, ISA, ASCI, IAA, WFA - Social and Economic aspects of Advertising –Media Planning, Media strategy, media scheduling, media mapping - Advertising Research –Pre Testing – Post Testing Methods – Recall Test – Recognition Test – PACT – Advertising Codes and Ethics – DD and AIR Advertising Code - Using Women and Children in Ads -Surrogate ads – Celebrities in Advertising

Unit-4

Definition of Brand – USP - Brand Architecture – Brand Audit –Brand Community – Brand Culture – Brand Equity – Brand Icons – Brand Loyalty - Brand Positioning - Different approaches to Brand Management – Brand Communication – Advertising as a Brand Building Tool -Brand Campaigning - Success stories of Branding -

Reference Books:

Jethwaney, Jaishri & Jain, Shruti: Advertising Management,
Ogilvy, David:. Ogilvy on Advertising
Valladares, June A.: The Craft of Copywriting
Sandage: Advertising Theory and Practice
Sethia and Chunawala: Advertising- Principles and Practice
Otto Kleppner: Advertising Procedure
Adrian R. Mackay: The Practice of Advertising
Angela Goddard: The Language of Advertising

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SEMESTER-3

Paper – 305 – Corporate Communications

Unit-1

Corporate Communication– Definition - Scope - Functions - Evolution of Corporate Communication in India, Corporate Communication vis-à-vis Public Relations - Professional bodies in PR / Corporate Communication – PRSI, IPRA, Professional code of ethics; PR digital platforms, Use of Social Media, PR Pioneers, P.T. Barnum, Ivy Lee, Rex Harlow, Edward Bernays, Carl Byoir, George Creel, C.V. Narasimha Reddy - Important PR Agencies in India

Unit II

Media Relations- Benefits of media relations, Public Relations and Media, Media Relations tools and techniques – Press Conference, Press Tour. Preparing Press Kits - Writing Press Releases

Unit III

Corporate Reputation Management and Crisis Communication – Corporate Reputation, Image repair theory, Building corporate identity - Crisis Management, Crisis vs. problem, Guidelines for preparedness and planning, Crisis Response Strategy

Unit IV

Various applications of Corporate Communication - Community Relations and CSR, Employee Communication, Investor Relations, Government Relations, Customer Relations, Corporate Communication in Brand Promotion - Corporate Communication and ethics, Legal aspects of Corporate Communication – CSR and Media Originations – Case Studies

Reference Books:

Jethwaney, Jaishri : Corporate Communication – Principles and Practice,
Sachdeva, Iqbal S: Public Relations – Principles and Practices,
Black, Sam: Practical Public Relations
Ries, Al & Reis, Laura: The Fall of Advertising and the Rise of PR.

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SEMESTER-3

Practical – 306 - 1- Film writing Skills

The students will be tested for their Film writing skills. The candidate needs to write a test for 50 marks in a time of one and half hours. The practical examination shall be conducted by the faculty member drawn from interdisciplinary departments of Yogi Vemana University / from other Universities and marks would be awarded by him along with the concerned faculty member of the Department. The Student will be asked to write Film Synopsis, Script apart from Film reviews, Film Appreciations as mentioned below Writing a film script for two pages with imaginary characters to a given situation

- Writing a film Synopsis
- Writing Film Review
- Writing a Film Appreciation

SEMESTER-3

Practical -306- 2 – Advertising & PR Writing Skills

The student will be tested for the Advertising and Public Relations writing skills. The candidate needs to write a test for 50 marks in a time of one and half hours. He will be asked to write Captions for Ads, Design Ads, Write a plan for Advertising Campaign. The practical examination shall be conducted by the faculty member drawn from interdisciplinary departments of Yogi Vemana University / from other Universities and marks would be awarded by him along with the concerned faculty member of the Department. The Students has to write Press Releases, design Press Kits, Broachers or News Letters as part of PR Skills as mentioned below

- Writing a Press Release for an event / occasion
- Writing a Press Rejoinder to a published news item
- Designing a Brochure / Pamphlet/ News Letter / House Journal
- Conceiving and hosting a PR Event.

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SEMESTER-4
Paper - 401: Development Communication

Unit 1

Development - Different Concepts – Causes for under development – Theories and models of development, Economic Theory, Walt Rostow Sociological Theory, Modernization Theory, Dependency Theory, Dominant Paradigm – Alternative Models of Development - New Paradigm of Development - Sustainable Development – Human Development Index, World Development Index - Development dilemmas.

Unit 2

Development Journalism, Origin, Growth, Concept, Case studies - Development News, Development Reporting- Problems of Indian Press in Development Journalism- Case Studies.

Unit 3

Development Communication, Definition, Nature, Scope, Merits and demerits - Case studies of SITE and Jabua Project- Development Support Communication, Concept, Overview – Communication and Human Development, Development Communication Concepts and case studies

Unit 4

Participatory development – Community development – Participatory communication research – case studies – Multimedia approach to development issues – Interpersonal communication – Traditional communication – Mass communication – Community Radio, TV, Film – Case studies

Reference Books

Uma Narula: Development Communication:
Wilbur Schram: Mass Communication and National Development
S.C. Dube: Development and Modernization
Daniel Lerner: The passing of Traditional Society
Participatory Communication for Social Change: Hean Serraes
D V R Murthy & K Vijai Kumar: Development Journalism: an Analysis
Manyozo, Linje: Media Communication and Development: Three Approaches
D.V.R.Murthy: Development Journalism: What Next

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SEMESTER-4

MJMC 402: International Media Studies

UNIT 1

Definition, Nature and Scope of International Communication - Characteristics of International Communication - Objectives of International Communication - Types of International News - Channels of International Communication, - International communication and National identity

UNIT 2

United Nations Educational, Scientific and Cultural Organization (UNESCO), New World Information and Communication Order (NWICO), McBride Commission, Non Aligned News Agencies Pool (NAM POOL), International Telecommunication Union (ITU), SAARC and Mass Media - International Press Institute (IPI), Association of Newspapers and News Publishers (WAN-IFRA), International Association for Media and Communication Research (IAMCR), Asian Media Information and Communication Centre (AMIC). International Federation of Journalist (IFJ), International Center for Journalists (ICFJ), World Global Investigative Journalism Network (GIJN), International Consortium of Investigative Journalists (ICIJ)- Watergate Scandal, Pentagon Papers, Paradise Papers, Panama Papers, Reporters Without Borders

UNIT 3

International News Papers - The New York Times, The Wall Street Journal, The Times, The Guardian, and People's Daily. International News Agencies- AP, UPI, Reuter, AFP, IPS, TASS, DPA, Interfax News, Kyodo News, CCTV+ - International Magazines -Time, Forbes, Reader's Digest, Fortune, Vogue, National Geographic, ESPN The Magazine - International Radio Broadcasters, BBC Radio, Voice of America (VOA), Radio Moscow, United Nations Radio, International News networks CGTN, CNN, BBC, RT, CNBC, AL JAZEERA, France 24.

UNIT 4

International Communication Policies and Media Regulation, Media Policy and Globalization, Global Media Trends, Nielsen Holdings, Media companies - Thomson Reuters, Time Warner, CBS Corporation, Cox Media Group, News Corp, Viacom, Walt Disney Company, 21st Century Fox, Media Moguls- Rupert Murdoch, Richard Branson, Stanley Hubbard, Anne Cox

Reference Books

V. S. Gupta: International Communication
H.D. Fischer and J. C. Merril: International Communication
Cees Hamelink: The Politics of World Communication
Nerbert Schiller: National Sovereignty and International Communication
Robertson: Communication and Third World

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SEMESTER-4

Paper– 403- Gender and Human Rights

Unit-1

Human Rights, Concept, Meaning, Evolution- Kinds of Human Rights, Civil and Political rights, Economic, Social and Cultural Rights - Universal Declaration of Human Rights - International Bill of Human Rights, India and the Universal Declaration -Human rights commissions in India - NHRC- SHRC – Human Rights Organizations, Amnesty International, Human Rights Watch, FIDH

Unit-2

Vulnerable Groups and Human rights – Rights of Women, Children - Human Rights and Media, Coverage of Human Rights issues in Newspapers, Television, Films - Human Rights Agenda setting by Media, Framing of Human Rights issues – Reporting Human Rights Reports.

Unit-3

Gender and Communication - Need for the Study - Gender Values - Feminism - Three waves of Feminism - Women and International Communication – WIN News, WINGS, FIRE- Women Communicating Globally – Women's Magazines in India – Women's Organizations in India, IMWF, IAWRT

UNIT-4

Feminist Communication Theories – The Structuralism Paradigm, Muted Group Theory, Stand Point Theory - Conversation Analysis - Critical Discourse Analysis - The Post Structuralism Paradigm, Performance and Positioning Theory, Transgender and Cyborg Theories. - Post Structuralism Discourse Analysis - Transverse Discourse Analysis

Reference Books

Donna Allen, Susan J Kaufman, Ramona, R. Rush: Women transforming Communications
Philip Shaver and Clyde Hendrick: Sex and Gender
Karen Boyle: Media and Violence
Marian Meyers. Engendering Blame: News Coverage of Violence against Women
Pamela Creedon and Judith Cramer: Women in Mass Communication.
Charlotte Krolokke & Anne Scott Sorensen: Gender Communication: Theories and Analyses

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SEMESTER-4
Paper – 404 -Political Communication

Unit 1

Definition of Political communication- Relationship between Politics and Communication – Role of Media in Politics, Public Participation, Public Opinion and Public Policy- Role of media in Democracy - Political journalism in India: Status and dynamics

Unit 2

Political Communication Theories – Agenda Setting - Priming, Framing – Media impact on formation and change of political attitudes – Gate Keeping and regulation of political information - Spiral of Silence and the social nature - Public Relations and Political Communication

Unit 3

Political Messages - Political Advertising- Political Campaigns - Coverage of Political campaigns by Media – Reporting of Pre Polls and Exit Polls – Political Research Organizations in India – Psephology, Important Psephologists in India – Coverage of Elections in Indian Media - Film stars and Politics

Unit 4

Liaison of Media organizations and Political Parties - Political messages in Print and Broadcasting Media - Social Media and Political campaigning – Ethics in Political Communication – Case Studies

Reference books

Brian McNair: Introduction to Political Communication
Eric Louw: Media and Political Process
Peter Gonsalves: Clothing for Liberation
John Corner: Media and Restyling of Politics
ArvindRajgopal: Indian Public Sphere: Readings in Media History, New Delhi
PeterDeSouza and E Sridharan: India's political parties
S P Qurashi: An Undocumented Wonder; The Making of Great Indian election
Arvind Rajgopal: Politics after Television. New Delhi
Asha Sarangi: language and politics in India
Praminda Jacob: Celluloid deities. New Delhi:
Vasanthi : Cut-outs, caste and cinema.
Linda L. K. and H. Christina: Handbook of Political Communication

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SEMESTER-4

Paper – 405 –Communication Research Methodology

UNIT-1

Development of Mass Communication research - Meaning of research, Scientific method – Characteristics – Types of Research – Steps in Research Process – Research areas in Print, Electronic, Advertising, Corporate Communications, Internet and Social Media.

UNIT-2

Basic elements of research – Concepts, Definitions, Types of Variables, Hypothesis – Types of hypothesis, Characteristics of Good Hypothesis, Hypothesis testing - Research designs in Mass Communication, Survey research, Focus Group Method, Experiment, Content analysis, Longitudinal Studies, Historical method –Levels of Measurement –Types of scales- Reliability, Validity

UNIT-3

Sampling in communications Research: Types, Applications and Limitations - Tools of data Collection, Interview, Questionnaire, Schedules, Observation and Case study, Applications and limitations of different methods

UNIT-4

Use of statistics in communication research- Quantitative, Qualitative Research, Descriptive and Inferential Statistics, Parametric and Non-Parametric Statistics - Basic Statistical Tools, Measures of central tendency, Mean, Median and Mode - Measure of Dispersion - Standard deviation, Chi-Square Test, T- Test –Correlation - Data Presentation, Use of graphics in data presentation

Reference Books:

Festinger. L.andKatz. D: Research Methods in the Behavioural Science
Kerlinger.F. N: Foundation of Behavioural Research
Krippendorf. K : Content Analysis. An Introduction to Methodology
Westley Bruce. N and Guido.H: Research Methods in Mass Communication
Mosor and Kalton : Survey Methods in Social Investigation –
Walker. J. T: Using Statistics for Psychological Research
Wilkison and Bhandarkar: Methodology and Techniques of Social Science research
C. R. Kotari: Research Methodology, Methods and Techniques
Pauline: Scientific Social surveys and Research:
Winner & Dominic: Mass Media Research, an introduction.

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SEMESTER-4
Paper – 406- P1 - Dissertation

During the fourth semester, all students will submit a **Dissertation project** on any issues related to Journalism and Mass Communication. The students shall take up research to identify specific issues in the context of journalism and mass communication and submit the report. The dissertation Document would be submitted before the semester-end examination. Dissertation will be evaluated by both **internal (Guide) and one external examiner from interdisciplinary departments of Yogi Vemana University / outside university for 30 Marks.** There shall be a Viva-voce on the dissertation for **20 marks given by a committee comprising Coordinator of the Department and External examiner drawn from interdisciplinary departments of Yogi Vemana University / other University**

SEMESTER-4
Paper – 406- P2 –Internship Report

Students have to undergo a three-week internship in the **month of May / June or December/ January** in any Print, Broadcast, Advertising, Public Relations or Online news organisation of their choice They have to submit a report on the Internship programme. 50 marks would be awarded based on the work done in the internship, overall opinion of the person in-charge of media house in which the student has undergone the Internship etc. The internship would be dedicated to general overall functioning of a journalist including one week of Editing at the News / Features Desk another week of reporting news and final week if field work.

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SYLLABUS - NON-CORE PAPER
SEMESTER -2 –Paper 207 – Film Studies

Unit-1

A brief history of films, Lumiere Brothers - Silent era – Talkies – Pioneers of Indian Cinema, Dada Saheb Phalke, Hiralal Sen, Raghupathi Venkaiah Naidu – The Golden Age of Indian Cinema, Popular Actors, Directors, Popular Cinema in 1950s – Growth of Studio System – Emergence of Star System –Film Genres – Problems and prospects of the Indian film industry

Unit-2

Types of Films, Feature Films, Non Feature Films and Documentary Films - Film Script – Process of Film Script Writing: Idea, Story, Synopsis, Screenplay, Script, Visualization, Shooting Script - Principles of script writing for films: Three Act Structure, Premise and Characterization

Unit 3

Film Review- Film Appreciation –Film Magazines in India – Film Awards in India - Film Censorship in India

Unit 4

Stages in film making – Production Process - Pre-production, Production, Post-production – Direction, Cinematography, Dubbing, Mixing, Sound Recording, Editing, SFX, Animations, Distribution, Exhibition –Emerging trends

Reference Books:

B.W. Welsch: A Handbook for script writers:
Satyajit Ray: Our films and their films:
KabitaSarkar:Indian cinema today:
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SEMESTER -3

Non –Core Paper – Paper – 307 –Basics in Photography & Videography

UNIT - 1:

History of Photography- Various parts of camera - Key components of DSLR- light path, lens elements, mirror, viewfinder, sensor, resolution, memory cards – Working of digital Camera - Basic Principle, Auto Focus , Light controls- Aperture, Shutter, Exposure, Lenses – Zoom - Use of Lenses – Using of Camera Accessories – Filter, Reflector, Lens hood, Tripod

UNIT - 2:

Picture Composition- Rule of Thirds - Headroom, Nose Room, Depth of field & Depth of Focus techniques - Branches of photography- Nature, Still, Architecture, Wedding, Sports, Photo Journalism – Photo Editing

UNIT-3:

Types of Video Cameras – White and Black Balance - Camera Angles – Camera Movements – 180^0 axis of action rule - Basics of Lighting- Tripod Setting – Tracks and Trolleys –Use of lenses - Outdoor and Indoor Shooting

UNIT – 4:

Single and Multiple camera productions – Types of Shots, Scenes, Sequence - Types of video formats – Audio equipment – Mikes

Reference Books

Burrows, Thomas D., et.al: *Video Production:* Disciplines and Techniques
Zettl,H.: Handbook of Television Production
Rabinger, Michael: Directing the Documentary
Shelley, S.L.: A Practical Guide to Stage Lighting
Compesi, Ronald J et.al: Video field Production and Editing

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Department of Journalism and Communication
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Scheme of Examination – Internal Examination

The internal examinations will be conducted twice in each semester. The first internal examination will be conducted in unit 1 & 2 of the syllabus and the second internal exam in unit 3 & 4. The internal examination will be for 25 marks and will be conducted for One hour. It will have two sections i.e. Section – A consisting of Short Answer and Section – B consisting of Essay questions.

Section – A

- Section – A will consist of Short Answer Questions
- The total marks for the Section – A is **10**
- It will consist of **8 Questions** given from **2 units i.e. 4 questions from each unit**. For the first internal examination questions will be from Unit-1 & 2 and for second internal exam the questions will be from Unit-3 & 4.
- The student has to answer **five questions** and each question carries **two marks**.
- The answer should not exceed **one page**.

Section – B

- Section – B will consist of **Essay Questions**
- The total marks for the Section – A is **15**
- It will consist of **6 Questions given from 2 units i.e. 3 questions from each unit with internal choice**. For first internal examination questions will be from Unit-1 & 2 and for second internal exam the questions will be from Unit-3 & 4.
- The student has to answer **three questions** and each question carries **five marks.**
- The answer should not exceed **three pages**

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Internal Examination -Model Question Paper

Department of Journalism and Communication

Yogi Vemana University

Internal Examination- 1st Semester

Paper – 102- Introduction to Communication Studies

Time: 1 1/2 Hour **Max.Marks:25**

PART-A **5 x 2=10 Marks**

Answer *any FIVE* questions.

Each question carries *Two (2)* Marks

1. Cognitive dissonance
2. Johari window model
3. Opinion Leaders
4. Body Language
5. Magic bullet theory
6. Space Communication
7. Authoritarian theory
8. Uses & Gratification Theory

PART-B **3 x 5 =15 Marks**

Answer *ALL* questions.

Each question carries *FIVE (5)* marks

9. Discuss the significance of agenda-setting Theory?

(OR)

10. Explain the functions of non-verbal communication?
11. Explain Cultivation theory with examples?

(OR)

12. Discuss the principles of effective oral and written communication
13. Explain in detail the gate-keeping models?

(OR)

14. Discuss the principles of Verbal communication?

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Department of Journalism and Communication
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Scheme of Examination – External Examination

The External examination will be conducted once in each semester. The External examination will be for 75 marks and will be conducted for Three hours. It will have two sections i.e. Section – A consisting of Short Answer and Section – B consisting of Essay questions.

Section – A

- Section – A will consist of **Short Answer Questions**
- The total marks for the Section – A is **15**
- It will have **8 Questions** given from **all four units i.e. 2 questions from each unit**
- The student has to answer **five questions** and each question carries **three marks**.
- The answer should not exceed **one page**.

Section – B

- Section – B will consist of **Essay Questions**
- The total marks for the Section – A is **60**
- It will consist of **8 Questions given from all four units** i.e. **2 questions from each unit with internal choice**.
- The students have to answer **4 questions** and each question carries **fifteen marks.**
- The answer should not exceed **three pages**

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External Examination -Model Question Paper

Department of Journalism and Communication

Yogi Vemana University

External Examination – 4thSemester

Paper – 403- Gender and Human Rights Studies

Time: 3 Hours **Max.Marks:25**

PART-A **5 x 3=15 Marks**

Answer *any FIVE* questions.

Each question carries *Three (3)* Marks

1. NHRC
2. Woman and ICT
3. Media Agenda Setting of Human Rights
4. Post-Structuralism Paradigm
5. WINGS
6. Gender Values
7. Gender Stereotyping
8. Human Rights courts in Districts

PART-B **4 x 15 = 60 Marks**

Answer *ALL* questions.

Each question carries *Fifteen (15)* marks

9. What do you understand by the term Human Rights? Why are they important?

(OR)

10. Discuss the Universal Declaration of Human Rights?
11. Discuss with examples the coverage of Human Rights issues in Indian Media?

(OR)

12. Why are human rights of vulnerable groups important? What is the role of media in covering the human rights of women and children?
13. What is role of New Media in Women's empowerment?

(OR)

14. Discuss the coverage of Women's issues by Indian mass media?
15. Write about Two Feminist Communication theories?

(OR)

16. Discuss the Performance and Positioning theory?

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Sl. No	Details of the Expert	Contact No.
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2	**Professor. P. Vijaya Lakshmi,** Department of Communication and Journalism, Sri Padmavathi Mahila Visvavidyalayam Tirupathi, Andhra Pradesh	9399920125
3	**Professor. T. Tripura Sundari** Department of Communication and Journalism, Sri Padmavathi Mahila Visvavidyalayam Tirupathi, Andhra Pradesh	9885081348
4	**Professor. Kiran Prasad** Department of Communication and Journalism, Sri Padmavathi Mahila Visvavidyalayam Tirupathi, Andhra Pradesh	9440412154
5	**Professor. C. Vani** Department of Communication and Journalism, Sri Padmavathi Mahila Visvavidyalayam Tirupathi, Andhra Pradesh	9866057627
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7	**Professor. V. Satti Reddy,** Department of Communication and Journalism, Sri Potti Sriramulu Telugu University, Hyderabad, Telangana	9441264451
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9	**Professor. K. Stevenson** Department of Journalism and Communication, Osmania University, Hyderabad, Telangana.	9533365858
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11	**Professor S. Nagarathinam** Head of the Department of Visual Communication, Madurai Kamaraj University, Madurai, Tamilnadu	09600930723

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13	**Dr. Mahendra Kumar Padhy** Associate Professor and HOD, Department of Media and Communication School of Communication, Central University of Tamilnadu, Thiruvayur.	09451529128
14	**Dr. G. Anita** Assistant Professor, Head of the Department, Department of Journalism & Mass Communication, AcharyaNagarjuna University, Guntur, A.P.	9440848413
15	**Dr. J. Madhu Babu** Assistant Professor Department of Journalism & Mass Communication, Acharya Nagarjuna University, Guntur, A.P.	9393110848
16	**Professor. C. Ramakrishna** Department of Journalism and Mass Communication, Andhra University, Visakhapatnam, , Andhra Pradesh	9441663874
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18	**Dr. T. Vijaylakshmi** Assistant Professor Department of Journalism & Mass Communication, Krishna University, Machilipatnam. A.P.	9493037988
19	**Dr. K. Jothirmayee** Assistant Professor Department of Journalism & Mass Communication, Krishna University, Machilipatnam. A.P.	9154442089

Prof. D.V.R. Murthy
Member

Prof. B. Balaswamy
Member

B. Nageswara Rao
Member

T. Shyam Swaroop
Member

Prof. P. Padma
Chairperson & Convener

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COURSE STRUCTURE (Revised in 2018-2019)

SEMESTER-I

S.No	Paper code	Title of the Paper	Theory Marks	Internal Assessment	Total Marks
1.	101	APPROACHES TO THE STUDY OF POLITICAL SCIENCE	75	25	100
2.	102	COMPARATIVE POLITICS	75	25	100
3.	103	PUBLIC POLICY	75	25	100
4.	104	Urban Governance	75	25	100
5.	105	ADMINISTRATIVE THEORIES	75	25	100

SEMESTER-II

S.No	Paper code	Title of the Paper	Theory Marks	Internal Assessment	Total Marks
1.	201	INDIAN POLITICAL PROCESSES	75	25	100
2.	202	POLITICAL SOCIOLOGY	75	25	100
3.	203	POLITICS IN ANDHRA PRADESH	75	25	100
4.	204	COMPARATIVE LOCAL GOVERNMENTS	75	25	100
5.	205	INDIAN STATE AND ADMINISTRATION	75	25	100
6.	206	**NON-CORE PAPER**: INDIAN AMINISTRATION	75	25	100

SEMESTER-III

S.No	Paper code	Title of the Paper	Theory Marks	Internal Assessment	Total Marks
1.	301	HUMAN RESOURSE MANAGEMENT	75	25	100
2.	302	FINANCIAL ADMINISTRATION	75	25	100
3.	303	INTERNATIONAL RELATIONS	75	25	100
4.	304	RURAL GOVERNANCE	75	25	100
5.	305	RESEARCH METHODOLOGY	75	25	100
6.	306	**NON-CORE PAPER**: POLITICAL THOUGHT OF Dr.B.R.AMBEDKAR	75	25	100

SEMESTER-IV

S.No	Paper code	Title of the Paper	Theory Marks	Internal Assessment	Total Marks
1.	401	ORGANIZATIONAL BEHAVIOUR	75	25	100
2.	402	INDUSTRIAL RELATIONS	75	25	100
3.	403	PUBLIC RELATIONS	75	25	100
4.	404	MANAGEMENT TECHNIQUES	75	25	100
5.	405	(Elective Papers) (a) GOOD GOVERNANCE AND INFORMATION TECHNOLOGY (b) Human Rights in India (c) Social Welfare administration (d) Disaster Management (e) Office Management	75	25	100

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FIRST SEMESTER SYLLABUS

Revised in 2018 - 2019

CORE – 101: APPROACHES TO THE STUDY OF POLITICAL SCIENCE

I. Political Science:

a) Meaning, Nature, Scope and Significance

b) Relationship of Political Science with other Social-Sciences economics, Public Administration, History, Sociology, Psychology, and Ethics etc.

II.Approaches:

a) State and Sovereignty Meaning Definition & Issues

b) Behavioural Approach & Systems Approach

III. Major Concepts:

(a) Power, law and Rights

(b) Liberty and equality their relationship

IV. Forms of Government:

(a) Democracy – Direct and Indirect

(b) Parliamentary and presidential form of Government

Selected Readings:

1. Michael Has & Henry S. Kariel (ed). Approaches to the Study of Political Science, Chandler, 1988.
2. David E. Apter, Introduction to Political Analysis, Prentice Hall, 1984.
3. Freeman (ed). Foundations of Political Science-Research, Methods and Scope, The Free Press, 1977.
4. Jessica Kuper, Political Science and Political Theory, Routledge and Kegan Paul, 1987
5. Charles E.Merriam, New Aspects of Politics, University of Chicago Press, 1990.
6. Bernard Crick, In Defense of Politics, Penguin Press,1982.
7. Robert A. Dahl, Modern Political Analysis, Prentice Hall, 1986.
8. Bains and Jain, Political Science in Transaction, Geetanjali, 1981.
9. Grenstein and Polsby, Political Science, Addisin-Wesely, 1985.
10. William Meyer, The Political Experience, Kreiger Publishing Co, 1987.
11. Governor: introduction of Political Science.

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FIRST SEMESTER SYLLABUS

Revised in 2018-2019

CORE – 102: COMPARATIVE POLITICS

I. Comparative Politics

a) Nature, Scope and Significance of Comparative Politics.

b) As a Method and an Area of enquiry

II. Elements of Comparison

a) The Philosophy of Constitution.

b) Party System and Political Participation

III. Comparative Perspectives of Third World Regimes

a) Dependency Theory

b) Communist System

IV. Comparative Perspective of Movements

a) Women's movement & Human Rights Movements.

b) Emerging Trends in Comparative Politics.

Selected Readings:

1. Lucian W. Pye, Aspects of Political Development Amerind Publications, New Delhi, 1966.
2. M.Curtis, Comparative Government & Politics: An Introductory Essay in Political Science, Harper & Row, New York, 1978.
3. Jean Blondel, Comparative Government: A Reader, Macmillan Press, London, 1975.
4. G.A. Almond and J.S. Coleman, The Politics of the Developing Areas, Princeton University Press, New Jersey, 1971.
5. G.A. Almond and G.B. Powell, Comparative Politics: A Developmental Approach, Ferrer and Simons, New York.
6. Lucian W.Pye and Sidney Verba, Political Culture and Political Development, Princeton University Press, New Jersey, 1972.
7. Shah, Ghanshyam, Social Movements in India: A Review of the Literature, Sage Publications. New Delhi, 1990.
8. Malik, S.C. (ed.) Indian Movements: Some Aspects of Dissent, Protest and Reform, IIAS, Simla, 1978.
9. Oommen, T.K. Protest and change: Studies in Social Movement, Sage Publications, New Delhi.
10. Rao, M.S.A. Social Movements and Social Transformation: A Study of Two Backward Classes Movement in India, Manohar. Publications, New Delhi, 1987.
11. G.A. Almond and G.B. Powell, Comparative Politics: A Development Approach, Boston: Free Press, 1966.
12. David Easton, Political System
13. Jean Rlunmdel, Comparative Politics: A Reader, New York, Free Press 1963.
14. W.T. Blum, Therories of Political Theory, New Delhi, prentice Hall 1981.
15. S.P. Varma, Modern Political Theory, New Delhi, Vikas Publishers, 1994.
16. D.D. Basu: 2010 Introduction to the Constitution of India.Lex is Nex is Butterworths Publications, Haryana

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FIRST SEMESTER SYLLABUS

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CORE – 103: PUBLIC POLICY

I. Public Policy

(a) Nature, Scope and importance

(b) Policy Analysis and Implications

II. Approaches to Public Policy

(a) Institutional Approach

(b) Incremental Approach

III. Major Stages involved in Policy – Making Process

(a) Policy formulation

(b) Policy implementation

IV. Strategies in Policy Making and Implementation

(a) Role of Bureaucracy & political parties in policy formulation

(b) Policy evaluation, techniques and approaches

Selected Readings:

1. Dye,Thomas R, Understanding Public Policy
2. Wool, Peter, Public Policy
3. Anderson, Thomas, Public Policy
4. Lasswell, Harold D, The Policy Sciences
5. Lasswell, Harold D, The Preview of Policy Sciences
6. Sharkansky, Era (Ed) , Policy Analysis in Political Science
7. Saxera, Pradeep, Public policy Administration and Development
8. Sapru, Public Policy
9. Ganapathi, R.S. (Ed), Public Policy and Policy Analysis in India.
10. *charles Lindblom the policy making process*

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FIRST SEMESTER SYLLABUS

Revised in 2018-2019

CORE –104: URBAN GOVERNANCE

UNIT - I

a) Meaning, Nature and Scope of Local Government.

b) Issues and Problems of Urbanization and Remedies.

UNIT - II

a) Structure and Functions of Urban Local Government.

b) Finances of Urban Local Government in India.

UNIT - III

a) Structure and Functions of Urban Development Authorities in A.P.

b) 74th Nagar Palika Constitutional Amendment Act, 1992.

UNIT - IV

a) Role of Political Parties in Urban Development

b) Problems of Autonomy and State Control, Urban – Challenges

Selected Readings:

1. S.R. Maheswari, Local Government in India.
2. S.K. Sharma and V.N. Chamla, Municipal Administration in India.
3. 74th Constitution Amendment act 1992.
4. A.P. Municipalities Act 74th constitution Andhra Act (Conformity Legislation 1994)
5. Avasthi (Ed) Municipal Administration in India.
6. T.N. Chatuvedi (Ed) Local Government
7. M.A. Muttalib (Ed) Theory and Practice of Local Government
8. M.A. Hussain, Urban Politics in India.
9. Abhijit Datta (Ed) Theory and Practice of Local Government.
10. United Nations Local Government Personnel System
11. Report of the Rural – Urban Relationship Committee 1966 (Khosal Committee Report)
12. National Commission or Urbanization 198 (Charles Corea Committee Report).

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FIRST SEMESTER SYLLABUS

Revised in 2018 -2019

CORE – 105: ADMINISTRATIVE THEORIES

UNIT I

a) Public Administration-meaning, Scope, Evolution & Significance of Public Administration

b) Classical Theory – Henry Fayol, Bureaucracy – Max Weber

UNIT I

a) Scientific Management – F.W.Taylor; Theory of Decision Making – Herbert Simon

b) Theories of Motivation – Maslow;

UNIT III

a) Ecology of Public Administration – Fred. Riggs

b) New Public Administration – Minnebrooke perspective

UNIT IV

a) New Public Management

b) Retreating State: The Future of Public Policy and Public Administration

Selected Readings:

1. Nicos P.Mouzelis Organization and Bureaucracy: An Analysis of Modern Theories (2nd edition), Routledge and Kegan Paul London, 1975.
2. D.Ravidra Prasad and P.Sadtyanarayana (ed). Administrative thinkers, sterling, New Delhi 1987.
3. Mohil bhattacharya, Public Administration, structure Process and Behaviour, world Press, Calcutta, 1987.
4. Susheela Kaushik (ed): Public Administration, structure Process and Behaviour, world press, Calcutta, 1987.
5. Albrow, M.Bureauvracy.
6. Dahl, Modrn Political analysis (Chapter 5).
7. Hersey and Blanchard, Management of organization Behaviour.
8. Ferrel Heady, Public Administration, Marcel Drekker Inc. New York, 1984.
9. Peter self, administrative Theories and Politics, george Allen & Unwin Ltd., London, 1977.
10. Thomas d. Lynch (ed) Organisation Theory and Management, Marcel Dekker Inc., 1983.
11. Mohit Bhattacharaya, New Horizons of Public Administration.
12. Sapru – Public Policy.

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DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

Common Course for M.A. Political Science and Public Administration

SECOND SEMESTER SYLLABUS

Revised in 2018 -2019

CORE – 201 INDIAN POLITICAL PROCESSES

Unit – I History Antecedents

a. Nation and Nationalist movement

b. Indian National Congress Gandhi and mass Politics

Unit –II Frame work of Politics

a) Indian constitution a) Major issues and concerns; major amendments and institutional developments.

b) New Frontiers of Civil Rights

Unit – III Major Policies and Governance

a) Agrarian Policies, Agrarian Change and Political Process

b) Welfare Policies, Anti-Poverty Programme, Reservation Policy

Unit – IV Political Process

a) Trends in party system

b) Emerging political movements: caste, communal regional and secessionist.

Selected Readings:

1. Bipin Chandra "Colonialism Stages of Colonialism and Colonial State" journal Contemporary Asia, Vol. 10, No. 3, 1980
2. Jairus Banall "Theiry of colonial Mode of Production". EPW 23 December 1972
3. Irfan Bashib "Colonialist of Indian economy" 1957 social Scientist, 1973
4. Hamze Alavi, "India and colonial Mode of production" Special Number, August, 1976
5. Rajat Ray: Three Interpretation of Indian Nationalism," in BR. Nanda and VC. Joshi (ad), Studies in Modern History, Bombay orient Longman, 1972.
6. Sudipta Kaviraj : On the construction of Colonial Power Structure, discourse Hegemony Occasional Paper – Teen Murti.
7. B.R. Nanda Mahatma Gandhi, A Biography, Delhi, Oxford University press 1958
8. Granville Austin, India's constitutions – Corner Stone of a Nation, Bombay Oxford Press 1991
9. Rudolph & Rudolph: inPursuit of Lakshmi: the Political Economy of the Indian State, Bombay Orient Longman, 1987.
10. Achin Vanaik: The Painful Transition, Dourgeoisic Democracy in India, London Verso, 1990.
11. Atul Kohli: Democracy and Descontent India's Growing Crisis of Governability Cambridge, Cambridge University Press, 1991
12. Atul Kohli (ed.) India Democracy: An Analysis of changing State –Society Relations, Hyderbad, Orient Longman, 1991.
13. Rajani Kothan, Politics in India, New Delhi, Orient Longman, 1970.
14. Rajani Kothari (ed.) Cast in Indian Politics, Hyderabad, Orient Longman, 1970, P 386.
15. Francine Frankel – India's Political Economy 1947-77. The Gradual Revolt, Delhi, Oxford University Press, 1978.
16. Francine Frnakel, India's green Revolution, Princeton University Press.
17. Sukhamoy Chakravarty : Development Planning : The Indian Experience, Oxford, Clarenden 1987.
18. Anthony G.wilhelm: 2004 Digital Nation : Towards an Inclusive Information society: The MLT LondonPress

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SECOND SEMESTER SYLLABUS

Revised in 2018

CORE – 202 POLITICAL SOCIOLOGY

Unit – I

a) Meaning, Nature and scope of Political Sociology

b) Political Sociology and other social sciences

Unit –II

a) Approaches to the study of Political sociology

b) Development and Characteristics of Indian Social Institutions and their Political Dimensions.

Unit – III

a) Social asymmetries and Politics in India.

b) Social stratification–caste and class: ethnic, Communal, Language and regional Differentiations.

Unit – IV

a) Political Socializations – Agents and stages of Socializations

b) Political communications – Leadership.: Society, State and Politics in contemporary India.

Selected Readings:

1. K. Mukhopadyay: Political Sociology
2. Ashraf and Sharma : Political Sociology
3. Anil Bhatt: Caste, and Politicas
4. Andrew Effrat: Perspective in Political Sociology.
5. Rajani Kothari (ed.): Caste in Indian Politics.
6. Rudolph & Rudolph : The Modernity of Traditions : Political Development in India.
7. M.N. Srinivas : ;Social Change in Modern India
8. Akhter majiee, Regionalism and Development Tension in India.
9. A.R. Desai : Recent Treads in National India.
10. Anil Bhatt : Development and Social Justice.
11. Human : Political Socialization
12. Rajani Kothari : State and Nation – Building.

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SECOND SEMESTER SYLLABUS

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CORE – 203: POLITICS IN ANDHRA PRADESH

Unit-I

(a) Evolution of Andhra Pradesh

(b) Separatists movement

Unit-II

(a) A.P Reorganization Act 2014

(b) Bifurcation of Andhra Pradesh and its consequences

Unit-III

(a) Green Revolution

(b) A.P Industrial Policy

Unit-IV

(a) Anti-Liquor Movement

(b) Recent trends in Andhra Pradesh Politics

Selected Readings:

1. Iqbal Narayan (ed) State Politics in India, Meenakshi Meerut, Meerut, 1967.
2. M. Weiner (ed) State Politics in India, Princeton University Press, New Jersy, 1976.
3. B.L. Faida, State Politics in India (2 Vol.), Radiant, Delhi, 1984.
4. B.L. Faida, Sarkaria Commission Report and Centre – State Relations. Agra
5. J.R. Wood (ed) State Politics in Contemporary India : Crisis or Continuity ? Westview Press, Boulder, 1984.
6. RamReddy and Sharma, BAV, State government and Politics in Andhra Pradesh
7. Prasanna Kumar, Government and Politics in Andhra Pradesh
8. Narayana Rao, K.V. Emergence of Andhra Pradesh
9. Rajani Kotari, Caste Politics in India.
10. S.R. Maheswari, State Governments in India, Macmillan, Delhi, 1979.

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Common Course for M.A. Political Science and Public Administration

II SEMESTER SYLLABUS

Revised in 2018-2019

CORE – 204:COMPARATIVE LOCAL GOVERNMENTS

Unit – I

a) Local Government: Meaning Nature, Scope and Significance

b) Decentralization and devolution - hurdles for Decentralization, Concept Democratic Decentralization

Unit –II English Local Governments

a) Local Government in England Evolution and recent Trends.

b) The Mayor of the greater London council, Powers and functions

Unit – III American Local Government

a) Local Government in USA – Evolution and recent trends.

b)

b) Weak Mayor and Strong Mayor – Patterns

Unit – IV Indian Local Government.

a) Local Government in India – Evolution and recent trends – 73rd and 74th Constitutional Amendments

b) Issues in Local governance – U.K.,U.S.A. India

Selected Readings:

1. Herman Finer, English Local Government.
2. Mard John & Finer S.E., Local government in England & Wales.
3. Peter Richards, The New Local Government System
4. Lord Radcliffe, English Local Government reforms.
5. M.A. Muttalib (ed). Theory and Practice of Local Government.
6. S.R. Nigam, Local Governments in the West.
7. S.R. Maheswari, Local Government in India.
8. Robjan, W.A. Great Cities f the World.
9. Aldufu H.F. American Local Government and Administration.
10. Fisher M.J., & Bi, Hop, American Local Government.

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SECOND SEMESTER SYLLABUS

Revised in 2018-2019

CORE – 205: INDIAN STATE AND ADMINISTRATION

UNIT – I judiciary

a) High court composition powers and functions.

b) Supreme Court of India, Composition Powers & functions, Judicial Review of Supreme Court and Writs.

UNIT – II Central Administration - Political

a) The President & Vice President

b) The Prime Minister – The Cabinet

UNIT – III Central Administration - Executive

a) The Central Secretariat

b) The Cabinet Secretariat – The Prime Minister's Office

UNIT – IV Planning in India

a) National Institutions for Transforming India NITI Aayog

b) Contemporary Issues in Indian Administration – Generalist vs. Specialist : Corruption in Administration; The Role of Institutions of Lokpal and Lokayukta.

Selected Readings:

1. B.B. Misra, The bureaucracy in India (An Historical analysis of Development up 1947) Oxford.
2. A. Avasthi, Central Administration, Tata Mc-Graw-Hill
3. Benerjea, Public Administration in ancient India.
4. Haridwar Rai and S.P. Singh, Current Ideas and Issues in Indian Administration.
5. B.N. Puri, History of Indian Administration, Vol.1 and 2.
6. O.P. Diwvedi, India's Administrative Stage
7. Strachey, India: Its Administration and Progress.
8. Yasin, Indian Administration.
9. Eric Stokes – The English Utilitarians in India, Oxford.
10. Majimdar. R (e tal.,), An Advanced History of India, Macmillian, New York, 1967.
11. Mahajan V.D., Constitutional History of India, S.Chand, New Delhi, 1956.
12. Pyle M.V. Constitutional Government in India, S.Chand, New Delhi, 1984.
13. Kapur, AC Select Constitutions, S.Chand, New Delhi, 1970.
14. Basu, DD Introduction to the Constitution of India, Printice hall of India, New Delhi, 1985
15. Ashok Chanda, Indian Administration, Allen and Unuri, London, 1967.
16. Avasthi, A Central Administration, Tata Mc Graw Hill, New Delhi, 1980.
17. Maheswari, S.R. Indian Administration, Orient Longman. New Delhi, 1986.
18. Khera, SS The Central Executive, Orient Longman. New Delhi, 1976.
19. Pranjape, Hik the Recorganized Planning Commission a Study in the Implementation of Administrative Reforms, II PA, New Delhi, 1970.

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SECOND SEMESTER SYLLABUS

Non-Core Paper: Indian Administration

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UNIT I

a) Constituent Assembly salient features of Indian Constitution

b) Fundamental Rights-Fundamental Duties-Directive principles of State Policy

UNIT I

a) President-Vice-President-Prime Minister

b) Parliament of India-Composition-Powers and Functions

c) Supreme Court-Composition, Powers & Functions

UNIT III

a) Governor-Chief Minister

b) State Legislative Assembly-Legislative Council-High Court

c) Union State relations-Recommendations of Sarkaria Commission

S**UNIT IV**

a) Election Commission-Electoral Reforms

b) Structure of Local Governments-73rd and 74th Amendment Acts.

Selected Readings:-

1. Introduction to the Constitution of India-D.D.Basu
2. Indian Government and Politics- S.S. Awasti
3. Indian Constitution - Pylee
4. Politics in India- Rajini Kotari
5. Constitutional Questions in India, The President, Parliament and States-A.G. Noorani
6. India Public Administration –Rajani Goel & R.K. Arore

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THIRD SEMESTER SYLLABUS

Revised in 2018 -2019

CORE – 301: HUMAN RESOURCE MANAGEMENT

Unit – I

a)Evolution:Meaning,Nature,Scope Significance of HRM

b) Man Power Planning

Unit –II

a) Recruitment – Direct and Indirect

b) Civil Services in India – UPSC and APPSC

Unit – III

a) Morale and Motivation

b) Performance Appraisal : Process and Methods of Performance Appraisal

Unit – IV

a) Employee Benefits – Salary Management – Welfare schemes

b) Human Resource Management and Industrial Relations: Globalization – New challenges of HRM, Human resource Audit

Selected Readings:

1. Monappa, Arun and Sayadain, Morza, Personnel Management, Tata mcgraw Hill pub. Comp. Ltd.
2. Venkataratnam, C.S.and Shirvastav, Personnel management, Tata mcgraw Hill pub. Comp. Ltd.
3. Aswathappa; K.Human Resource and Personnel management and Human Resources, Tata mcgraw Hill pub. Comp. Ltd.
4. Dwivedi, R.S. Managing Human Resource, Galgotai publishing Comp. Ltd. New Delhi.
5. Ajihiesh, K.B. and Nagaraj, D.R. (ed.) Human resource Management and Industrial Relations, Himalaya publishing house, Mumbai.
6. Subba Rao, P.Essentials of Human resource Management an Industrial Relations, Himialya Publishing house, Mumbai.
7. Sharan P. Modern, Public Administration, Lakshmi Narayana, Agra, 1982.
8. Shara,, P.Modern Public Administration, Meenaksh prakashan, New Delhi, 1981.

   Mattalib, M.A. UPSC.

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DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

Common Course for M.A. Political Science and Public Administration

THIRD SEMESTER SYLLABUS

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CORE – 302: FINANCIAL ADMINISTRATION

Unit-I

a) Nature – Scope and Importance of Financial Administration

b) Budget – Meaning – Principles

Unit-II

a) Budget – Preparation – Enactment - Execution

b) Ministry of Finance – Organization and Functions

Unit-III

a) GST-Merits and Demerits CAGI – Powers and Functions

b) Financial Committees of Indian Parliament

Unit-IV

a) Centre – State Financial Relations – Finance Commission

b) RBI Powers and Functions

Selected Readings:

1. MJK Thavaraj, Financial Management of Government
2. Gupta BN, Government Budgeting
3. Agarwal R.N., Financial Committees & Indian Parliament
4. Lal G.S., Financial Administration in India
5. Premchand.A., Control of Public Expenditure in India
6. II PA, Financial Administration
7. Bunkhead. J, Government Budgeting
8. ARC, Reports of Financial Administration
9. Ramesh K.Arora &Rajani Goyal , Indian Public Administration, Viswa prakasan, New Delhi, 1996.
10. Gupta Dc., Indian Government & Politics, New Delhi, 1978.
11. Das Bc, The President of India, Schand, New Delhi, 1978.
12. Maheswari, S.R., The ARC, Lakshminarayan Agarwal.

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CORE – 303: INTERNATIONAL RELATIONS

I. History

a) Nature scope, and growth of International Relations

b) Idealistic and realistic approaches in international relations

II. Cold War

a) United States / Soviet Union Rivalry with Reference to Europe / Asia / Latin America.

b) Nonalignment and International Relations.

III. Changing Trends in International Relations

a) Globalization

b) Foreign Policy

IV. Concepts - I

a) National Power, Capacity; Understanding Geopolitics, Balance of Power

b) Security / Collective Security – State System and Non-State Actors; Society of States and System of States.

Selected Readings:

1. Ahuja, Kanta, Huup Coppens and Herman van der Wusten (eds.) *Regime Transformation and World Realignment, New Delhi, SAGE, 1993.*
2. Bajpai, Kanti and Shukul Hariss (eds.) *Interpreting World Politics, New Delhi, SAGE, 1995.*
3. Bruce L. Sanders and Duraban Alanc, *Contemporary International Politics Introductory Readings, New York, John Wiley, 1971.*
4. Bull, Hedley and Adam Watsom, The Expansion of the Internal Society, Oxford, Clarendon Press, 1984.
5. Buzan, Barry, People, States and Fear, Sussex Wheat Sheaf Books, 1983.
6. Calvocoressi, World Politics, New Work, Longman, 1982.
7. Carr, EH. The Twenty Years Crises 1919-1939, London, Macmillan, 1981.
8. Giddens, Anthony, *The Third Way, Cambridge, Polity Press, 1998.*
9. Halliday, Fred, *Making of the Second Cold War,* London, Verso, 1989.
10. Halliday, Fred, Rethinking International Relations, London, Macmillan, 1994.
11. Harshe, Rajen, Twentieth Century Imperialism, New Delhi, SAGE, 1997.
12. Malhotra V. Kuman, International Relations, New Delhi, Anmol, 1993.
13. Mayall, James, Nationalism and International Society, Cambridge, Cambridge University Press, 1990.
14. Mishra, K.P., (ed.) Non-Alignment – Frontiers and Dynamics, New Delhi, Vikas, 1982.
15. Rahman, MM. The Politics of Non-alignment, New Delhi, Associated Publishing House, 1969.
    Rajan, M.S., Non-alignment: India and the future, Mysore, University of Mysore, 1970

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THIRD SEMESTER SYLLABUS

Revised in 2018-2019

CORE – 304: RURAL GOVERNANCE

UNIT – I

a) Meaning, Nature, Scope and importance of Rural Development

b) Empowerment of Rural Women

UNIT – II

a) Panchayati Raj System and Rural Development

b) Services for Rural Development - Integrated Rural Development Programmes

Rural Housing, Rural Health, Drinking Water Sanitation, Rural Education

UNIT – III

a) Democratic decentralization – Salient Features of 73rd Amendment

b) District Rural Development Agency (DRDA)

UNIT – IV

A) Societal Programme for Rural Development

b) Concept and causes of poverty, dimensions and impact on rural development.

Selected Readings:

1. Ramesh K. Arora : Peoples participation in Development Process.
2. PR. Dhubasi : Rural Development Administration.
3. SC. Jain : Community Development and Panchayat Raj
4. Pai Panandikar : Development Administration in India.
5. N. Chandrababu Naidu, Peoples agenda Janmabhoomi.
6. B. Ramulu : Administration of Anti – Poverty Programmes.
7. NIRD : Emerging Institution for Decentralized Rural Development 'Vol. I, II.
8. NIRD : India Panchayathi Raj Report – 2001 ' Vol. I.II.
9. Bajpai : Panchayati Raj and Rural Development.
10. S.N. Mishra : Rural Development and Panchayati Raj.
11. D. Thakur : Rural Development and planning in India.

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DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

Common Course for M.A. Political Science and Public Administration

THIRD SEMESTER SYLLABUS

Revised in 2018 -2019

CORE – 305: RESEARCH METHODOLOGY

Unit-I

a) Meaning, Scope and importance of Social Science Research

b) Scientific Method – Limitations

Unit-II

a) Hypothesis – Sources and Methods

b) Formulation of Research Design what is knowledge (Epistemology & ontology)

Unit-III

a) Methods of Sampling and Limitations: Random Sampling, Stratified Sampling, Quota Sampling, purposive sampling, Multi – Stage sampling

b) Case Study Method – Characteristics limitations

Unit-IV

a) Data Collection – Tools, Techniques Processing and analysis – Use of Computers

b) Report writing and Thesis writing

Selected Readings:

1. Gerald Hursh – Cesar and pradipto Rou : Third World War Surveys : Survey Research in Developing Nations.
2. Kerliger, F.N : Foundation of Behavioral Research, 1973 :
3. R.B. Jain : "Research methods in Public Administration : A Critical survey of important works in Historical and Comparative Methodology" The Indian Journal of Public Administration, Oct-Dec., 1971.
4. Goode and Hatt : Methods in Social Research
5. Young, P.V. Scientific Social Surveys and Research
6. Krishna Swamy O.R. : Methodology of Research in Social Sciences
7. Agnihothri and Vidhyadhar : Techniques of Social Research
8. H.J. Rubin : Applied Social Research
9. B. Smith : Political Research Methods
10. J. Doby : An Introduction to Social research
11. Komhausu : Questionnaire construction and interview procedure
12. J.Selitz : Research method in Social Research
13. B.A.V. Sharma & D. Ravindra Prasad : Research Methods in Social Sciences.
14. MS Office: Word, Power Point.

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THIRD SEMESTER SYLLABUS

Non-Core Paper: Political Thought of Dr. B.R.Ambedkar
Revised in 2018-2019

Objectives: This course aims at training the students to study one political thinker in depth. It also expects students to know the anti-caste thinking on Indian context. The course is also expected to relate the thinking of Dr. B.R. Ambedkar to contemporary problems.

Unit I

1. Indian Society: Socio, Political Perspectives
2. Critique of Indian Nationalism

Unit II

3. Interpretation and critique of Caste System
4. Interpretation of Buddhism

Unit III

5. Constitutional Democracy
6. Reservation Policy

Unit IV

7. Theorizing Dalit Movement
8. The Emergence of Dalits in Political Power

Selected Readings:

1. Gore M.S. 1993, Socuial context of an Ideology: Political and Social Thought of Dr. Ambedkar, New Delhi, Sege
2. Jafferelot Christophe 2004, Dr. Ambedkar and Untouchability, New Delhi, Permanent Black
3. Kasabe Raosaheb, 1985, Ambedkar ani Marx, Pune, Sugava prakashan
4. Omvedt Gail, 2004, Ambedkar: Towards an Enlightend India, New Delhi, Penguin
5. Omvedt Gail, 2003, 'Buddhism in India' , New Delhi, SAGE
6. Omvedt Gail,1994, 'Dalits and the Democratic Revolution in Colonial India', New Delhi, Sage
7. Rodrigues Valerian, (ed.), 2002, The Essential itings of B.R.Ambedkar, New Delhi, OUP
8. P.Kesava Kumar, 2014, Plitical Philosophy of Ambedkar Kalpaz Publication, New Delhi
9. Badri narayan:2014, Kanshiram, Leader of the Dalits ,London, Pengvin Books India Pot Ltd
10. Surinders J. Jodhkar:2012Caste, New Delhi, Ootid Univertiy Pera
11. B.R. Ambedkar Volumes
12. Valerian Rodrigves, 2008 Dalit-Bahryan Discourse in Muderu India, New Delhi critical event publication
13. Piyasena Dissanayake:2009 Elementary Aspects of Biddeit Political Theory New Delhi, Critical Quest
14. B.R. Ambedkar; 2004 conversion as Emancipatio: Critical Quest publication.
15. Sauda Aruna:2015 Ambedkar Varna Nirmulana-Annihilation of caste (Philosophy of Castedemocracy), Chennai saibonds Print System
16. Rahul Govind: 2018: Ambedkars Lessions, Ambedkars Challenges: Hinduism, Hindutva and the Indian Nation & PW, January 27,2018, Vol, VIII No.4

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DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

Common Course for M.A. Political Science and Public Administration

FORTH SEMESTER SYLLABUS

Revised in 2018-2019

CORE – 401 ORGANIZATIONAL BEHAVIOUR

Unit – I

a) Organizational Behavior – Meaning and Concept

b) Approaches – Models – Global Scenario

Unit –II

a) Individual Behavior – Personality, Learning, Attitudes, Perception, Ability – Their Relevance to Organizational Behavior

b) Group Behavior – Group dynamics, Group norms, Group Cohesiveness – Their relevance to Organizational Behavior.

Unit – III

a) Leadership –Qualities ,Styles & Approaches

b) Organization Communication – Meaning, Process, Barriers, Methods to reduce barriers , Principles of effective Communication.

Unit – IV

a) Organizational Change – Nature of Change, Levels of change, Approaches for Managing - Organizational change.

b) Organizational Development – Process and Interventions

Selected Readings:

1. Fred Luthans, organizational Behaviors, Mc Graw Hill Book., 1995
2. Stephen P. Robbins, Organizational Behavior, Prentice Hall, 1997
3. Keith Davis, Human Behavior at work, Mc Graw Hill book Co., 1991
4. Gregory Moorehead and R.S. Griffin, Organizational Behavior – Managing People and Organizations.
5. Judith R. Gorden, A Diagnostic Approach to Organizational Behavior, Allyan & Becaon, 1993.
6. Korean, Abraham K. Organizational Behavior, Prentic Hall of India Pvt., Ltd., New Delhi.

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DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

Common Course for M.A. Political Science and Public Administration

FOURTH SEMESTER SYLLABUS

Revised in 2018 -2019

CORE – 402: INDUSTRIAL RELATIONS

Unit – I

a) Industrial Relations – Concept, Definition, Significance, Objectives, Scope, Approaches, Principles of Good Industrial Relations, Role of State, Employers and the Unions in Industrial Relations.

b) Labour and the Constitution – Constitutional Frame work, Fundamental Rights and Directive Principles of State Policy in Labour, Relevant Legal Enactments.

Unit – II

a) Trade Unionism and Industrial Relations – Labour Movement, Concepts, trade Union Movement, development of Trade Unionism in India, Functions and Problems of Trade Unions.

b) World Federation of Trade unions (WFTC), International Labour Organizations (ILO),Origin, History, Objectives and Functions.

Unit – III

a) Industrial Conflict – Causes, Trends Manifestations and Effects. Methods and Machinery for Settlement of Industrial disputes In India.

b) Employee Discipline – Definition, Causes of Indiscipline, Code of Discipline, Disciplinary Procedure, Code of Conduct; Grievance Handling – Meaning of Grievances, Causes of Grievances, Guidelines for Grievance Handling, Grievances Rederssal Procedures.

Unit – IV

a) Worker's Participation in Management – Meaning, Significance, Forms, Situation in India

Collective Bargaining; Meaning, Significance, Principles, Process.

b) Wage Administration and Industrial Relations – Wage Policy, Objective, Wage Regulation

Machinery, Wage Board; Growth and Development, Composition and Functions, Evaluation of Wage Boards.

Selected Readings:

1. Bhagoliwar T.N. Personnel Management and Industrial Relations, Agra Publishers, Agra.
2. Arun Monappa, Industrial Relations, Tata Mc Graw Hill, New Delhi.
3. Michael VP, HRM and Human Relations, Himalaya Books House, Mumbai.
4. Ratan Sen, Industrial Relations, Macmillan, New Delhi.
5. Jermo Joseph, Industrial Relations, Response Books, New Delhi.
6. Sharma, A.M., Industrial Relations, Conceptual and Legal Frame Work, Himalaya Publishing house, Mumbai.
7. Verma, Pramod, Management of Industrial Relations, Oxford 71BHPub.Co., New Delhi.
8. Venkataratnam, C.S. (Ed.), Industrial Relations in India States, Global Business Press, New Delhi.
9. Sinha P.R.N.et.al., Industrial Relations, Trade Unions and Labour Legislation, Pearson, New Delhi.
10. Sivananthiran, A., Venkatratnam C.S. Prevention and Settlement of Disputes in India – ILO.
11. Sivananthiran, A. Venkatratnam C.S. Social Diologue – ILO.

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DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

Common Course for M.A. Political Science and Public Administration

FOURTH SEMESTER SYLLABUS

Revised in 2018 -2019

CORE – 403: PUBLIC RELATIONS

Unit-I

(a) Definition: Nature, Elements, Functions and Process of Public Relations

(b) Origin and Growth of Public Relations

Unit-II

(a) Organization of PR Department Qualities and Functions of PRO,

(b) Media Relations

Unit-III

(a) Media relations, Press Conference, Press Briefings, press Tours Exhibitions open days, special Events Media classification, crisis Management, Traditional Media

(b) Corporate PR-organizational Structure, Planning, and image.

Unit-IV

a) Corporate P.R. Strategies and Media Relations.

b) Ethics in Public Relations.

Selected Readings:

1. Cutlip & Centre "Effective Public Relations"
2. Reddy, Narasimha, "How to be a Good PRO"
3. Lesley Philip "Public Relations hand book", Lesley's Public Relations Hand Book"
4. Black, Sam, "Practical Public Relations"
5. Robert D Ross, "The Management of Public Relations"
6. Philip J Kitchen, " Public Relations – Principles & Practice"
7. Robert L Dilenschneider, "The Dartnell Public Relations Hand Book"
8. Sam Black, "Practical Public Relations"

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DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

Common Course for M.A. Political Science and Public Administration

FOURTH SEMESTER SYLLABUS

Revised in 2018-2019

CORE – 404: MANAGEMENT TECHNIQUES

UNIT – I

a) Organization and Methods

b) Define Supervision and explain its functions, duties, qualities, elements of Supervision.

UNIT – II

a) Work Study, Method Study

b) Work Simplication and Work Measurement

UNIT – III

a) Management by Objectives

b) Training and employment under personnel management

UNIT – IV

a) Operational Research

b) Steps & benefits of Carrier development plan- HRM and Employee

Selected Readings:

1. Business Environment, K. Aswathappa.
2. Business Environment , Francis Chernullian.
3. Industrial Engineering, O.P. Khanna.
4. Management, Harold Koontz, Cyril O' Donnell.
5. Management Information Systems, Gordon B. Devis, Margrethe H.Olson.
6. Management Information Systems, Waman S Jawadekar
7. Operational Research, S.D. Sharma
8. Operational Research, Hamdy A. Taha
9. Operational Research, C.K.Mustafi
10. Organizational Behavior, L.M. Prasad
11. Organizational Behavior, K. Aswathappa.
12. Organizational Behavior, Fred Luthans.
13. Production & Operations Management, K. Aswathappa.

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Common Course for M.A. Political Science and Public Administration
FOURTH SEMESTER SYLLABUS

Revised in 2018-2019

CORE – 405(a) GOOD GOVERNANCE AND INFORMATION TECHNOLOGY

Unit-I Concepts of Governance

(1) E-Governance - Philosophy of Technology –

Accountability:Social Dimension - Good Governance

(2) IOT- (Internet of Things) - Machine Learning Based Solution - E-Judiciary

Unit-II

(1) Information Revolution: Strategic Restructuring Governance

(2) IT Policies

Unit-III

(1) Data-Governance

(2) Digital Divide

Unit-IV

(1) Issues and Challenges in E - Governance caused by Privacy Threats

(2) Digital Democracy: Digitalizing the Future

Selected Readings:

1. Anthony G. Wilhelm: 2004: Digital Nation towards an inclusive information Society: The MIT press London.
2. Ernert J Wilron III : 2004: The Information Revolution and Developing Countries, MIT Press, London.
3. T.M. Vinod Kumar ed, 2017, E- Governance for smart Cities, Springer Publication
4. T.M. Vinod Kumar ed, 2014, E- Governance for smart Cities, Springer Publication
5. Gilardi, Fabrizio: 2016 Digital Democracy
6. Van Dij K J A GM 2014 Digital Democracy Vision & Reality: Public Administration in the information Age
7. Gil de Zuniga, Homero (ed) 2010 Digital Democracy" Reimaging pathways to Political participation : journal of information Technology X Politics
8. Simon Julie (ed) 2017 Digital Democracy
9. Ashwani Saith, M Vijay Baskar 2005 ICTS and Indian Economic Development
10. M. P Gupta, 2004 Promise of E-Governance operational challenges Tata MC Graw Hill Publishing Company Ltd. New Delhi
11. World Bank: Websites on Governance, E-Governance & Internet etc.
12. Roger Browsword, Eloise Scotford,Karen Yeung: 2016 The Oxford Handbook of Law Regulation and13.Technology: Oxford Publication, London
13. Mohit Bhatta charya 2012 Public Administration : New Issues and Perspectives jawahar Publishers Distributions, New Delhi
14. Francesco Contini Giovan Francesco:2008 ICT and innovation in the Public sector : European studies in the making of E – Government:Palgrave publication
15. Charalambos, Vrasidas,Michalinos zembylas : 2009 ; ICT for Education , Development and Social Justice: Current Perspectives on Applied Information Technologies Information Age Publishing

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DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

FOURTH SEMESTER SYLLABUS (Revised in 2018-2019)

Elective Paper

CORE-405 (b) : HUMAN RIGHTS IN INDIA

Unit - 1

1. Philosophical Foundations of Morality and State.
   (Liberal, Marxist and Humanist Perspective)
2. Human Rights and World order.

Unit - II

1.Fundamental Rights (1st generation rights)
and Cultural Rights (3rd generation rights/munity)
2. Directive Principles of State icy (2nd generation) .

Unit - III

1. Political and Legal
2. Socio-Economic disparities and Terrorism

Unit - IV

1. Complaints, Investigations, Commissions and Judicial Acts
2. Children, Women, Old, Disabled, Professional Victims, Socially and Economically Deprived

BOOKS:

1. H.O. Aggarwal : Human Rights (3rd edition) Central Law Publications, Allahabad, 2000
2. G. Haragopal : Political Economy of Human Rights, Emerging Dimensions (Himalaya Publishing House, New Delhi, 1977)
3. Sir Francis Uallat : An Introduction to the study of Human Rights (Europa Publications, London, 1972)
4. Tim Dunne & Nichlas Press, J. Wheeler : Human Rights in Global Politics (Cambridge University Cambridge, 1999)
5. : Human Rights, The task before US (International Federation of Universal Women, London, 1951)
6. R.V.R. Chandrasekhara Rao : Human Rights for whom? A perspective on Human Rights Discourse in perspectives on Indian Development

YOGI VEMANA UNIVERSITY

DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

FOURTH SEMESTER SYLLABUS - Revised in 2018-2019

Elective Paper

CORE:405 (c):SOCIAL WELFARE ADMINISTRATION

Unit-I

1. Social Welfare – Concept and Philosophy
2. A Brief History of Welfare and Development

Unit-II

1. Welfare Schemes for Women and Programmes Relating to SC, ST and BCs
2. Social Welfare Constitutional Provisions

Unit-III

1. Social Welfare Policy of the Union and the State Government
2. Central and State Social Welfare Boards

Unit-IV

1. Central Social Welfare Board: Composition Powers and Functions
2. *Role of Non*-Governmental Organizations in Socio-Economic Development and Problems in Implementation of Social Welfare Programmes.

Suggested Readings:

1) Sachdeva, D.R. (2004). Social Welfare Administration (English and Hindi), Kitab Mahal, Allahabad.
2) Davis C.March. (1965). An Introduction to Social Administration, Routledge and Kegan Paul, London.
3) Kulkarni, P.D. (1961). Centre Social Welfare Board, Asia Publishing House, New Delhi.
4) Jaganadhan, V. (1966). Social Welfare Organisation, IIPA, New Delhi.
5) Paul Chowdary, D. (1979). Social Welfare Administration, Atma Ram & Sons, New Delhi.
6) Goel, S.L. and R.K.Jain (1988). Social Welfare Administrational, Deep & Deep, New Delhi.
7) Chaturvedi, T.N. and S.K.Chandra (1980). Social Administration
Development and Change, IIPA, New Delhi.
8) Chowdhary, D.P. (1992). Social Welfare Administration, Atma Ram & Sons, Delhi.
9) Mohinder Singh (ed)(1996). Social Policy and Administration in India, M.D. Publications Pvt.Ltd., New Delhi
10) Surendra Kataria (2002). Social Administration, RBSA Publishers, SMS High Way, Jhaipur

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FOURTH SEMESTER SYLLABUS - Revised in 2018-2019

Elective Paper

CORE-405 (d):DISASTER MANAGEMENT

Unit-I

1. Meaning, Objectives and Importance of Disaster Management.
2. Effectiveness of Disaster Management

Unit-II

1. Tools, Techniques and Theories of Disaster Management
2. Types and Effects of Disaster Management (Drought, Earthquake, Natural Calamities, Rehabilitation, Displacement and Communal Riots).

Unit-III

1. Manmade Disaster – Bhopal Disaster.
2. Safety Provisions at Indian Nuclear Plant, Accidental Explosives and Management of Emergencies.

Unit-IV

1. Risk and Causality Management, Role of Red Cross Society, Armed Forces, Panchayati Raj, NGOs and ICT in Disaster Management.
2. Resource Mobilization and Peoples Participation for Effective Disaster Management

Suggested Readings:

1) Parasuraman: India Disaster Report.
2) Bhattacharya: Environmental Economics.
3) Ram Prakash: Disaster Management.
4) Mollinga : Integrated Water Resource Management
5) Narayana: Disaster Management.
6) NRam Mohan Prakash, (2014) Risk Management and Insurance, Students Helpline Publishers Pvt Ltd, Hyderabad.

YOGI VEMANA UNIVERSITY

DEPARTMENT OF POLITICAL SCIENCE & PUBLIC ADMINISTRATION

FOURTH SEMESTER SYLLABUS - Revised in 2018-2019

Elective Paper

CORE-405(e):OFFICE ADMINISTRATION

Unit-I:

1. Nature, Scope and Importance of Office Management
2. Basic Principles of Office Organization

Unit-II:

1. Office Planning and Lay out of Office Management.
2. Office Equipment and Office Services

Unit-III:

1.Filling System, Record Management, 0ffice Communication and Correspondence
2. Office Supervision , Office Stationary, Training and Staff Welfare

Unit-IV:

1. O & M –Work Study, Work simplification and Work Measurement.
2. Office Management in Government- Some Issues.

Suggested Reading

1) V.SP.Rao &P.S Narayana- TextBook of Office Management,Tata Mc Graw Hill New Delhi,1937
2) J.C.Denyer - Office Organisation & Management, Principle and Practice, S.Chand &Sons, New Delhi, 1990.
3) S.R.Chunwalla - Management R.Srinivasan Principles and Practice.
4) Terry and Franklen - Principles of Management
5) S.L.Goel - Modern Management Techniques
6) H.Koontz & O.Donnel - Essentials of Management
7) Z.K.Quible - Introduction to Administration Office Management
8) S.P.Arora - Office Organization and Management, Vikas Publishing House, New Delhi, 1982.
9) Aswathappa & Shridhara Bhat.K- Office Management
10) George R.Terry - Office Management & Control
11) Jonson and Savage - Administrative Office Management
12) P.N.Reddy and H.P.Appanaich -Office Organisation and Management, Himalaya Publishing House, New Delhi, 1990.
13) B.Sudeer & M Mohan, (2014) Management Information System, Students Helpline Publishers Pvt Ltd, Hyderabad

M.Sc. DEGREE

IN

MATERIALS SCIENCE AND NANOTECHNOLOGY

CHOICE BASED CREDIT SYSTEM

(Effective from the Academic Year 2017-2018)

DEPARTMENT OF MATERIALS SCIENCE AND NANOTECHNOLOGY

YOGIVEMANA UNIVERSITY,

KADAPA – 516 005, ANDHRA PRADESH, INDIA

September - 2018

COURSE STRUCTURE AND EXAMINATION SCHEME

Semester	Course code	Title of the Course	No. of credits	No. of hours per week	Max. Marks 100	
					Internal Assessment	End Exams
SEMESTER I	MSNT 101	Classical and Statistical Mechanics	04	04	25	75
	MSNT 102	Concepts in Materials Science	04	04	25	75
	MSNT 103	Fundamentals of Chemistry	04	04	25	75
	MSNT 104	Polymeric Materials	04	04	25	75
	MSNT 105	Practical - I Physical Chemistry	04	12	25	75
	MSNT 106	Practical-II Inorganic Chemistry	04	12	25	75
SEMESTER II	MSNT 201	Quantum Mechanics	04	04	25	75
	MSNT 202	Properties of Bulk and Nanomaterials - I	04	04	25	75
	MSNT 203	Polymeric Processing, Composites and Heat Resistance Polymers	04	04	25	75
	MSNT 204	Introduction to Nanoscience and Synthesis of Nanomaterials	04	04	25	75
	MSNT 205	Practical - I Polymer Material Lab	04	12	25	75
	MSNT 206	Practical-II Study of Properties of Materials	04	12	25	75
	MSNT 207	***Non-Core: Concepts of Nanomaterials***	***04***	***04***	***25***	***75***
SEMESTER III	MSNT 301	Characterization Techniques	04	04	25	75
	MSNT 302	Semiconductors and Devices	04	04	25	75
	MSNT 303	Alloys and Paints	04	04	25	75
	MSNT 304	Nanocatalysis and its Applications	04	04	25	75
	MSNT 305	Practical - I Nanocatalysis Lab	04	12	25	75
	MSNT 306	Practical- II Semiconductors Lab	04	12	25	75
	MSNT 307	***Non-Core: Characterization Techniques and Applications of Nanomaterials***	***04***	***04***	***25***	***75***
SEMESTER IV	MSNT 401	Advanced Characterization Techniques	04	04	25	75
	MSNT 402	Properties of Bulk and Nanomaterials – II	04	04	25	75
	MSNT 403	Applications of Nanomaterials and Nanotechnology	04	04	25	75
	MSNT 404	Energy Conversion Technologies	04	04	25	75
	MSNT 405	Practical – I Nanomaterials Synthesis Lb	04	12	25	75
	MSNT 406	Project Work – I	04	12	--	100
Total for Core Papers			96			
Total for Non-CorePapers			08			
Grand Total			104			

NON CORE COURSES(FOR THE STUDENTS OF OTHER DEPARTMENTS)

COURSE CODE	TITLE
MSNT207	Concepts of Nanomaterials
MSNT307	Characterization Techniques and Applications of Nanomaterials

Note: The Department will offer both External Elective Courses depending on the student's strength opted for that course, which will be intimated at the beginning of the semester.

MSNT101: Classical and Statistical Mechanics

Unit-I: Lagrangian Mechanics and Hamiltonian Mechanics 15 h

Newtonian Mechanics of one and many particle systems; Conservation laws ; Constraints and their classification; Principle of virtual work ; D' Alembert's principle; Generalized coordinates; Lagrange's equations of motion; Hamiltonian principle ; Lagrange's equation from Hamilton's principle ; Hamilton's equation of motion ; Some applications of Lagrange's and Hamilton's formulation.

Unit-II : Canonical Transformations and Hamilton – Jacobi Theory 15 h

Canonical transformations ; generating function ; properties: Condition for transformation to be canonical ; Illustration of canonical transformation ; Poisson; brackets ; canonical equations in terms of Poisson – bracket notation ; Lagrangian; brackets and their properties ; The Hamiltonian; Jacobi equation ; one dimensional harmonic oscillator ; action Angle variables ; Kepler problem in action angle variables.

Unit-III: Ensembles & Partition functions 15 h

Foundations of statistical mechanics, specification of states of systems, relation between statistics and thermodynamics, phase space, concept of ensembles, ensemble average, Liouville's theorem.

Canonical, molecular, translational, rotational, vibrational, electronic and nuclear partition function, applications of rotational and vibrational partition functions to solids.

Unit-IV: Maxwell-Boltzman, Bose-Einestein and Fermi-Dirac Statistics 15 h

Maxwell-Boltzman statistics: Distribution of velocities, calculation of mean values, equipartition of energy, Bose-Einestein distribution; Bose-Einestein condensation, thermodynamic properties of an idea Bose-Einestein gas; Ideal Fermi-Dirac Gas, Fermi-Dirac Distribution, degeneracy.

Text Books:

1. Classical Mechanics by N.C. Rana and P.S. Joag (Tata Mc;graw Hill) 1991
2. Classical Mechanics by H. Goldstein (Addi Wesly) 1980
3. Introduction to Classical Mechanics by R. G. Takwale and P.S. Puranic
4. Classical Mechanics by J.C. Upadhyaya, Himalaya Pub.house, Mumbai
5. Introduction to IR & Raman Spectroscopy, N.B. Calthrup, L.N. Daly & S.E. Wiberlay, Academic Press, New York 1964.
6. B.K. Agarwal, Statistical Mechanics, Melvin Einser
7. ESR Gopal, Statistical Mechanics and Properties of Matter
8. F. Reif, Statistical and thermal physics
9. C. Kittel, Elementary Statistical Mechanics

MSNT102: Concepts in Materials Science

Unit-I: Crystal Systems **15 h**

Translational vectors; Lattice and Basis; Unit cell; Bravais lattices; Lattice constants, Crystal planes; Miller indices; Symmetric operations; Packing fraction; Simple cubic structures; Body centered cubic structure, Face centered cubic structure; Hexagonal close packed structure; NaCl, CsCl, Diamond and ZnS structures

Unit-II: Imperfections in Crystals **15 h**

Point defects: Impurities; Vacancies - Frenkel and Schottky intrinsic vacancies; Equilibrium concentration of defects; Ionic conductivity in alkali halides; Color centers: Classification-F,F', V centers-Production of color centers

Line defects: Edge and Screw dislocations; Burger vector; Stress field around dislocations; Dislocation energy - Estimation of dislocation densities, Expression for strain energy of dislocation; Role of dislocations in crystal growth;

Plane defects: Stacking faults; Grain boundaries – Low angle grain boundaries

Unit-III: Lattice Vibrations **15 h**

Lattice vibrations: Elastic vibrations of one dimensional homogeneous line; One dimensional line of atoms; Normal modes of vibrations in a finite length of lattice; The linear diatomic lattice; Phonons; Scattering of phonons by neutrons & photons

Unit IV: Band Theory of Solids **15 h**

Motion of electron in periodic potential – Bloch function – Kroning – penny model- formation of energy bands in solids, Concept of effective mass, Brillouin zones- different schemes of representation of E vs K curves, Distinction between metals, insulators and semiconductors.

Text Books:

1. R. L. Singhal, Solid State Physics, Kedarnath Ramnath - Publisher
2. M.A.Wahab, Solid State Physics: Structure and Properties of Materials, Alpha Science International Ltd., (2005)
3. S.O. Pillai, Solid State Physics, Wiley Easter Ltd.(1994)
4. C.Kittle, Introduction to Solid State Physics, Wiley, 7th Edition (1995)
5. Gupta, Kumar, Sharma, Solid State Physics
6. Stephen Elliott and S.R. Elliot, The Physics and Chemistry of Solids, Wiley, 1st Edn (1998)
7. Malik Wahid U. Et. Al, Selected topics in inorganic chemistry, S. Chand & Co., Ltd. (2009)

MSNT 103: Fundamentals of Chemistry

UNIT-I: Chemical bonding and Shapes of Molecules 15 h

Ionic or electrovalent, covalent and vander walls bonds; Inert pair effect; Lattice energy of ionic crystals; Ion deformation or polarization of ions; Hydrogen bond, Odd electron bonds; Bonding in metals-Metallic bond.
Molecular orbital theory (MOT): Molecular orbital configuration of some homonuclear diatomic species; Bond order or bond multiplicity; Molecular orbital configuration of some hetro-nuclear diatomic species; Hybridization of atomic orbital's - Types of hybridization and shapes of some common molecules with σ-or σ+ π bonds; Structure and bonding of diborane

UNIT-II: Coordination Chemistry 15 h

IUPAC nomenclature; Bonding theories – review of Werner's theory and Sidgwick's concept of coordination, Valence bond theory; Geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations;
Crystal filed theory: Splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes, low spin and high spin complexes; Factors affecting crystal-field splitting energy; Merits and demerits of crystal-field theory; Isomerism in coordination compounds – Structural isomerism and stereo isomerism; Stereochemistry of complexes with 4 and 6 coordination numbers.

UNIT-III: Reaction Mechanisms in complexes 15 h

Reactivity of metal complexes- inert and labile complexes- kinetics and Mechanisims of substitution reactions- Substitution reactions in octahedral complexes- Acid hydrolysis- factors affecting Acid Hydrolysis-Base hydrolysis- conjugate base mechanisms- Anation reactions-substitution reaction in square plannar complexes- trans effect- Mechanisms of trans effect-Electron transfer reaction- Inner sphere and outer sphere mechanisms-Marcus theory

UNIT-IV: Halogen compounds 15 h

Nomenclature and classification of alkyl (into primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl halides; Chemical reactivity; Formation of RMgX; Nucleophilic aliphatic substitution reaction - Classification into S_N1 and S_N2.

Energy profile diagram of S_N1 and S_N2 reactions; Stereochemistry of S_N2 (Walden Inversion) S_N1 (Racemisation); Explanation of both by taking the example of optically active alkyl halide – 2 bromobutane; Ease of hydrolysis – comparision of alkyl, benzyl, alkyl, vinyl and aryl halides.

Text Books:

1. Concise Inorganic Chemistry, (5^{th} Ed.), J. D. Lee (Blackwell)
2. Modern Inorganic Chemistry, W. L. Jolly (McGraw-Hill)
3. Coordination Compounds, S. F. A. Kettle (ELBS)
4. Inorganic Chemistry, Gary Wulfsberg (Viva Books)
5. Mechanism and theory in organic chemistry, Thomas H Lowry, Addison Wesly Longman

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MSNT 104: Polymeric Materials

Unit-I: Basic Concepts in Polymers 15 h

Definition of monomer & polymer; Classification of polymers; Mechanism of polymerization - Addition (Free radical) and Condensation polymerization; Polymerization techniques - Bulk, Solution, Suspension and Emulsion; Definition of Copolymer (Random, Alternate, Block and Graft) and blends

Unit-II: Molecular Weight and its Determination 15 h

Concept of average molecular weight, Number, weight, viscosity and Z-average molecular weights; Molecular weight and degree of polymerization; Polydispersity and molecular weight distribution in polymers; Significance of molecular weight; Determination of molecular weight by membrane osmometry, viscosity and end group analysis.

Unit-III: Physical Properties 15 h

Glass transition temperature: Definition, determination of t_g and factors influencing t_g , relation between t_g and t_m and t_g of blends and copolymers

Crystallinity: Degree of crystallinity and polymer crystallization behaviour

Rheology of polymer materials: Hooke's equation; Newton's equation; Maxwell and Voigt models for visco-eleasticity; Deformation behaviour of polymer

Unit IV: Polymer Solutions 15 h

Process of dissolution; Thermodynamics of polymer dissolution; Flory-Huggins theory of polymer solutions; Nature of polymer molecules in solution; Size and shape of macromolecules in solution; viscosity of dilute polymer solutions

References:

1. Text Book of polymer science by Gowarikar, Sreedhar and Viswanathan, Wiley-Eastern Publications. India
2. Introduction to polymers – by R.J.Young, Chapman and Hall, U.K.
3. Organic polymer chemistry by K.J.saunders, 2nd Ed., Chapmann Hall Publications, U.K.,1988
4. Plastic materials by J. Brydson, 7th ed., Butterworth-Heineman, Elsevier (2005)
5. Industrial Polymers – by Ulrich

MSNT 105 Practical – I: Physical Chemistry

1. Determination of rate constant of acid hydrolysis of an ester and investigate the effect of catalyst concentration, reactant concentration and temperature.
2. Conductometry.
3. Potentiometry
4. Estimation of monomer, and other functional groups

5. Identification of plastics by simple test

6. Synthesis of polymer by bulk and solution techniques

MSNT 106 Practical – II: Inorganic Chemistry

1. Semi-micro qualitative analysis of a mixture containing four cations of rare elements and insolubles:

   Rare elements: Te, W, Se, Mo, Zr, Ce, Th, V, and U.

   Insolubles: $PbSO_4$, $SrSO_4$, Al_2O_3, Cr_2O_3, Fe_2O_3, SnO_2, TiO_2, ThO_2, WO_3.

2. Quantitative separation and determination of the following pairs of metal ions using complexometric methods

   a) Cu^{2+} and Ni^{2+}

   b) Ca^{2+} and Mg^{2+}

   c) Fe^{3+} and Ti^{3+}

   d) Cu^{2+} and Zn^{2+}

MSNT 201: Quantum Mechanics

Unit-I:Postulates of Quantum Mechanics 15 h

Postulates of quantum mchanics; Eigen values and Eigen functions for finite well and barrier; Simple harmonic oscillator; Schroedinger equation and operator method.

Liner vector space-Ket and Bra notations; Observables as Hermitian operators; Properties of Hermitian operators; Matrix representation of and operator-Unitary transformation

Unit-II Angular Momentum 15 h

Orbital angular momentum – L_x, L_y,L_z, L^2, L_+, L_-operators; Commutation operators, Eigen functions and Eigen values of L^2 and L_z; Spin angular momentum and matrices,; Addition of angular momenta; Clebsch-Gordon coefficients for J_1=J_2 = ½.

UNIT-III: Approximate Methods 15 h

Time independent nongenerate perturbation- Anhormonic oscillator; Degenerate; Linear stark effect in H atom; Variation method; He atom and harmonic WKB approximation; Connecting formulae; Application to potential well barrier; Quantization and tunnelling; Time dependent perturbation; Transition - Harmonic perturbation and Fermi Golden rule.

UNIT-IV: Relativistic Quantum Theory 15 h

Klein – Gorden equation; Probability current density; Inadequacy of K. G. equation; Dirac's linear equation-plane wave solution; Negative energy states and spin of electrons.

Reference Books:

1. Arul Das, Quatntum Mechanics
2. S.L. Kakani and H.M. Chandalia, Quantum Mechanics
3. B.S. Rajput and Pragatiprakasan, Advanced quantum Mechanics
4. V.K. Thankappan, Quantum Mechanic, Wiley Eastern Limited
5. P.M. Methews and K. Venkatesan, A Textbook of Quantum Mechanics, Tata McGraw Hill Publishing Company.
6. S. L. Gupta, V. Kumar, H.V. Sharma and R. C. Sharma Jai, Quantum Mechanics, RakashNath and Company.
7. P.T. Mathews, An Introduction to Quantum Mechanics, McGraw Hill Publishing Company

MSNT 202: Properties of Bulk and Nanomaterials - I

Unit-I: Dielectric and Ferroelectric Properties **15 h**

Dielectric properties: Dielectric polarization; Dielectric constant and displacement vector; Atomic or molecular polarizability; ClausiusMossotti relation; Types of polarizability - Dipolar polarizability, Frequency dependence of dipolar polarizability; Ionic polarizability; Electronic polarizability

Ferroelectric properties: Classification and properties of ferroelectrics; Ferroelectric domains; Dipole theory of ferroelectricity; Theory of $BaTiO_3$; Dielectric behaviour of $BaTiO_3$ and determination of transition constants; Titanium and oxygen ion displacement theories; Anti-ferroelectricity and piezoelectricity; Effect of particle size on ferroelectrics

Unit-II: Magnetic Properties **15 h**

Classification; Weiss filed theory; Temperature dependence of spontaneous magnetization; Heisenberg model; Exchange; Exchange interaction; Exchange integral; Concept of ferromagnetic domains;

Antiferromagnetism: Molecular field theory of Antiferromagnetism; Ferrimagnetism – Introduction; Structure of ferrites; Curie temperature and susceptibility of ferromagnets; Garnets; Occurrence of super paramagnetism; Effect of nano size particles on domain structures and other magnetic properties

Unit-III: Mechanical Properties **15 h**

Concept of stress and strain; Hook's law; Stress strain behaviour; Anelasticity; Elastic properties of materials -Young's modulus, bulk modulus, shear modulus and Poissson's ratio; Plastic deformation - Yielding and yield strength, tensile strength, ductility, resilience, toughness, true stress and strain and hardness; Creep of soft materials;

Effect of nanodimensions on mechanical properties- Elastic properties, hardness and strength, tensile ductility and strain hardness, creep and super-plastic behaviour, fracture and toughness

Unit-IV: Thermal Properties **15 h**

Specific heat of solids – The classical model, the Einstein model, the Density of states; The Debye's model; Thermal conductivity of solids; Conductivity due to electrons and phonons; Thermal expansion of solids; Thermal properties of nonmaterials

Text Books:

1. R. L. Singhal, Solid State Physics, KedarNath Ram Nath& Co.;, India
2. Material science and engineering An introduction by W.D. Callister, Jr, John wiley and Sons
3. Wahab, Solid State Physics
4. Kittle, Introduction to Solid State Physics
5. Gupta, Kumar, Sharma, Solid State Physics
6. S.O.Pillai, Solid-State-Physics
7. Nanostructures and Nanomaterials by Guozhong Cao, Imperial college Press
8. Textbook of Nanoscience and Nanotechnology by B.s. Murthy, P. Shankar, Baldev Raj, B.B. Rath and J. Murday, Universities Press InidaPvt Ltd.

MSNT 203: Polymer Processing, Composites and Heat Resistant Polymers

Unit-I: Plastic Additives, Degradation and Stabilization 15 h

Additives: Type of plastic additives - fillers, plasticizers and softeners, lubricants and flow promoters' anti aging additives, flame retardants, colourants, blowing agents' cross linking agents, photo stabilizers, Nucleating agents; Equipment used for compounding-the fabricator, raw material forms and mixing.

Degradation and Stabilization: Types of degradation – Physical (thermal, photo and mechanical degradation and stabilization) and Chemical degradation (solvolytic, hydrolysis, oxidative and bio degradation)

Unit – II: Polymer Processing 15 h

Extrusion: Extrusion line; Extruder screw-single and twin screw; Mixing zones

Injection moulding: Process details of plunger and reciprocating screw type injection moulding, Components of a basic mould.

Blow moulding: Basics of extrusion and injection blow moulding.

Fibre spinning: Spinning process; Spinnerets; Melt, dry and wet spinning

Unit-III Composites and its fabrication 15 h

Need of composites; Classification; Components of composites; Matrix Materials – Preparation and properties of epoxy, polyesters; Reinforcements - glass, carbon and Kevlar; Fabrication of composites – Hand layup, Spry dry, reaction injection moulding, compression moulding and Pultrusion

Unit-IV: Heat Resistant Polymers 15 h

Preparation, properties and uses of (i) Polyphenylene sulfide; (ii) Poly sulfones; (iii) Poly benzimidazole (PBI) and (v) poly(ether ether Ketone) (PEEK); Aromatic polyamides- Poly(meta Phenyleneisophthalamide)-Poly(paraphenyleneterephthalamide; Polyimides- Poly(amide-imides), Polyesterimides, Polyetherimides-Poly bismaleimides.

Text Books:

1. Text Book of polymer science by Gowarikar, Sreedhar and Viswanathan, Wiley-Eastern Publications. India
2. Organic polymer chemistry by K.J.saunders, 2nd Ed., Chapmann Hall Publications, U.K.,1988
3. Plastic materials by J. Brydson, 7th ed., Butterworth-Heineman, Elsevier (2005)
4. Polymer processing by D.H. Morton Jones, Chapman and Hall, UK.
5. Polymer mixing Technology: George Mathews,applied science Publishers.
6. An introduction to composite materials by Derek Hull, Cambridge University Press, Cambridge, U.K. ((1981)

MSNT 204: Introduction to Nanoscience and Synthesis of Nanomaterials

Unit 1: Basic Concepts in Nanoscience and Carbon Nanostructures 15 h

Scientific Revolution - Feynman's Vision – Nanoscience – Nanotechnology - Nanomaterials definitions - Classification of Nanomaterials - dimensions, confinement - Surface to volume ratio - Energy at bulk and nano scale - Nature Nanophenomena – Size dependent variation in Physical- Chemical- Catalytic properties - Allotropes of carbon and carbon nanostructures.

UNIT – II: Synthesis of Nanomaterials: Chemical Methods 15 h

Colloidal precipitation - Sol-Gel process - Reduction method - Hydrothermal - Solvothermal - Templated - Combustion route and photochemical method.

UNIT – III: Synthesis of Nanomaterials: Physical and Mechanical Methods 15 h

Arc discharge – Lithography – Chemical Vapor Deposition - High Energy Ball milling – Mechano-chemical reactions - Special Nanostructures - Quantum dots - Magnetic NPs - Nanocomposites- ZnO- TiO_2.

UNIT-IV: Synthesis of Nanomaterials: Biological Methods and applications 15 h

Advantages of biogenic synthesis of nanoparticles – Bio-Nanoparticles using bacteria, fungi andalgae – Purification and characterization of bio-nanoparticles- Bioremediation using microorganism – Gold Nanoparticles in Catalysis and Biomedical applications – Application of Biogenic silver nanoparticles in fabrics and antibacterial properties - Application of Nanomaterials for self-cleaning surfaces.

Text books:

1. Nanomaterials, Nanotechnologies and Design - M.F.Ashby, P.J.Ferreira, D.L.Schodek, Elsevier (2009).
2. Text book of Nanoscience and Nanotechnology - B S Murthy, P Shankar, Baldev Raj, B BRath and James Murday, Universities Press (2012).
3. NANO: The Essentials – T.Pradeep, TATA McGraw Hill (2007).
4. Springer Handbook of Nanotechnology- Ed. by B. Bhushan, Springer-Verlag(2004)
5. Vacuum Technology, A. Roth, North- Holland Pub., 2nd Edition (1982)
6. The Chemistry of Nanomaterials: Synthesis, Properties and Applications, C.N.R. Rao, A. Muller, A. K. Cheetham (Eds), Wiley-VCH Verlag (2004)
7. B.S. Murty and S. Ranganathan, International Materials Reviews (1998) Vol. 43(3), 101

MSNT 205 Practical – III: Polymer Material Lab

1. Determination molecular weight of a polymer by viscometer and end group analysis methods
2. To study the effect of solvents on viscosity of polymer using viscometer.
3. Size of the molecule: To determine the intrinsic viscosity, Huggins and Kramer's constants, viscosity average molecular weight and hence root mean square end to end length and expansion coefficient of the given polymer using viscometer
4. Synthesis of polystyrene/PMMA
5. Study the miscibility of the polymer blend using refractometer and viscometry.
6. Degradation studies of poly (vinyl alcohol) by Viscosity method.

MSNT 206 Practical – IV: Study of Properties of Materials

1. Determination of lattice constant of a mono-atomic and di-atomic lattices
2. Creep behaviour
3. Hysteresis behavior of magnetic materials
4. Di-electric behavior of ferroelectric materials
5. Thermal expansion of materials
6. Initial permeability of magnetic materials
7. Determination of specific heat of a graphite with a change in temperature

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MSNT 207: Introduction to Nanoscience and Synthesis of Nanomaterials

Unit 1: Basic Concepts in Nanoscience and Carbon Nanostructures 15 h

Scientific Revolution - Feynman's Vision – Nanoscience – Nanotechnology - Nanomaterials definitions - Classification of Nanomaterials - dimensions, confinement - Surface to volume ratio - Energy at bulk and nano scale - Nature Nanophenomena – Size dependent variation in Physical- Chemical- Catalytic properties - Allotropes of carbon and carbon nanostructures.

UNIT – II: Synthesis of Nanomaterials: Chemical Methods 15 h

Colloidal precipitation - Sol-Gel process - Reduction method - Hydrothermal - Solvothermal - Templated - Combustion route and photochemical method.

UNIT – III: Synthesis of Nanomaterials: Physical and Mechanical Methods 15 h

Arc discharge – Lithography – Chemical Vapor Deposition - High Energy Ball milling – Mechano-chemical reactions - Special Nanostructures - Quantum dots - Magnetic NPs - Nanocomposites- ZnO- TiO_2.

UNIT-IV: Synthesis of Nanomaterials: Biological Methods and applications 15 h

Advantages of biogenic synthesis of nanoparticles – Bio-Nanoparticles using bacteria, fungi andalgae – Purification and characterization of bio-nanoparticles- Bioremediation using microorganism – Gold Nanoparticles in Catalysis and Biomedical applications – Application of Biogenic silver nanoparticles in fabrics and antibacterial properties - Application of Nanomaterials for self-cleaning surfaces.

Text books:

1. Nanomaterials, Nanotechnologies and Design - M.F.Ashby, P.J.Ferreira, D.L.Schodek, Elsevier (2009).
2. Text book of Nanoscience and Nanotechnology - B S Murthy, P Shankar, Baldev Raj, B BRath and James Murday, Universities Press (2012).
3. NANO: The Essentials – T.Pradeep, TATA McGraw Hill (2007).
4. Springer Handbook of Nanotechnology- Ed. by B. Bhushan, Springer-Verlag(2004)
5. Vacuum Technology, A. Roth, North- Holland Pub., 2nd Edition (1982)
6. The Chemistry of Nanomaterials: Synthesis, Properties and Applications, C.N.R. Rao, A. Muller, A. K. Cheetham (Eds), Wiley-VCH Verlag (2004)
7. B.S. Murty and S. Ranganathan, International Materials Reviews (1998) Vol. 43(3), 101

MSNT 301: Characterization Techniques

Unit-I: UV-Visible and Atomic absorption spectroscopy 15 h

UV-Visible spectroscopy: Introduction, Types of electronic transisitons, Effect of conjugation, Concept of chromophore and Auxochrome, Bathochromic, Hyperchromic and Hypsochromic shifts, Theory, Instrumentation, Double beam spectroscopy; Sources of radiation, Detectors, Monochromators, Applications to organic compounds and Chemical kinetics and disadvantages.

Atomic Absorption spectrophotometer: Theory, Instrumentation, resonance line sources, hollow cathode lamp, chemical and spectral applications with special reference to analysis of trace metals in oils, alloys and toxic metals in drinking water and effluents**.**

Unit-II: IR Spectroscopy 15 h

Vibrational energies of diatomic molecule, Infrared selection rules, Asymmetry of rotation, Hydrogen bonding, Rotational vibration spectra of polyatomic molecules, Interpretation of vibrational spectra, Instrumentation, Fourier transform infrared spectroscopy.

UNIT-III: Raman Spectroscopy 15 h

Classical and quantum theory of Raman effect. Stokes and anti-Stokes Raman lines, Pure rotational Raman spectra, Linear symmetric, top and spherical top molecules, vibrational Raman spectra, Complementary nature of IR and Raman spectra. Structure determination using Raman spectra, Experimental techniques and instrumentation.

UNIT-III: X-ray Diffraction 15 h

Bragg's law, Laue transmission and back reflection methods, Powder Methods: Principle of powder diffraction, Interpretation of powder photographs by analytical and graphical methods, Rotating crystal Methods: Oscillation and rotation methods, Weisenberg and Burger's precession methods, Reciprocal Lattice: Geometrical construction, relation between direct- reciprocal Lattice, Reciprocal of simple cubic, BCC, FCC lattices.

Text Books:

1. M.H.Willard, Instrumental Methods of Analysis, CBS publishers, (1986)
2. G.R. Chatwal and S. Anand, Spectroscopy Atomic and Molecular, Himalaya Pub. House (2004)
3. M. Bersohn and J.C. Baird, An Introduction to Electron Paramagnetic Resonance, Benjamin Inc., London (1967)
4. BK Sharma, Spectroscopy, Goel Publishers House, Meerut (2007)
5. B.D. Cullity, Elements of X-ray Diffraction,
6. L.V. Azarkoff, Elements of X-ray Crystallography,
7. L.V. azarkoff and M.J. Buerger, The Powder Method in X- ray Crystallography
8. Atomic and Molecular spectroscopy-C,L Arora ,S Chand Publishing Company,3rd Edition (2001)
9. Molecular Spectroscopy- Raman Gopalan and Raghavan, Thomson Learning Publishers(2004)

MSNT 302: Semiconductors and Devices

UNIT-I: Basic Aspects of Semiconductors **15 h**

Intrinsic and extrinsic semiconductors, Expression for position of Fermi levels and carrier concentrations, Variation of Fermi levels with temperature, np product, Carrier mobility, Conductivity and their variation with temperature, Direct and indirect band gap semiconductor, Hall effect, Continuity equation, Drift and Diffusion, Einstein relation,

Unit-II: Transport Phenomenon **15 h**

Concept of electrical and thermal resistivity, Different scattering mechanisms, Matheissens rule, Formulation of Boltzmann transport equation, Relaxation time approximation, Distribution function, Expression for thermal and electrical conductivities for metals, Lorenz number.
Somerfield model: its consequences, Electron-Lattice interaction (Quantitative only),

Unit-III: Junctions and Interfaces **15 h**

p-n Junctions: Description of p-n Junction action, Junction in equilibrium, Application of bias- energy band diagrams, The abrupt junction- Calculation of the built-in voltage, Electric field and potential distributions, Expression for Depletion layer capacitance
Static-I-V characteristics of p-n junction diodes: The ideal diode model, Derivation of ideal diode equation, Real diodes- Carrier generation, recombination in the junction depletion region, I-V characteristics of Real Diodes.
Electrical breakdown in p-n junctions: Zener and Avalanche breakdown in p-n junctions, Distinction between the Zeber abd avalanche breakdown, Applications of breakdown diodes.

Unit-IV: Junction Transistors: **15 h**

Bipolar junction transistors: Principle of operation, Ebers Moill Equations- Four regions of operation of a bipolar transistor. Real transistors – carrier recombination in the Emitter- Base junction depletion region- effect of collector bias variation, avalanche multiplication in the collector- base junction and base resistance.
Junction field – effect transistors: JFET principle of operation, Static I-V Characteristics of the idealized model.
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Text Books:

1. M. S. Tyagi, Introduction to Semiconductor Materials and Devices, John Wiley & Sons, 2004.
2. S. M. Sze, Semiconductor Devices Physics and Technology, 2nd Edition, John Wiley & Sons, 2005.
3. Kannan Kano, Semiconductor Devices, PHI, 2005.
4. Robert F Pierret, Semiconductor Device Fundamentals, Pearson Education, 2006.
5. J. L. Moll, Physics of Semiconductors**,** McGraw-Hill.
6. Ben G. Streetman and Sanjay Banerjee, Solid State Electronic Devices, VI ed, Pearson Ed, 2007.

MSNT303: Alloys and Paints

Unit-I: Alloys **15 h**

Introduction to Alloys; Solid solution - substitutional and interstitial; Hume Rother's rules for primary substitution sold solubility; Intermediate phase – interstitial compounds, defect phase and electro valence compounds;

Shape memory alloys: General Characteristics; Nickel-titanium shape memory alloy, Cu-Zn-Al; Cu-Al-Ni alloy systems; Applications of shape memory alloys

Unit-II: Phase diagrams **15 h**

Introduction; Phase rules; Unary phase diagrams – pure iron phase diagrams; Binary Phase diagrams – Ni-Cu system; Lever rule; Bi-Cd; Fe-C; Pb-Sn system; Uses of Phase diagrams; Limitations of phase diagrams

Unit-III: Fundamentals of Paints **15 h**

Definition; Ingredients of paints –binders, pigments, additives, solvent and plasticizers; Classification of paints by curing mechanism (air dried and baked), solvent (aqueous and non-aqueous), functions of system ingredients (primers, sealers, under coats and finishing/top coats), solid content (high and low) and resin components; Film formers – synthetic resins (alkyd, acrylic and urethane coatings); Methods of film formation; Fundamentals of film formation; Factors affecting coating properties – film thickness (mechanical and optical methods), film density and pigment volume concentration

Unit-IV: Properties and Evaluations of Paints: **15 h**

Optical properties of coatings (basics of color, gloss and hiding power); mechanical properties of coatings [structure-mechanical correlations and measurement and performance (hardness and bending tests)]; Ageing properties (accelerated outdoor and laboratory tests); Adhesion properties of coatings (factors affecting the establishment of adhesion bond, measurement sof surface coating adhesion (Destructive methods film detachment by normal (direct pull off and topple method), by lateral stress (scratch and peel test) Non-destructive tests; Scratch, mar and wear resistance test; Ani-condensation paint test; Water and chemical resistance of paint films; Tautening test; Fire resistance; Resistance to yellowing; Bleeding.

References:

1. Physical Metallurgy by Vijendra Singh, Standard Publishing distributors
2. Material Science & Engineering by V. Raghavan, Prentice Hall of India
3. Physical Metallurgy- Principles, Practise by V. Raghavan, Prentice Hall of India
4. Introduction to Paint Chemistry by G.P.A. Turner, Oxford & IBH Publishing Company, India
5. Text Book of polymer science by Gowarikar, Sreedhar and Viswanathan, Wiley-Eastern Publications. India
6. Surface coatings by Swaraj Paul, John Wiley & Sons (1985)
7. Testing of paints by CJA Taylor and S. Mark)

MSNT 304 Nanocatalysis and its Application

Unit I: Fundamentals in Catalysis

Homogeneous and Heterogeneous Catalysis – Characteristics of Catalytic Reactions - Promotors – Catalytic Poisoning – Activation Energy and Catalysis – Intermediate compound formation theory – Adsorption theory – Acid-base Catalysis and its mechanism - Enzyme Catalysis and its mechanism - Requirements for Successful Catalysts - Surface Area determination of non-porous and porous materials using BET method.

Unit II: Synthesis of Nanoporous Catalysts

Microporous materials: Zeolites- Zeotypes – Overall steps in zeolite crystallization- Zeolite synthesis via.- dry gel route- Zeolite Y- determination of surface acidity- shape-selectivity; Mesoporous aluminosilicates: Synthesis of Mesoporous Silica- MCM-41- SBA-15; Mesoporous Carbon - Sulfated Zirconia - Ag/SiO_2 composite nanocatalysts.

Unit III: Nanophotocatalysis and Catalysis of Gold nanocrystals

Introduction to photocatalysis: Principle- Band energy engineering- Degradation of dye - Hydrogen generation- Organic synthesis. Gold catalysts: Uniqueness- particle size- Metal-support interaction; Preparative methods: Co-precipitation – Deposition – Precipitation - Impregnation- Photodeposition- bimetallic catalysts; Properties- Selective oxidation & reduction reactions.

Unit IV: Applications of Nanocatalysts

Environmental protection; Energy processing: Processes involved in crude oil refinery- Gasoline production- Cracking- Fuel cell- Biomass gasification- Biodiesel- Naphtha reforming; Energy conversion & storage; Synthesis of fine chemicals- Hydrogenation/dehydrogenation- Synthetic fuels- Selective oxidation reactions- Polymerization.

References

1. Essentials of Physical Chemistry, Arun Bahl, B.S. Bahl, G.D. Tuli, S.Chand, Revised Edition 2012.
2. Nanoporous Materials: Synthesis and Applications, Edited by Qiang Xu, CRC Press, 2013
3. Catalysis: Principles and Applications, Edited by B. Viswanathan, S. Sivasanker, A.V. Ramaswamy, Narosa Publishing House, 2011
4. Photocatalysis, Edited by Masao Kaneko, Ichiro Okura, Springer, 2003.
5. New and Future Developments in Catalysis, Edited by Steven L. Suib, Elsevier, 2013.
6. Catalysis by Gold, Geoffrey C. Bond, Catherine Louis, David T. Thompson, Imperial College Press, 2006.

MSNT 305 Practical III: Nano Catalysis Lab

1. Study on Adsorption Properties of porous and non-porous materials
2. Solar Photocatalytic degradation of Methyl Orange dye in aqueous solution using TiO_2 photocatalyst
3. Semiconductor Band Gap Engineering – Synthesis of N-doped ZnO
4. Photochemical deposition of Silver nanoparticles on anatase TiO_2 photocatalyst under solar light irradiation.
5. Hydrothermal Synthesis of Zeolite (Microporous Materials)
6. Synthesis of Mesoporous material by template assisted method
7. Synthesis of $H_2Ti_3O_7$ nanostructure using alkaline hydrothermal method and its post-synthesis process for conversion into anatase TiO_2
8. Preparation of Fe-ZSM-5 Zeolite by ion-exchange method
9. Synthesis of CdS nanoparticles Chemical kinetics, Optical absorption spectra, Band gap estimation from the band edge using UV-VIS spectrophotometer

MSNT 306 Practical IV: Semiconductors Lab

1. Determination of energy gap of semiconductors
2. Hall effect
3. Field emission transmitter characteristics
4. Bipolar junction transistor
5. MOSFET characteristics
6. Characteristics of zenaer-diode
7. Analysis of powder diffraction pattern
8. Lave diffraction pattern
9. Silicon solar cells

MSNT-307 Non-core: Characterization Techniques and Applications of Nanomaterials

Unit 1: X-ray diffraction and UV-Visible spectroscopy 15 h

Bragg's law - Powder Methods: Principle of powder diffraction, Interpretation of powder photographs by analytical and graphical methods, Rotating crystal Methods: Oscillation and rotation methods – Estimation of particle sizes by X-ray diffraction pattern.

Introduction - Types of electronic transitions, Effect of conjugation, Concept of chromophore and Auxochrome, Bathochromic, Hyperchromic and Hypsochromic shifts, Theory, Instrumentation, Double beam spectroscopy; Sources of radiation, Detectors, Monochromators, Applications to organic compounds and Chemical kinetics and disadvantages.

UNIT – II: Electron Microscope and Chromatography Techniques 15 h

Principle, Instrumentation and Applications of Scanning Electron Microscopy (SEM) – Transmission Electron Microscopy (TEM) – Dynamic Light Scattering (DLS) – Gas Chromatograph – High Performance Liquid Chromatograph (HPLC).

UNIT – III: Nanotechnology enabled sensors 15 h

Sensors and Nanotechnology Enabled Sensors - Inorganic Nanotechnology Enabled Sensors – Gas Sensing with Nanostructured Thin Films - Nanotechnology enabled optical sensors - Organic Nanotechnology Enabled Sensors - Proteins in Nanotechnology Enabled Sensors - Nano-sensors based on Nucleotides and DNA.

Unit-IV: Drug Delivery Applications 15 h

Preparation of nanomaterials - Dispersion, Solvent Evaporation, Emulsification, Supercritical fluid technology, polymerization - Drug loading - Drug releases characteristics, surface properties - protein adsorption, characterization methods, surface modification (PEG, PEO coated) – Nanoparticles (Polysorbate) for blood brain barrier.

Text Books:

1. M.H.Willard, Instrumental Methods of Analysis, CBS publishers, (1986)
2. G.R. Chatwal and S. Anand, Spectroscopy Atomic and Molecular, Himalaya Pub. House (2004)
3. B.D. Cullity, Elements of X-ray Diffraction,
4. John J. Bozzola and Lonnie D. Russel, "Electron Microscopy", Jones and Bartlett Publishers Inc., USA, 1999.
5. Sivasankar, Instrumental Methods of Chemical Analysis, Oxford University Press, New Delhi (2012)
6. K.Kalantar-zadeh and B. Fry, Nanotechnology-Enabled Sensors, Springer, USA (2008).
7. Biodegradable Polymeric nanoparticles as drug delivery devices, K.S.Soppimath et al., *Journal of Control Release*, 70 (2001) 1 - 20.

MSNT 401: Advanced Characterization Techniques

Unit-I: Microscopic Techniques **15 h**

Surface topography, Principle, Instrumentation and applications of Electron microscopy, Scanning electron microscopy (SEM),Transmission electron microscopy (TEM), Scanning Probe Microscopy (SPM), Scanning tunnelling electron microscopy (STM), Atomic force microscopy (AFM).

UNIT-II: Thermal Analysis **15 h**

Principles, Instrumentation and applications of ThermogravimetricAnalalysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC), Thermo-mechanical Analysis (TMA); Understanding of curing kinetics and thermal decomposition reactionto ceramics and polymers.

Unit-III: Chromatographic Techniques **15 h**

Chromatographic Parameters - Paper Chromatography (PC), Thin Layer Chromatography (TLC), Column Chromatography (CC), Ion Exchange Chromatography (IEC). High Performance Liquid Chromatography (HPLC): Principle, Instrumentation, pumps, columns, Detectors and Applications of HPLC. Gas Chromatography (GC): Principle, Instrumentation, columns, Detectors and Applications of GC.

UNIT-IV: Chemical and Particle size Analysis Techniques **15 h**

Basic concepts – Energy dispersion Analysis of X-rays (EDAX) – X-ray photoelectron spectroscopy (XPS) – Auger Electron Spectroscopy (AES) – Dynamic Light Scattering (DLS).

Text Books:

1. M.H.Willard, Instrumental Methods of Analysis, CBS publishers, (1986)
2. M. Bersohn and J.C. Baird, An Introduction to Electron Paramagnetic Resonance, Benjamin Inc., London (1967)
3. Sivasankar, Instrumental Methods of Chemical Analysis, Oxford University Press, New Delhi (2012)
4. R. Haynes, Optical Microscopy of Materials, International Textbook Company, Glascow, 1984.
5. John J. Bozzola and Lonnie D. Russel, "Electron Microscopy", Jones and Bartlett Publishers Inc., USA, 1999.
6. H. W. Willard, L. L. Merritt and J. A. Dean, Instrumental Methods of Analysis, (Affiliated East-West)
7. D. A. Skoog and D. M. West (Holt, Rinehart and Wilson) Principles of Instrumental Analysis.
8. Nature (2000) Microscopy Techniques

MSNT 402: Properties of Bulk and Nanomaterials-II

Unit -I: Optical Properties: 15 h

Electromagnetic radiation; Light interaction with solids and Atomic and electron interactions; Optical properties of metal; Optical properties of non metals-refraction, refelction, absorption, transmission, color, opacity and translucency in insulators; Basic concepts of luminescence, photoconductivity, lasers, and optical fibers in communication;
Optical properties of nanomaterials –Surface Plasmon resonance and quantum size effects

Unit-II: Superconductivity 15 h

Concept of zero resistance, Magnetic behaviour, Distinction between a perfect conductor and superconductor,Meissner effect,Isotope effect, Specific heat behaviour, Thermal conductivity, Infrared absorption- First and second order transitions in superconductors, Londons equations,Penetration depth, BCS theory(Qualitative aspects only), Applications of superconductors, High T_c superconductors.

Unit-III Diffusion in Solids 15 h

Fick's laws; Diffusion mechanism; Study state diffusion; Non study state diffusion; Factors that influence diffusion; The Kirkendal effect; Diffusion in alkali halides; Ionic conductivity

Unit-IVElectrical Properties 15 h

Ohm's law; Electrical conductivity; Electronic and ionic conduction; conduction in terms of band and atomic bonding model; electron mobility; electrical resistivity of metals; conduction in ionic materials; Electrical conductivity of semiconductors with temperature; Electrical properties of polymers
Effect of particle size on electrical properties – surface scattering, change of electronic structure, quantum transport, effect of microstructure

Text Books:

1. R. L. Singhal, Solid State Physics, KedarNath Ram Nath& Co.;, India
2. Material science and enginerring An introduction by W.D. Callister, Jr, John wiley and Sons
3. Wahab, Solid State Physics
4. Gupta, Kumar, Sharma, Solid State Physics
5. S.O.Pillai, solid-state-physics
6. Nanostructures and Nanomaterials by Guozhong Cao, Imperial college Press
7. Textbook of Nanoscience and Nanotechnology by B.s. Murthy, P. Shankar, Baldev Raj, B.B. Rath and J. Murday, Universities Press InidaPvt Ltd.

MSNT 403: Applications of Nanomaterials and Nanotechnology

Unit-I: Introduction to MEMS, Photonics and spintronics: 15 h

MEMS: Introduction to MEMS; Materials for MEMS-si based; Processes for micro-machining – dry and wet etching; Substrate bonding; surface micromachining; Oxidation; Applications – pressure sensors.

Photonics: Photons and electrons – similarities and differences, free space propagation, confinement of photons and electrons, Propagation through classically forbidden region; Tunnelling applications; Photonic crystal.

Spintronics: why spin; Metallic magnetic multilayers – interlayer exchange coupling and giant magnetoresistance; Applications – magnetic hard drives

Unit-II: Inorganic Nanotechnology Enabled Sensors 15 h

Introduction - Sensors andNanotechnology Enabled Sensors; Inorganic Nanotechnology Enabled Sensors –Gas Sensing with Nanostructured Thin Films; Nanotechnology enabled optical sensors; Organic Nanotechnology Enabled Sensors - Proteins in Nanotechnology Enabled Sensors; Nano-sensors based on Nucleotides and DNA.

Unit-III: Environmental Applications: 15 h

Introduction; Nanomaterials for ground water remediation; Nanomaterials for membrane process - principles and membrane fabrication; Nanomaterials as adsorbents; Electrochemical sensors based on nanomaterials for environmental monitoring.

Unit-IV: Drug Delivery Applications 15 h

Introduction; Preparation of nanomaterials - Dispersion, Solvent Evaporation, Emulsification, Supercritical fluid technology, polymerization; Drug loading; Drug releases characteristics, surface properties - protein adsorption, characterization methods, surface modification (PEG, PEO coated) – Nanoparticles (Polysorbate) for blood brain barrier.

Text Books:

1. Nanostructures & Nanomaterials, Guozhong Cao, Imperial College Press (2003)
2. Introduction to Nanoscale Science & Technology, Massimiliano Di Ventra, StephaneEvoy, Randy Heflin, Kluwer Academic Publishers (2004)
3. Nanophotonics by Paras N Prasad, Wiley & sons Publications (2004)
4. Nanoelectronics& Photonics by AnatoliKorkin, Federico Rosei, Spinger publications
5. Biodegradable Polymeric nanoparticles as drug delivery devices, K.S.Soppimath et al., *Journal of Control Release*, 70 (2001) 1 - 20.
6. K.Kalantar-zadeh and B. Fry, Nanotechnology-Enabled Sensors, Springer, USA (2008).
7. Environmental Nanotechnology, Eds. M.R.Wiesner and J.Y.Bottero, McGrawHill (2007)
8. Environmental Applications of Nanomaterials, Eds.G.LFryxell, G.Cao, Imperial College Press (2007).

MSNT 404: Energy Conversion Technologies

UNIT - I Introduction **15 h**

Principles of renewable energy – Introduction, Energy and sustainable development, Fundamentals, Scientific principles of renewable energy, Societal implications; Nanotechnology for sustainable energy - Energy conversion process; indirect and direct energy conversion; Nanotechnology enabled renewable energy technologies -Energy transport, conversion and storage.

Unit-II: Batteries **15 h**

Principles of battery operation; Battery components; Types of batteries – Primary and secondary batteries; Lead acid, Nickel-cadmium and Lithium ion batteries

Unit-III: Fuel Cells **15 h**

Fuel Cell principles; Types of fuel cells - Alkaline Electrolyte, Phosphoric acid, Molten Carbonate, solid oxide and direct methanol fuel cells; Principle and operation of Proton Exchange Membrane (PEM) fuel cell -Construction of PEM fuel cell stack, efficiency characteristics of PEM fuel cells; Direct methanol fuel cells

Unit-IV: Solar Cells **15 h**

Importance of solar cells; Principle of operation; Current-voltage characteristics,; Comparison of inorganic and organic solar cells, silicone solar cells - manufacture of polycrystalline and nanocrystalline silicon; Conjugated polymer solar cells - Concept of heterojunction (dispersed and molecular heterojunctions); Function of dye sensitized solar cells (DSSC).

Reference Books:

1. J. Twidell and T. Weir, *Renewable Energy Resources*, Routledge, Taylor & Francis group, New York, Third Edition (2015).
2. Vielstich, Hand Book of Fuel Cells: Fuel Cell Technology and applications, Wiley CRC Press
3. C.Rayment, S.Sherwin. Introduction to fuel cell technology (2003)
4. D.M.Roundhil, John P.Facker, Optoelectronic properties of inorganic compounds, Plenum press, New York (2009).
5. A brief history of the development of organic and polymeric photovoltoics, H.Spanggaard and F.C. Krebs, Solar Energy Materials & Solar Cells 83 (2004) 125-146.

MSNT 405: Nanomaterial synthesis Lab

1. Nanocomposite (TiO_2/Fe_2O_3) preparation by wet-chemical method
2. Synthesis of SnO_2 nanoparticles by co-precipitation method
3. Synthesis of ZnO_2 nanoparticles by sol-gel method
4. Solid state synthesis of ZnO nanorods
5. Synthesis of Fe^o nanoparticles by chemical reduction method using $NaBH_4$ solution

MSNT 406: Project work

DEPARTMENT OF GENETICS AND GENOMICS
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2018-19

I[st] SEMESTER

S.No	Title of the Paper		No. of credits	Hrs per week	Max. Marks			Exam time(hrs)
					Internal	External	Total	
1	15121:Principles of Genetics	T	4	4	25	75	100	3
2	15122:Biomolecules	T	4	4	25	75	100	3
3	15123:Cell Biology	T	4	4	25	75	100	3
4	15124: Analytical Biotechniques	T	4	4	25	75	100	3
5	15121-15122: Principles of Genetics & Biomolecules	P	4	9	100		100	3
6	15123-15124:Cell Biology & Analytical Biotechniques	P	4	9	100		100	3

II[nd] SEMESTER

S.No	Title of the Paper		No. of credits	Hrs per week	Max. Marks			Exam time(hrs)
					Internal	External	Total	
1	25121: Microbial Genetics	T	4	4	25	75	100	3
2	25122:Energy Metabolism	T	4	4	25	75	100	3
3	25123:Molecular Biology	T	4	4	25	75	100	3
4	25124: Evolution and Population genetics	T	4	4	25	75	100	3
5	25125:Basics in Genetics (Non-Core)	T	--	4	25	75	100	3
6	25121-25122:Microbial Genetics & Energy Metabolism	P	4	9	100		100	3
7	25123-25124:Molecular Biology & Evolution and Population genetics	P	4	9	100		100	3

III[rd] SEMESTER

S.No	Title of the Paper		No. of credits	Hrs per week	Max. Marks			Exam time(hrs)
					Internal	External	Total	
1	35121:Epigenetics	T	4	4	25	75	100	3
2	35122: Genetic Engineering	T	4	4	25	75	100	3
3	35123: Applied Biotechnology	T	4	4	25	75	100	3
4	35124: Biostats and Computers	T	4	4	25	75	100	3
5	35125: Inherited Diseases of Human (Non-Core)	T	--	4	25	75	100	3
6	35121-35122: Epigenetics & Genetic Engineering	P	4	9	100		100	3
7	35123-35124: Applied Biotechnology & Biostats and Computers	P	4	9	100		100	3

IV[th] SEMESTER

S.No	Title of the Paper		No. of credits	Hrs/ week	Max. Marks			
					Internal	External	Total	Exam time(hrs)
1	45121:Structural Genomics	T	4	4	25	75	100	3
2	45122: Functional Genomics	T	4	4	25	75	100	3
3	45123: Immunology &Immunogenetics	T	4	4	25	75	100	3
4	45124:Pathogenomics	T	4	4	25	75	100	3
5	45121-45124 : Genomics and Immunology & Immunogenetics	P	4	9	100		100	3
6	45125-Project work	PW	4	-	100		100	

Total number of credits : 96
Total marks : 2400

- No credits for Non-core papers and marks of these papers not included with grand total of marks of the core papers.
- T – Theory, P – Practicals, PW – Project work

Department of Genetics and Genomics
Semester-I

15121: PRINCIPLES OF GENETICS

UNIT-I

History and Milestones in genetics, importance and applications of genetics; Model organisms in genetics- *Saccharomyces cerevisiae, Drosophila melanogaster, C. elegance, Arabidapsis thaliana*; Terminology of genetics; Outlines of cell structure, Chromosome structure- Bacterial chromosome, eukaryotic chromosome (primary constriction, secondary constriction, satellites, telomeres, euchromatin, heterocromatin); chromosome number, sex chromosomes, special type of chromosomes-salivery gland chromosome, lampbrush chromosomes, accessory chromosomes; Cell division-Mitosis and Meosis and their significance; Spermatogenesis and Oogenesis.

UNIT-II

Mendel's principles of inheritance-Principles of dominance, segregation and independent assortment, punnet square method and forked-line method; The rediscovery of mendelian principles; Extensions of Mendel's principles-incomplete dominance, codominance, multiple alleles, allelic series, testing gene mutations for allelism; Genetic interactions, Epistasis- recessive epistasis, dominant epistasis, duplicate dominant genes, duplicate recessive genes, duplicate genes with cumulative effect, dominant-and-recessive interaction; non epistatic interactions and pleotropism; Penetrance and Expressivity, The classical genetics of organelles-Leaf variation in plant and antibiotic resistance in clamydomonas.

UNIT-III

Methods to know genotype of an organism-Test cross, back cross, tri-hybrid cross and polyhybrid cross; Inheritable characters in human beings; Influence and effect of environmental factors on gene expression. Heterosis- Occurrence and causes of heterosis, effect of heterosis, role of heterosis in increasing production.

Cytological techniques-analysis of mitotic chromosomes, the human karyotyping; Cytogenetic variations : Overview of cytogenetic variation; Polyploidy- sterile polyploids, fertile polyploids, tissue-specific polyploidy and polyteny; Aneuploidy - Trisomy, monosomy, deletion and duplications of chromosome segments; Rearrangement of chromosome structure-inversion, translocations, Mutations : Origin and frequency of spontaneous mutations, Induced mutations-physical and chemical mutagens, screening and selection of mutations, molecular basis of spontaneous and induced mutations. Transposable element, detection of transposition in bacteria

UNIT-IV

Sex determination, sex linked genes, sex limited traits, sex influenced traits, Linkage-linkage through experiments, complete and incomplete linkage, strength of linkage, factors affecting strength of linkage, measurement of linkage strength, importance of linkage; Recombination and crossing over; Chromosome mapping-crossing over as measure of genetic distance, Morgan's cross and strut's event map; recombination mapping with two point test cross, determination of gene order by three point test cross; Mapping of genes by tetrad analysis; Interference and the coefficient of coincidence; Linkage analysis in humans (pedigree analysis).

Recommended books:

1. Principles of genetics, by Snustad . Simmons.4th Ed.2006.
2. The science of genetics by Atherly, Girton andMcDonald.1999.
3. Genetics *A molecular approach* by Peter J.Russell.2nd Ed.2006.
4. Genetics fundamentals and applications by Srivastava and Debmalya barch.1st Ed.2008.
5. Genetics by Winter, Hickey and Fletcher.2nd Ed.2003.
6. Genetics Analysis of genes and genomes by Jones and Bartlett.6th Ed.2005.
7. Genetics, Schaum's outlines.4th Ed. TATA McGraw-hilledition.2002.
8. Principles of genetics by Robert H. Tamarin. 4th Ed. TATA McGraw-hilledition.2002.

Department of Genetics and Genomics
Semester-I
15122:BIOMOLECULES

UNIT – I

Introduction of Biomolecules, Classification of carbohydrates, outline, structure and properties of monosaccharides (glucose, galactose, fructose), disaccharides (lactose, maltose, sucrose) and Polysaccharides. Structure, occurrence and biological significance of polysaccharides: (starch, cellulose, glycogen); Mucopolysaccharides. Types and functions of Vitamins and Hormones.

UNIT – II

Amino acids: Classification, structure and physiochemical properties. Peptide bond, peptides of non-protein origin (glutathione, tyrocidine, gramicidin, valinomycin), Acid – base properties of peptides, chemical properties and chemical synthesis of peptides. **Proteins** – classification, physiochemical properties and biological functions of proteins, Structural organization- 1^{o}, 2^{o}, 3^{o}& 4^{o} and supra molecular level of organization. Ramachandran plot. Sequencing of amino acids in peptides. Structural & functional relationship of proteins, denaturation, renaturation (hemoglobin, RNase) and evolution of proteins.

UNIT – III

Lipids and Porphyrins: Structure, properties and classification of lipids, fatty acids, waxes, phospholipids, cerebrosides and gangliosides, lipoproteins, prostaglandins, leukotrienes, thromboxanes, steroids and bile acids. Structure of Porphyrins, Structure and function of Heme, Cytochromes and Chlorophyll. **Nucleic acids**: Purine and Pyrimidine Bases, Nucleosides, Nucleotides, Formation of phosphodiester bond and its stability, Structure of DNA-Watson and Crick model, different form of DNA, types of DNA, Structure of t-RNA, Denaturation and Renaturation of DNA, melting curves.

UNIT – IV

Enzymes: Classification and nomenclature of enzymes: The Six main classes of enzymes, Kinetics of enzyme catalyzed reaction: Michalis –Menten equation, determination of V_{max}, K_m and their significance. Line weaver-Burk plot. Factors affecting enzyme activity (concentration, pH, temperature), Enzyme inhibition- reversible and irreversible inhibition, competitive and noncompetitive inhibitors, Allosteric inhibition. Catalytic mechanism of Lysozyme, Chymotrypsin and Ribonuclease.

Reference:

1. LEHNINGER (2017)Prniciples of Biochemistry, 7^{th}edition, NELSON &COX (Worth) Publ.
2. CONN,STUMPF, Outlines of Biochemistry (5^{th}edition)BRUENING &DOI.
3. David E. Metzler and Carol M. Metzler (2001). Biochemistry-The chemical reactions of living cells- Vol1&2.(2nd edition).Harcourt/Academic press, NewYork.
4. Donald Voet and Judith G. Voet . Biochemistry – Second Edition. John Willey and Sons,Inc.
5. Geofferey, L and Zubay . Biochemsitry. (Fourth Edition) Wm. C. Brown Publishers.
6. Jeremy M. Berg. John L. Tymoczko and LubertStryer (2002). Biochemistry. (5th edition).W. H. Freeman and company, NewYork.
7. Lubert Stryer.. Biochemistry.. W.H. Freeman andcompany, NewYork.

Department of Genetics and Genomics
Semester-I
15123: CELL BIOLOGY

UNIT- I

Structural organization of prokaryotic and eukaryotic cells, Ultrastructure and functions of nucleus, mitochondria, plastids, endoplasmic reticulum, Glogi complex, lysosomes, microbodies, ribosomes. Cytoskeleton – microtubules and microfilaments.

UNIT-II

Plant and animal cells – variation in structure and function, Types of tissues – Epithelial tissues, basement membrane, extracellular matrix – Collagen, Elastin, fibrillin, Chromatin organization, telomere, centromere, cell receptors, endocytosis and exocytosis. Biomembranes - composition of Membranes (plasma and organelle membranes). Membrane lipids, proteins and carbohydrates. Molecular structure of membranes, Membrane fluidity, fluid mosaic model of biological membranes.

UNIT- III

Membrane transport: Active transport, Active transport of Na^+/K^+(sodium/potassium ATPase) Ca^{2+} (Ca^{2+} - ATPase). Basic concepts of cell signaling and transduction, different signaling molecules, second messengers, calcium, calmodulin, inositol phosphate, cAMP, cGMP, NO. Signal cascades, inhibition of cell signaling pathways.

UNIT-IV

Cell cycle (eukaryotic cell cycle): Phases of cell cycle, Control of the cell cycle-Role of protein kinases, checkpoints, kinase inhibitors and cellular responses; M-Phase: Prophase- Formation of the mitotic chromosome and spindle, dissolution of the nuclear envelope and partitioning of cytoplasmic organelles; Prometaphase; Metaphase-metaphase plate, microtubule flux; Anaphase- role of proteolysis in progression through mitosis, events of anaphase, spindle assembly checkpoints; Telophase, forces required for mitotic movement, cytokinesis; Meiosis and fertilization-stages and process of meiosis, regulation of Oocyte meiosis, fertilization, quorumsensing.

Recommended books

1. Cell Biology by Karp 2010, 6th Ed. John Wiley & Sons (Asia) PteLtd
2. The Cell a molecular approach by G M Cooper &E Hausman 2007, 4th Ed.
3. Molecular Cell Biology by Lodish et al., 2008, 6th Ed. W.H Freeman andCompany.
4. Essential Cell Biology by Alberts et al., 2004, 2nd Ed. Garland Science, Taylor & Francis group

Department of Genetics and Genomics
Semester-I
15124: ANALYTICAL BIOTECHNIQUES

Unit I

pH, Buffers: pH meter, glass electrode, reference electrodes, ion selective electrodes and oxygen electrode. Measurement of pH,pKa. Importance of pH and buffers in biological systems, Solutions - Molarity, Molality, Normality.

Centrifugation:Basic principles of centrifugation, Preparative and analytical, Rotors: Fixed Angle and Swinging Bucket, Differential Centrifugation, Ultra-centrifugation. Centrifuge Its Use and Safety.

Unit II

Chromatography: Principles, method and applications of Chromatography: Paper Chromatography, Thin Layer Chromatography(TLC), Column Chromatography, Gas liquid chromatography(GLC), High Performance Liquid Chromatography (HPLC), Affinity Chromatography.

Electrophoresis: Principles,method and applications of Agarose Gel Electrophoresis, Sodium Dodecyl Sulphate-Polyacrylamide Gel Electrophoresis (SDS-PAGE), native PAGE, Immuno-electrophoresis, Isoelectric-Focusing and Two-Dimensional Gel Electrophoresis; **Blotting techniques:** Northern blotting, Southern blotting, Western blotting.

Unit III

Radioactivity: half – life, decay constant, average life, units of radioactivity, Radioactivity measuring techniques, and correction factors.GM counter, liquid scintillation counter, γcounter. isotope dilution techniques and Radioactive disposal. Biological effects of radiation, applications of Radioisotopes in medicine.

Unit IV

Microscopy: Principles, method and applications of of light microscopy, Transmission electron microscopy(TEM), Scanning electron microscopy (SEM) and fluorescence microscopy.

Spectroscopy: Electromagnetic radiations, Beer – Lamberts law, principles and applications of colorimetry, spectrophotometry: UV, fluorimetry, flame photometry, Infrared, ESR, NMR spectroscopy, polarimetry.

Recommended Books

1. Principles and Techniques of Practical Biochemistry, Ed. Williams andWilson.
2. Techniques in Molecular Biology Ed. Walker &Gastra, CroomHelm.
3. Principles of Instrumental Analysis, 2nd Ed.Holt-Sanders.
4. An Introduction to Spectroscopy for Biochemistry, Ed. Brown Sn., AcademicPress.
5. Analytical Biochemistry, Holmes and Hazel Peck,Longman.
6. An Introduction to Practical Biochemistry. David t. Plummer, Tata Mac grew – Hill.
7. Biophysical Chemistry, Ed. Shall & Wyman, Academic Press Vol II &I.
8. A text book of quantitative inorganic analysis including elementary instrumentalanalysis, VogelELBS.
9. Biochemical Calculations Seigel, IH, 2nd Ed. John Wiley & SonsInc.
10. Analytical Biochemistry by DavidFriefelder.

Department of Genetics and Genomics
Semester-I

Ist SEMESTER PRACTICALS

15121-15122: PRICIPLES OF GENETICS AND BIOMOLECULES

1. Problems in Genetics
2. Microscopic observation of chromosomes
3. Karyotyping
4. Qualitative tests for identification of carbohydrates
5. Qualitative tests for identification of amino acids
6. Qualitative tests for identification of nucleic acids
7. Quantitative tests for protein (Lowry and Bradford methods)
8. Quantitative tests for glucose (DNS method)
9. Quantitative tests for Glycine
10. Quantitative tests for Bilirubin
11. Quantitative tests for Cholesterol

15123-15124: CELL BIOLOGY AND ANALYTICAL BIOTECHNIQUES

1. Observation of distinguishing features of prokaryotic and eukaryotic cells
2. Measurement of Onion epidermal cell
3. Preparation of plant and animal cells slides for observation by microscope
4. Preparation of blood smear and differential staining of blood cells.
5. Study of divisional stages in Mitosis.
6. Study of divisional stages in Meiosis
7. Estimation of amount of chlorophyll present in the leaf tissue
8. Isolation of chloroplasts by sucrose density gradient centrifugation
9. Measurement of pH
10. Verification of Beer's Law and determination of λ max for color solutions.
11. Paper chromatography for separation of amino acids and plant pigments
12. Thin layer chromatography (TLC) for separation of lipids and amino acids
13. Dialysis
14. SDS-PAGE for separation of proteins
15. Submarine Agarose gel electrophoresis for DNA separation
16. Ion-exchange column chromatography (Demonstration)
17. Gel permeation column chromatography (Demonstration)

Department of Genetics and Genomics
Semester-II
25121: Microbial Genetics

UNIT-I

Essentials of microbial genetics: General properties, growth and culture of bacteria, Genetic nomenclature, Mutants and mutations- Types of mutants, isolation and characterizations of mutants, revertants, reversion, uses of mutations; Genetic analysis of mutants-Genetic recombination, genetic mapping, linkage and multifactor crosses, multiple exchanges and the recombination frequency for distant markers, deletion mapping.

UNIT-II

Transformation-Transformation in the history of molecular biology, uptake of DNA in transformation and Integration of transforming DNA;
Transduction- Generalized transduction, specialized transduction.
Conjugation- Essential features and mechanism of DNA transfer during conjugation, Formation of Hfr strains, Use of Hfr strains in genetic cross, Transfer of chromosomal genes to F plasmid.

UNIT-III

Classification and replications of viruses: General properties, nucleic acid-based classification (Baltimore classification), Replication: DNA viruses- SV40, CaMV, Bacteriophage T4 and λ, RNA viruses- defective-interfering virus (DI), Poliovirus and potyvirus; Retroviruses- HIV, Human hepatitis B virus.

UNIT-IV

Genetics of viruses: Phage mutants, recombination in phages, fine-structure mapping of T4 rII locus; Evolution in RNA viruses: The potential for rapid evolution in RNA viruses, recombination and reassortment, evolution of Influenza virus. Sub-viral agents: Satellites, viroids and prions.

Recommended books

1. Microbilal genetics by Stanley R.Maloy, John E.Cronan and David Frieflder(1994), second ed.,Jones and Bartlettpublishers.
2. Molecular genetics of bacterial by Larry syder and Wendy champnes (2007), 3rd ed., ASMpress.
3. Modern virology by N.J.Dimmock, A.J.Easton and K.N.Leppard (2007), sixth ed.,Blackwellpublishing.
4. Principles of Virology,molecularbiology,pathogenesis and control byS.J.Flint, L.W.Enquist, R.M.Skalka (2000)ASMpress.
5. Principles of Molecular Virology by A.Cann (1997), 2nd ed., AcademicPress

Department of Genetics and Genomics
Semester-II

25122: ENERGY METABOLISM

Unit I

Bioenergetics: Thermodynamic principles – Chemical equilibria; free energy, enthalpy (H), entropy (S). Free energy change in biological transformations in living systems; High energy compounds. Phosphoryl group transfer and calculation of phosphorylation potential. oxidation- reduction reactions. Electron transfer reactions in mitochondria. ATP synthesis and regulation of ATP producing pathways. Regulation of oxidative phosphorylation. Utilization of oxygen by oxygenases, Superoxide dismutase and catalase.

Unit II

Broad outlines of metabolism. Metabolism of carbohydrates: Glycolysis: Preparative and payoff phases of Glycolysis, Regulation of glycolysis, Fermentation: the anaerobic fate of pyruvate, Metabolism of hexoses other than glucose: fructose, galactose and mannose, Citric acid cycle: pyruvate dehydrogenase complex, metabolic sources of acetyl CoA, reactions and regulation of citric acid cycle, Amphibolic nature of citric acid cycle.

Unit III

Uronic acid pathway, metabolism of amino sugars, glycogen metabolism: glycogen synthesis and break down, Regulation of glycogen synthesis and breakdown. Other pathways of carbohydrate metabolism: Gluconeogenesis and maintenance of blood glucose levels, glyoxylate cycle. Pentose phosphate pathway of glucose oxidation, Disorders of carbohydrate metabolism – Glycogen, galactose, Fructose.

Unit IV

Overview of amino acid catabolism, Biosynthesis and degradation of fatty acids (Saturated and unsaturated), energy yield and regulation, Biosynthesis of triacyl glycerols, and membrane phospholipids. Biosynthesis and degradation of cholesterol and its regulation. Metabolism of lipoproteins and Ketone bodies.

Recommended Books:

1.LEHNINGER (2017)Prniciples of Biochemistry, 7thedition, NELSON &COX (Worth) Publ.

2.Principles of Biochemistry, White. A, Handler, P and Smith.

3.David E. Metzler and Carol M. Metzler (2001). Biochemistry-The chemical reactions of living cells- Vol1&2.(2nd edition).Harcourt/Academic press, NewYork.

4. Biochemistry, Lubert Stryer.

5.Review of physiological chemistry, 16th edition, Harold A.Harper.

6.Text of Biochemistry, West and Todd.

7.Outlines of Biochemistry, Conn and Stummf.

8.Metabolic pathways –Greenberg.

9.Biochemistry, 2 nd Edition, G.Zubay.

Department of Genetics and Genomics
Semester-II

25123: MOLECULAR BIOLOGY

UNIT-I

Genetic material: Functions of the genetic material; Evidence for DNA is the genetic material; Evidence for RNA is the genetic material.
Nucleic acids: Types, chemistry; polymorphism of DNA and RNA; Chargaff's ratios; Chemical, physical and spectroscopic properties of nucleic acids; Denaturation and renaturation kinetics of nucleic acids; Hydrolysis of nucleic acids-Exonucleases, endonucleases and ribozymes; DNA topology-linking, writhing, twisting number, positive and negative supercoiling, significance of supercoiling *in vivo*, topoisomerases types and mechanism; Unusual DNA secondary structures.

UNIT-II

Genome organization: Bacterial genome, plasmids, Eukaryotic Chromosome-Histone proteins, non-histone chromosomal proteins, nucleosome, linkers, chromatin fibers, centromeres, telomeres and alternative chromatin structures. **DNA replication**: Concepts and strategies/models for replication. Relation between cell cycle and DNA replication. Molecular mechanisms of DNA replication in prokaryotes and eukaryotes. Replication models- mtDNA and phage θX174. Inhibitors of DNA replication. DNA damage andrepair.

UNIT-III

Recombination: Homologous recombination, site-specific recombination and transposition. **Gene expression** (Transcription and translation): Overview of gene expression. **Transcription (RNA biosynthesis)**: Types of RNA and their role; RNA polymerases involved in transcription of prokaryotes and eukaryotes. Mechanism in pro and eukaryotic cells-promoter recognition, initiation, elongation and termination of RNA synthesis. Maturation and processing of different RNA transcripts-capping, methylation, polyadenylation, splicing, RNA editing and modification of nucleosides in tRNAs. Inhibitors of transcription.

UNIT-IV

Translation (protein biosynthesis) : Genetic code and its elucidation, structure and composition of prokaryotic and eukaryotic ribosome's; Structural features of rRNA, mRNA and tRNAs in relation to function, mechanisms of protein biosynthesis in prokaryotic and eukaryotes; post- translational modification of proteins and their sorting and targeting and degradation; regulation of translation; inhibitors of protein biosyntheses.
Regulation of gene expression: Principles of gene regulation, terminology and operon concepts, enzyme induction and repression; positive and negative regulation in *E.coli*–lac, and regulation by attenuation-trp operons.

Recommended books:

1) Fundamental Molecular Biology.2007, by Lizabeth A.Allison. Blackwellpublishing.
2) Molecular Biology of the gene by Watson et al.,5thEdition,2004,Addison WesleyLongman.
3) The foundations of Biochemistry by Lehninger,4thEdition
4) Principles of Genetics by Snustad,Simmons, 4thEdition,2006
5) Instant notes in Molecular Biology by P.C.Turner et al.Viva BooksPvt.Ltd.
6) Advanced Molecular Biology by A Concise reference.1998, by R.M.Twyman. Viva Book Pvt.Ltd.
7) Molecular Biology by David Fdreifelder,1995 NarosaPubl.House.
8) Molecular Cell Biology by Lodish et al., 2003, Scientific American books, W.H.Freeman and Company.
9) Genes VI by Lewin,1997,Oxford UniversityPress.

Department of Genetics and Genomics
Semester-II
25124: EVOLUTION AND POPULATION GENETICS

UNIT-I

Quantitative genetics: Quantitative characteristics-variability, relation between genotype and phenotype, types of quantitative characteristics, phenotypic inheritance, determining gene number for a polygenic characteristic; Heritability- phenotypic variance, Types of heritability, calculating heritability, limitations of heritability; Locating genes that affect quantitative characteristics- Mapping QTL, Genome wide association studies.

UNIT-II

Population genetics: Fundamental concepts, genetic structure of populations- Genotype frequencies, Allele frequencies; The Hardy-Weinberg Law- Assumption, prediction, deviation and extensions; Genetic variation- in space and time, in natural populations; Forces that changes gene frequencies in population- Mutation, genetic drift, migration; Hardy-Weinberg and natural selection.

UNIT-III

Evolutionary genetics : Organism evolve through genetic change, Natural populations, Genetic variation- Molecular variation, protein variation, DNA sequence variation; New species through evolution of reproductive isolation- the biological species concept, reproductive isolating mechanisms, modes of speciation, genetic differentiation associated with speciation; Evolutionary history by homologous characteristics- The alignment of homologous sequences, construction of phylogenetic trees; Molecular evolution : Genome evolution- early RNA world, the first DNA genome, peptide nucleic acid; Acquisition of new genes by duplication and form other species; Noncoding DNA and genome evolution- transposable elements and genome evolution, the origin of introns; evolutionary history of human genome.

UNIT-IV

Developmental Genetics : Development through cell determination-cloning experiments on plants and animals; Genetic control of development in Drosophila- Development of fruit fly, egg-polarity genes, determination of the dorsal-ventral axis, determination of the anterior posterior axis; Segmentation of genes, Homeotic genes in Drosophila, home box genes in other organisms; Connecting concepts : Gene control the development of flowers in plants- flower anatomy, genetic control of flower development; Programmed cell death-Apoptosis, regulation of apoptosis, apoptosis in development, apoptosis in disease.

Reference books:

1.Genetics *A conceptual approach* by Benjamin A. Pierce(2010)
2.Genetics *Analysis and principles* by Robert J.Brooker(2009)
3.Genomes 3 by T.A.Brown(2007)
4.iGenetics*A molecular approach*, second ed. By Peter J.Russell(2006)

Department of Genetics and Genomics
Semester-II

IInd SEMESTER PRACTICALS

25121-25122: Microbial Genetics & ENERGY METABOLISM

1. Bacterial growth curve
2. Isolation of mutants by gradient plate technique
3. Isolation of mutants by replica plate technique
4. UV survival ,curve
5. Isolation of mutations in bacteria by physical agents
6. Isolation of mutations in bacteria by chemical agents
7. Bacterial conjugation
8. Bacterial transformation
9. Isolation and estimation of glycogen/starch
10. Extraction and assay of extracellular enzymes from fungal source.
11. Factors influencing enzyme activity: pH, substrate concentration and Temperature.

25123-25124: MOLECULAR BIOLOGY & EVOLUTION AND POPULATION GENETICS

1. Setting of molecular biology laboratory creating of ribonuclease free environment in the laboratory.
2. Quantification of DNA and RNA by UV-spectrophotometer.
3. Isolation of total DNA from *E.coli* cells.
4. Isolation of total DNA from Plant leaf tissue
5. Isolation of total RNA from plant leaf tissue
6. Isolation of plasmid DNA from *E.coli* cells.
7. Agarose gel electrophoresis analysis of nucleic acids

Department of Genetics and Genomics
Semester-II
25125: Non Core 1: Basics in Genetics

UNIT I

An over view on biological organization (eg. human); Introduction, role and functions of different cell components- carbohydrates, lipids, proteins, and nucleic acids generalized structure of DNA and RNA, types and role of RNA molecules; DNA as genetic material; Introduction to enzymes and hormones.

UNIT II

Structure and functions of cells: Bacterial cell – cell wall, membrane, cytoplasm, arrangement of DNA; Plant and animal cells- variation, cell membrane, cell wall, endoplasmic reticulum, golgi complex, mitochondria, plastids, nucleus.

UNIT III

Chromosome- generalized classification, structure and organization of eukaryotic chromosome; chromosome number, euchromatin, heterochromatin, telomere, centromere, homologous and non-homologous chromosomes; Cell cycle and its importance, Mitosis – prophase, metaphase, anaphase, telophase, and cytokinesis; Meiosis-generalized mechanism; diploid (body cells), haploid (sperm and egg) and stem cells.

UNIT IV

Mile stones in genetics, Inheritance and its importance, terminology: genotype, phenotype, self- fertilization, cross-fertilization, true-breeding strain, P,F1 and F2 generations, monohybrid crosses, reciprocal crosses, allele, Mendelian experiments of inheritance-, principles of dominance, segregation and independent assortment; a generalized over view of non-mendelian inheritance.

Recommended books

1. Principles of Genetics 2006; SnustadSimmons
2. Introduction to Genomics 2012; ArthurM.Lesk
3. iGenetics 2006; PeterJ.Russell

Department of Genetics and Genomics

Semester-III

35121: EPIGENETICS

UNIT-I

Introduction, DNA methylation-De Novo methylation, Maintenance methylation and DNA methylation and transcriptional silencing; DNA methylation in prokaryotes and eukaryotes; Histone modifications and Histone code- Acetylation, Methylation, Phosphorylation, Ubiquitinylation and ADP-Ribosylation and Sumoylation; Non-coding RNA (ncRNA)- MicroRNA biogenesis and function, Small interfering RNA biogenesis and function and Epigenetic regulation by ncRNA.

UNIT-II

Epigenetic regulation of gene and genome expression- Heterochromatin spreading and position effect variegation, Transvection, Paramutaion, Imprinting and X-chromosome inactivation; Epigenomics in Cancer- Epigenetic features of a normal cell, DNA Hypomethylation in tumours, inactivation of tumor suppressor genes, Histone modifications of cancer cells, Epigenetic factors and miRNA epigenetics in cancer management, epigenetic therapy of cancer;

UNIT III

Epigenetics and its genetic syndromes: Introduction, Chromatin remodeling- X-Linked Thalassemia Mental Retardation syndrome, CHARGE syndrome, Cockayne syndrome (CSB), ICF syndrome, Rett syndrome, CLS syndrome and FSHD. Epigenetics and Immunity: Introduction, Epigenetics in immune differentiation and the immune response, Epigenetics in Autoimmunity, Epigenetic changes in other Autoimmune disorders

UNIT IV

Analysis of gene-specific DNA methylation : Introduction, principles of DNA methylation analysis, characteristics of individual techniques-Southern blot hybridization, Bisulfite sequencing, Combined Bisulfite restriction analysis (COBRA), Methylation-specific PCR (MSP), Real-Time MSP, pyrosequencing andMethyLight.

Methods for Assessing genome-wide DNA methylation : Introduction, Restriction Landmark genomic scanning (RLGS), Methylation sensitive restriction finger printing (MSRF), Methylated CpG island amplification coupled microarray (MCAM)

Reference Books:

1. Epigenomics by Anne C.Ferguson Smith(2009)
2. Epigenetics and diseases by Susan M.Gasser, En Li(2011)
3. Epigenetics in Biology and Medicine by NanelEsteller(2009)
4. Handbook of Epigenetics-The new molecular and medical genetics by TrygveTollefsbol (2011)
5. Epigenetics in Cancer-The new England journal of medicine by Manel Esteller(2008)
6. Advanced Molecular Biology by Twyman(1999)

Department of Genetics and Genomics

Semester-III

35122: GENETIC ENGINEERING

Unit – I

Introduction to Genetic engineering; **Tools for genetic engineering**: **Enzymes** - Restriction nucleases (exo- and endonuclease), *Restriction endonuclease*: Nomenclature, classification, cleavage pattern and applications; *Enzymes in modification*- Polynucleotide phosphorylase, DNase (DnaseI, DNaseII, Exonuclease III and Mung bean nuclease), Phosphatases, Methylases, Ligases, Polynucleotide kinase and RNase.Oligonucleotides- primers, linkers and adaptors; **Vectors for cloning**- types, plasmid and phage vectors, cosmids, phagemids, BAC & YAC.

Unit – II

PCR for gene amplification and detection: PCR principle and mechanism, Enzymes of PCR-Taq polymerase, Reverse Transcriptase, factors affecting PCR, different types of PCR (RT-PCR, nested PCR, Multiplex PCR and real time PCR) and their applications, **Probes**: Oligonucleotide, DNA and RNA probes, methods for radioactive and non-radioactive labeling; **Strategies for molecular cloning**: Choice of vector for cloning, preparation of DNA molecules for cloning, ligation, transformation into bacterial cells, screening and identification of positive clones.

Unit-III

Libraries: Construction and screening of cDNA and genomic DNA libraries; **DNA sequencing**-Chemical method of Maxam and Gilbert, Sanger's dideoxy chain termination and automated sequencing; **Site-directed mutagenesis**: Oligonucleotide directed mutagenesis, site-directed mutagenesis by means of the PCR and importance of site-directed mutagenesis;

Unit – IV

Gene expression: Construction of vectors for expression- choice of promoter, ribosome binding sites, transcription terminator, fusion protein tags, purification tags, protease cleavage sites and reporter genes; Over expression of heterologous protein in bacterial, purification and detection and analysis of recombinant protein. Vaccines-Types of vaccines, subunit vaccines, peptide vaccine, vector vaccines. **Gene therapy**- Ex vivo and In vivo gene therapy methods; Applications of genetic engineering.

Recommended books:

1) Principles of Gene Manipulation and genomics: An Introduction to genetic engineering. 2007, by Primrose andTwyman
2) Fundamental Molecular Biology.2007, by Lizabeth A.Allison. Blackwellpublishing.
3) Molecular Biology of the gene by Watson et al.,5thEdition,2004,Addison WesleyLongman.
4) The foundations of Biochemistry by Lehninger,4thEdition
5) Principles of Genetics by Snustad,Simmons, 4thEdition,2006
6) Instant notes in Molecular Biology by P.C.Turner et al.Viva BooksPvt.Ltd.
7) Advanced Molecular Biology by A Concise reference.1998, by R.M.Twyman. Viva BookPvt.Ltd.
8) Molecular Biology by David Fdreifelder,1995 NarosaPubl.House.
9) Molecular Cell Biology by Lodish et al., 2003, Scientific American books, W.H.Freeman andCompany.
10) Genes VI by Lewin,1997,Oxford UniversityPress.
11) NPTEL-IIT and IISc material(BioTechnology)

Department of Genetics and Genomics
Semester-III
35123: Applied Biotechnology

Unit I

Definition, scope and importance of Biotechnology. **Plant tissue culture**-Basic structure and growth of plant, terms used in tissue culture, plasticity and totipotency; Culture types-Callus, Cell-suspension cultures, Protoplasts, Root cultures, Shoot tip and meristem culture, Embryo culture, Microspore culture; Plant regeneration-somatic embryogenesis and organogenesis. **Animal tissue culture**-History and development of animal tissue culture, conditions and media for animal cell culture, cultured cell biology and its characterization, primary cell culture, cell lines, subculture, stem cell cultures, scale up of animal cell subculture: scale up in suspension and monolayer. Applications of plant and animal cell cultures

Unit II

Gene transfer methods: Physical methods-Electrophoration, microinjection and particle bombardment; chemical methods-Liposomes, receptor mediated gene transfer; Biological methods- Viral vectors, bacteria (Ti plasmid of *Agrobacterium tumefaciencs*). **Transgenic plants**: insect,virus and herbicides resistant plants. **Transgenic animals**: production of transgenic mice and its applications in medicine, cloning livestock by nuclear transfer (sheep-Dolly), transgenic bird and fish. Determining eukaryotic gene function: by gene elimination, in vitro mutagenesis, knockout mice, RNA interference.

Unit III

Role of biotechnology in conservation of biodiversity: Bioremediation, Phytoremediation, Biofertilizers, Biopesticides, Biofuels, Biosafety, Bioethics, Biopiracy, Patents, Environmental risk assessment of genetically modified crops.

Unit IV

Nanobiotechnology : Introduction to nanoparticles : nanofibres, nanoplates, nanotubes, nano carpets and its uses. **Imaging nanostructures**: Scaning tunneling microscope (STM) and Atomic force microscope (AFM), **Nanomedicine:** Drug delivery, nanoparticles in cancer therapy, antimicrobial nanoparticles - assembly of nanocrystals by microorganisms, nano particles in detection of viruses, Biomedical nanodevices, Denaturation of DNA by gold nanoparticles. **Biological effects of nanoparticles**: Toxicity, triggering an adverse immune response.

Reference books:

1) Biotechnology-applying the genetic revolution by David P.Clark& Nanette J.Pazdernik, (2009)Accademic press Elsevier
2) Principles of Gene Manipulation and genomics: An Introduction to genetic engineering . 2007, by Primrose andTwyman
3) Fundamental Molecular Biology.2007, by LizabethA.Allison. Blackwellpublishing.
4) Principles of Genetics by Snustad,Simmons, 4th Edition,2006 5)iGenetics*A molecular approach* by Peter J.Russell.2nd Ed.2006.
6) Culture of Animal Cells: A Manual of Basic Technique and Specialized by R. Ian Freshney (2005)
7) Plant tussue culture: Theory and practice a revised edition by S.S.Bhojwani, M.K.Razdan (1996)Elsevier
8) Plant tissue culture:techniques and experiments by Roberta H.Smith (2000)
9) Introduction to plant tissue culture by M.K.Razdan(2003)
10) Essentials of Nanotechnology: Jeremy Ramsden& Ventus publishing (2009):ISBN 978-87-7681-418-2.
11) Nanobiotechnology (2014) one central press Ltd.UK, Prof. David Andrw Phoenix, Prof.Waqar Ahmed,978-1-1910086-02-5.

Department of Genetics and Genomics
Semester - III
35124: Biostats and Computers

UNIT-I

Population, sample, variables, classification and Tabulation of date, Diagrams & graphs, frequency distribution, skewness, kurtosis, central tendency, Average, mean, median, mode, Dispersion, Measures of dispersion, Standard deviation, coefficient of Poisson, Normal distribution, standard error.

UNIT-II

Hypothesis testing, Null hypothesis, Type-I & Type-II errors, level of significance, Decision about Null hypothesis (HO), Students 't' test-applications, chi-square fest, Application Analysis of Variance (ANOVA)- F test- Applications Correlation, Types-Applications, Regression- Applications.

UNIT – III

A). Introduction to windows: Desktop files and folders; simple operations like creation, deletion, moving, copying files or folders using window explorer. Searching files and folders and other simple operations. **Word processing:** creating, saving and opening documents. Typing, navigating, selecting, editing and sorting, checking spelling and grammar formatting – changing appearance of page – importing graphics, working with tables, documentsprinting.
B). Excel Basics: Touring the Excel Program Window, Touring the Workbook Window, Entering and editing Data in cells, Excel Formulas and Functions, Entering a formula in to a Worksheet Cell, Using the Chart wizard, Understanding Data Series and Data Categories, Picking a chart type, Adding and editing Titles, Legends and Datalabels.

UNIT – IV

A). Basics of power point: Creating a power point presentation, Entering and formatting the text on slides, Creating a table slide, Ways of viewing and working on slides, Inserting, deleting, rearranging and copyingslides.

B). Internet Basics: Introduction, Evolution of Internet, Basic Internet Terms, Getting Connected to Internet, Internet Applications. Electronic Mail: An Introduction, How E-Mail Works, Searching the Web (Search Engines), Language of Internet, Internet andViruses.

Reference books:

1. The Complete Reference Office 2000: Stephen L.Nelson: TATA McGRAW-HILL EDITION 2002.ISBN0-07-463768-1.
2. Introduction to computer science: ITL Education Solutions Ltd.ISBN978-81-317-0436-3
3. Peter Norton's Introduction to computers: II edition Tata MC Graw HillPublication

IIIrd SEMESTER PRACTICALS

35121-35122: EPIGENETICS and GENETIC ENGINEERING

1. Determination of type of nucleic acid by nucleases
2. Restriction digestion of plasmid DNA
3. Ligation of inset with Plasmid DNA
4. Polymerase chain reaction(PCR)
5. Preparation of *E.coli* competent cells for transformation
6. Transformation of Plasmid DNA into competent cells
7. Screening and confirmation of recombinant clone
8. Over-expression of recombinant proteins in *E. coli* system
9. Purification and confirmation of recombinant proteins
10. Sothern blotting (Capillary and diffusion methods)
11. Solving the black board problems
12. Restriction digestion and comparison of methylated and unmethylated DNA by agarose gel

35123-35124: Applied Biotechnology & Biostats and Computers

1. Preparation of media and sterilization of glassware for plant tissue culture
2. Anthere culture
3. Shoot tip culture
4. Leaf culture
5. Preparation of media and sterilization of glassware for animal cell culture
6. Primary cell culture preparation of Chick embryo
7. Trypsinization of the cells
8. Counting and checking the viability of the cells
9. Subculture of the primary cells
10. Viability checking of embrocated chick egg
11. Frequency tables and bandiagrams
12. Normal distribution Z-test
13. Calculation of standard deviation, 20.χ^2 test calculation
14. Student t-test for measuring significance between sample and population test
15. Correlation between two parameters
16. Prepare a resume in MS-word
17. Prepare a visiting card in MS-word
18. Create a chart for students marks in excel
19. Prepare a presentation using MS-power point
20. spotters

Department of Genetics and Genomics
IIIrd SEMESTER
35125: Inherited diseases of Humans
(Non Core paper-2)

UNIT I

Reasons for genetic disorders, syndromes: Chromosome mutations - Chromosome rearrangement-duplication, deletions, inversion and translocation; aneuploidy and polyploidy; Gene mutations- Base substitution, base insertion and base deletion, transposable elements in humans (SINEs and LINEs).

UNIT II

Genetic basis of syndromes and disorders: Introduction, Monogenic disorders- Cystic fibrosis, Huntington's disease, Hemophilia, Neurofibromatosis, sickle cell disease and thalassemias; chromosome disorders- cri-du-chat syndrome, Down syndrome; Inborn errors of metabolism- Albinism, Alkaptonuria, cystinuria and pentosuria; DNA repair defects- Xerodermpigmentosum; and multifactorial disorders – diabetes, coronary artery disease and congenital malformation.

UNIT III

Cancer genetics: Definition, types, relationship of the cell cycle to cancer, cancer and programmed cell death, genetic basis for cancer, oncogenes, tumor suppressor genes, role of environmental factors in cancer and genetic pathways to cancer. An overview of epigenetic modifications for cancer

UNIT IV

Diagnosis, Genetic counseling and treatment: Prenatal diagnosis- Ultrasonography and fetal echocardiography, Maternal serum screening, Amniocentesis and chorionic villus sampling; Genetic testing for common mutations - protein truncation test, Single stranded conformation polymorphism test and full resequencing of the gene. Genetic counseling- introduction, psychotherapeutic counseling, genetic susceptibility and treatment of genetic diseases.

Reference books:

1. Principles of Genetics 2007: Gardner, Simmons, Snustad; Wiley IndiaEdition
2. Human Genetics 2010: Gardner andDavies;
3. Elements of Medical Genetics, Emery's.

Department of Genetics and Genomics
Semester-IV

45121: Structural Genomics

UNIT I

Introduction to Genomics: Definitions, Classification based on system attributes, relationships to other scientific disciplines and types of organisms studied, Historical Perspective of Genomics, Genome sizes, Organization of genome of viruses, prokaryotes, eukaryotes, telomers, tandomly repeated sequences, DNA transposons, retro transposans, organelle DNA. Mapping in prokaryotes by Transformation, Mapping in prokaryotes by Tranduction, Mapping in prokaryotes by Conjugation.

UNIT II

Genetic linkage mapping: DNA markers:-RFLP, AFLP, RAPD, SSRs, SNPs, CAPS, SCAR markers; Construction of the genetic linkage maps:- human, plants, Map based cloning- Mutant Mapping, LOD score, MAPMAKER.
Quantitative genetics: Two locus control, Three locus control, Study of polygenic traits, Effect of environment on QTLs, heritability and description of continuous variation of wheat kernel color and human skin color, Cloning QTLS.
Physical mapping: Cytogenetic maps of chromosomal banding, STS, FISH, restriction maps, radiation hybrid mapping (RH), clone contig maps.

UNIT III

Whole genome sequencing: DNA sequencing strategies,clone-by-clone approach, whole genome shotgun sequencing, assembly and finishing genome sequencing, Next generation sequencing and applications, Human genome project.
Sequence databases: Nucleotide sequence databases, protein sequence databases, protein structural databases, literature databases; Genomic databases- UCSC, NCBI Map viewer, ENSEMBL; data files and formats.

UNIT IV

Predictive methods using DNA sequences: Gene prediction methods and programs, promoter characterization and prediction, strategies and considerations.
Sequence comparison: Sequence alignment- pair wise sequence alignment, multiple sequence alignment and their importance.
Phylogenetic analysis: Background terminology and basics, tree construction and importance, common software
Protein structure prediction: How protein structures are determined, Secondary structure prediction; Visualizing proteins; Three-dimensional structure of protein-Homology modeling, threading or Ab initio method, protein structure evaluation and protein structure comparison

Reference books:

Genetics-A molecular approach by peter J.Russel (2006), 2nd ed.

1. Genomes3 by T.A.Brown(2007)
2. Principles of Gene manipulation & Genomics by S.B.Primrose&R.M.Twyman, 7th ed, (2007)
3. Microbial functional genomics by Jizhgahov, Dorothea K.Thompson Ying xu, James M.Tiedje
4. Bioinformatics-Apractical guide to the analysis of Genes and proteins, by Andreas D.Baxevanis, B.F.Francis Ouellette,3rd.Bioinformatics-Tools and applications by David Edwards, Jason strajich and David Hansen(2009)

Department of Genetics and Genomics
Semester-IV
45122: Functional Genomics

Unit I

Functional genomics: Concepts and applications, Forward genetics and Reverse genetics approaches, Loss of function, Gain of function.

Mutagenesis as Functional Genomics Tool: T-DNA insertional mutagenesis, Transposon-based mutagenesis (*Ac/Ds*), Activation tagging, Enhancer trapping, GAL4 mediated over expression, Floxing, Viral mediated transfection.

Genome wide mutation screening: TILLING (Targeted Induced Local Lesion IN Genome) - principle and experimental approach, ECO-TILLING; **DEALING** (Detecting Adducts Local Lesion IN Genome) - principle, experimental approach; Site directed Mutagenesis.

Unit II

DNA Microarray Technology: Introduction, Types of Microarrays and Advantages, Experimental design- Concepts, principles, Probe design, target preparation, Hybridization and Detection, Specificity, sensitivity, reproducibility, and Data Analysis; **RNA silencing:** Antisense RNA technology, RNAi and Si RNA; **SAGE for transcript profiling-** principle, methodology and applications; Molecular analysis of gene expression (RT-PCR)., **CRISPR (CRISPR/Cas9)-** Mechanism and applications.

Unit III

Functional proteomics: Gene functions through protein interactions: Identification of Protein–Ligand Interactions. **Yeast Two-Hybrid Selection System:** Analysis of genome-wide protein–protein interactions in organisms, Use of M13, T7 Phage to Detect Protein–Ligand Interactions, Combining yeast two-hybrid and phage display data, Detecting Interactions with Protein Fragment Complementation Assays.

Mass Spectrometry for Protein–Protein Interaction Mapping: Overview, Identification of substrates for E. coli GroEL, Studying the transcriptome and proteome of *Escherichia coli* and *Saccharomyces cerevisiae.*

Unit IV

Protein microarrays: overview, principle, limitations; **Protein microarray-** Manufacturing technology, solid supports, different formats, experimental approach and detection, peptidomics; Microarray for protein-carbohydrate interaction (phage display technology); protein domain microarray; protein biochips; Antibody microarray; protein microarray for drug discovery.

References:

1.Protein Microarrays, edited by Mark schena, Jones and Bartlet pblisher, 2005.
2.Microbial Functional Genomics, Jizhong Zhou, Dorothea K. Thompson, Ying Xu, James M. Tiedje, A John Wiley & Sons, Inc., Publication, 2004.
3.Microarrays for an Integratiul J. But. Kho and Atte, Published in India by Ane Books, 2003.
4.Gene Cloning and DNA analysis An Introduction, Sixth Edition, T. A. Brown, Wiley-Blackwell publications, A John Wiley & Sons, Inc., Publication, 2010.

Department of Genetics and Genomics
Semester-IV
45123: Immunology and Immunogenetics

Unit I

Basic concepts in Immunology: Innate immunity and Adaptive immunity. Cells of the immune system - B cells, T cells, NK cells, phagocytes, inflammatory cells, antigen presenting cells, organs of immune system - primary, secondary and tertiary lymphoid organs. Immunohematology: blood groups, blood transfusion and Rh-incompatibility.

Unit II

Antigens - nature, types, factors influencing antigenecity, haptens, adjuvants and superantigens. Antibodies - structure, types, classes and functions. Antigen – antibody interactions:Monoclonal antibodies: production and applications; Immunological techniques: Flocculation, Precipitation, immunodiffusion, Agglutination, Phagocytosis, Opsonization, complement fixation,Neutralization, ELISA.

Unit III

Immune Response: Kinetics of the antibody/ humoral immune response, cell mediated immune response. Recognition of antigen: MHC - Types, Antigen processing and presentation, activation and differentiation of B cells and T cells. Effector mechanisms: Cytokines, CTL, NK cell mechanism of cytolysis and ADCC. Complement activation pathways: Classical, alternate and lectin pathway. Hypersensitivity, Autoimmunity, Regulation of immune response. Vaccines, Immunization: Passive and active immunization, WHO recommended Immunization Schedule.

Unit IV

Immunogenetics: Organization, rearrangement and expression of Ig genes. Generation of antibody diversity, Inherited and acquired immunodeficiency diseases: Recessive gene defects, X- linked lymphoproliferative syndrom, SCID, Type 1 diabetes mellitus, mutiple sclerosis, Inflammatory bowl disease, Rheumatoid arthritis, Chronic lymphocytic leukemia, haemophilia, sickle cell anaemia, erythroblastosis fetalis, AIDS.

Reference books:

1. Essentials of Immunology - Ian Roitt - Blackwell ScinentificPublications
2. Fundamentals of immunology - William C. Boyed (WileyToppan).
3. Introduction to Immunology - John W.Kinball.
4. Fundamentals of Immunology - Otto S. View and others.
5. Immunology - D.M.Wier.
5. Immunology - Jains Kubay, (2007) 7th Edition, W H Frecman& Com. NewYork.
7. Cellular and Molecular Immunology 3rd ed. Abul K. Abbas Andrew K.Lichtman Jordan S.Pober
8. Immunebiology: The immune system in health and disease. Charles A Janeway and others.

Department of Genetics and Genomics
Semester-IV
45124: PATHOGENOMICS

UNIT I

Principles and vocabulary of epidemiology, common epidemic diseases in humans (agent, sources, and reservoir),Stages of disease progression, infectious disease transmission-Direct host –to-host, indirect host-to-host transmission; Natural Host resistance, Harmful microbial interactions with humans: entry, colonization and growth, virulence, virulence factors and toxins; Host risk factors in infection: age, stress and diet, compromised host. **New diagnostics** Advanced molecular diagnostic methods for detection of microbial infections: PCR, SNP, FISH, flow-cytometry, Microarray.

UNIT II

Emerging and reemerging infectious diseases- Chikungunya, Swine flu (H1N1)-history, symptoms, viral replication, genetic variability, diagnosis, prevention.

HIV pathogenesis-gene-therapy: Overview of HIV pathogenesis: structure and genome, replication, target-cell depletion and apoptosis, genetic variability; Bioinformatic analysis of HIV. Ribozyme as gene therapeutic agents for HIV/AIDS: Ribozyme design and in vitro efficacy, in vivo efficacy-animal models.

UNIT III

Genomics of the *Mycobacterium tuberculosis* and BCG vaccines: *Mycobacterium* pathogenesis-tuberculosis, information from complete genome sequencing of *Mycobacterium tuberculosis*, strain-to –strain variability with *M.tuberculosis*spp., genomic analysis of *M.bovis* BCG vaccines;

HPV pathogenesis-microarray technology: Application of microarray technology in understanding HPV pathogenesis, Tissue-culture systems for studying HPV, alternation of cellular gene expression during latent infection by HPV.

UNIT IV

Patho Genomics-applications:Search for new antibiotics: Need for novel antibiotics, genomic technologies in antibacterial research, targeting the resistance mechanism, extremely narrow-spectrum drugs, strategies for reducing virulence, gene therapy; **Recombinant Vaccines**: Polyvalent vaccine, Subunit Vaccines, DNA Vaccines.Reverse vaccinology:MenB vaccine approach by reverse vaccinology.

Reference books:

1.Pathogenomics impact on human health by Kares Joy Schaw (2002)
2.Pathogenomics-Genome analysis of pathogenomic microbes by Jory Hacker, Ulrich Dobrindt(2006)
3.Encyclopedia of genetics, genomics, proteomics and bioinformatics by Lynn B.Jorde et al.,
4. Brock biology of Microorganisms. Pearson International Edition. By Madigan, Martinko, Dunlap and Clark.

5. Molecular Diagnostics For the Clinical Laboratorian SECOND EDITION Edited by William B. Coleman Gregory J. TsongalisHumana Press 2006.

Department of Genetics and Genomics
Semester-IV
45121-45124 (SFIP) Practicals of Genomics and Immunology

1. Nucleotide and amino acid sequence based practical's using online public databases and offline bioinformatics software tools
2. Work with Mega5
3. Work with Bio-edit
4. Primer designing oligo6/online tools
5. Computer based protein structure prediction experiments
6. DNA sequence based Phylogenetic tree construction and analysis
7. Protein sequence based Phylogenetic tree construction and analysis
8. Mapmaker
9. RFLP
10. QTL Cartographer
11. COBRA
12. Solving the black board problems
15. Separation of serum and plasma from whole blood.
16. Separation of immunoglobulins
17. Trypan blue exclusion test of Lymphocyte viability
18. Isolation of peripheral blood lymphocytes by Ficoll- Hypaque gradient.
19. Different routes of immunization(Rat/Rabbit)
20. Dissection and identification of thymus, spleen and lymphnodes.
21. Cell counting by Hemocytometer (WBC andRBC).
22. Quantitative precipitation test:
    a. Redial immunodiffusion.
    b. Ouchterloney double diffusion.
23. Immunoelecrophoresis
24. VDRL test for syphilis
25. Widal test for typhoid
26. Determination of A,B,O and Rh grouping & Rh typing by Agglutination.
27. HBs Ag test
28. HCG test
29. Enzyme Linked Immunosorbent Assay (ELISA) / Tridot test.
30. Characterization of proteins and analysis of their functions.
31. TILLING
32. Spotters

With effect from 2018-2019 Under CBCS

YOGI VEMANA UNIVERSITY COLLEGE :: KADAPA
DEPARTMENT OF APPLIED MATHEMATICS

Name of the Course : Mathematics

(With effect from 2018-2019 Under CBCS)

PAPER CODE	TITLE OF THE PAPER
SEMESTER - I	
15051	MA 101 : Algebra
15052	MA 102 : Real Analysis
15053	MA 103 : Ordinary Differential Equations
15054	MA 104 : Complex Analysis
15055	MA 105 : Numerical Methods
SEMESTER - II	
25051	MA 201 : Topology
25052	MA 202 : Galois Theory
25053	MA 203 : Partial Differential Equations
25054	MA 204 : Advanced Complex Analysis
25055	MA 205 : Fluid Dynamics
25056 Non-Core	**Business Mathematics**
SEMESTER - III	
35051	MA 301 : Functional Analysis
35052	MA 302 : Discrete Mathematics
35053	MA 303 : SemiGroups
Elective I 35054-A 35054-B	MA 304 (A) : Operations Research MA 304 (B) : Coding Theory
Elective II 35055-A 35055-B	MA 305 (A) : 'C' & Data Structures MA 305 (B) : Biomechanics
35056 Non Core	**Mathematics and Applications**
The student has to choose one from each of the Elective I and Elective II	
SEMESTER - IV	
45051	MA 401 : Lebesgue Measure Integration
45052	MA 402 : Graph Theory
45053	MA 403 : Number Theory
Elective III 45054-A 45054-B	MA 404 (A) : Mathematical Statistics MA 404 (B) : Theoretical computer science
Elective IV 45055-A 45055-B	MA 405(A) : Mathematical Modelling MA 405(B) : Fuzzy sets and Fuzzy logic
The student has to choose one from each of the Elective III and Elective IV	

YOGI VEMANA UNIVERSITY COLLEGE :: KADAPA

DEPARTMENT OF APPLIED MATHEMATICS

M.Sc., MATHEMATICS

SYLLABUS

SEMESTER-I

MA 101 :ALGEBRA

UNIT I: Structure Theorems of groups : Conjugacy and G-Sets, Normal series, solvable groups and sylow theorems.

UNIT II: Permutation Groups: Cyclic Decomposition – Alternating group A_n-Simplicity of A_n.

UNIT III :Unique Factorization domains and Euclidean Domains: Unique factorization domains – Principal ideal domains – Euclidean domains polynomial rings over UFD.

UNIT IV Modules: Definition and examples, sub modules and direct sums, R- homomorphisms and quotient modules, completely reducible modules,free modules

Scope and standard as in **"Basic Abstract Algebra"** by P.B. Bhattacharya , S.K.Jain and S. R. Nagpaul, Cambridge University press.

Chapter 5: Section 4 , Chapter 6 : Sections 1 and 2 , Chapter 8 : Section 4, Chapter 7, Chapter 11, Chapter 14: Sections 1 to 5

REFERENCE BOOKS :

1. Topics in Algebra, by I.N. Hierstein .
2. Commutative algebra, by Zariski and Samuel Affiliated East – West Press.

MA102 : REAL ANALYSIS

UNIT I : The Remiann - Steiltjes Integral: Definition and Existence of Integral- Properties of the Integral - Integration and Differentiation-Integration of Vector – valued Function**.**

UNIT II Sequences and Series of Functions: Discussion of Main Problem-Uniform Convergence - Uniform Convergence and Continuity - Uniform Convergence and Integration - Uniform Convergence and Differentiation, Equicontinuous Families of Functions- The Stone - Weierstrass Theorem.

UNIT III Improper Integrals: Introduction - Integration of Unbounded Functions with Finite Limits of Integrations - Comparison Tests for Convergence at a of $\int_a^b f$ dx, Infinite Range of Integration - Integrand as a Product of Functions.

UNIT IV Functions of Several Variables : Explicit and Implicit Functions –Continuity - Partial Derivatives – Differentiability - Partial Derivatives of Higher Order- Differentials of Higher Order - Functions of Functions - Change of Variables - Taylor's Theorem - Extreme Values – Maximum and Minima.

1. Scope and Standard as in "**Principle of Mathematical Analysis**" by Walter Rudin's (Third Edition 1976) Mc Graw Hill International Student Edition 1976.
   Chapter 6: Sections 6.01 to 6.25 , Chapter :7 Sections :7.1 to 7.26
2. Scope and Standard as in **"Mathematical Analysis"** By S.C.Malik 1994 of Wiley Eastern limited
   Chapter 11:Sections 1 to 5, Chapter15: Sections 1 to 10.

REFERENCE BOOK:-

1. **"Mathematical Analysis"** By Tom .M .Apostol (Second Edition) Addison Weslay publishing company.

MA 103 : ORDINARY DIFFERENTIAL EQUATIONS

UNIT –I : **Oscillation Theory and boundary value problems**: Qualitative properties of solutions –The Sturm comparison theorem-Eigen values, Eigen functions and the vibrating string.

UNIT – II: **Power series solutions**: Series solutions of first order equations –Second order linear equations-Ordinary points-Regular singular points- Gauss's hyper geometric equation.

UNIT – III: Some special functions of Mathematical Physics : Legender polynomials – properties of Legender polynomials –Bessel functions –The gamma function- Properties of Bessel functions.

UNIT-IV: **The existence and uniqueness of solutions** : The method of successive approximations-Picard's theorem-systems - The second order linear equations.

Scope and standard as in " **Differential Equations with Applications and Historical notes"** by George F. Simmons . (1992) Tata Mc Graw Hill Publications
Chapter 4 :Sections 22 to 24, (excluding Appendices A), Chapter 5: Sections 26 to 30, Chapter 6: Sections 32 to 35, (excluding Appendices), Chapter 11: Sections 55 to 57.

REFERENCES :
1. Advanced Differential Equations, M.D. Raisinghania , S. Chand Publications
2. " Differential Equations" Ross, Shepley L Wieley India Pvt LTD.

MA 104 : COMPLEX ANALYSIS

UNIT I : Differentiation : Analytic Functions : Derivative rules for differentiating complex functions – The Cauchy – Riemann equations – analytic functions – Geometric interpretation of arg $f'(z)$ and $|f'(z)|$- conformal mapping – The mapping $w = \frac{az+b}{cz+d}$- Conformal. Mapping of the extended plane.

UNIT II : Mobius Transformations : The Group property of Mobius transformations – The circle preserving property of Mobius transformations – Fixed points of a Mobius transformation – Invariance of cross ratio- Mapping of a circle onto a circle – symmetry transformations.

UNIT III : Complex Integrals : Cauchy integral theorem : Rectifiable curves – complex integrals – The case of smooth curves – Cauchy's integral theorem – The Key lemma-Proof of Cauchy's integral theorem – Application to the Evaluation definite integrals – Cauchy's integral theorem for a system of Contours.

Cauchy's Integral formula and its Implications: Indefinite integrals – Cauchy's integral formula – Morera's theorem – Cauchy's Inequalities.

UNIT IV : Power series: The Cauchy – Handamard theorem – Taylors series – The Uniqueness theorem for power seies – Expansion of an Analytic function in a power series – Liouville's theorem – The uniqueness theorem for analytic functions- A points and zeros- Weierstrass Double series theorem – Substitution of one power series into another – Division of power series.

Scope and standard as in **"Introductory Complex Analysis"** by Richard A. Silverman Dover Publications, Inc. (1972), New York. Chapters 3,5,7,8 and 10.

REFERENCE BOOKS :-

1. A Text book of "Functions of a Complex variable" by J. N. Sharma.
2. A Text book of "Complex variables theory and applications " by H. S. Kasana, Second Edition.

MA 105 : NUMERICAL METHODS

UNIT 1 : **Least Squares ,B - Splines and Fourier Transforms Introduction** ; **Least-Squares Curve Fitting Procedures**: Fitting a Straight line – Nonlinear Curve Fitting- Curve Fitting by a Sum Of Exponentials. **Weighted Least Squares Approximation**; Linear Weighted least Squares Approximation- Nonlinear weighted Least Squares Approximation. **Cubic B-Splines**: Least-Squares Solution – Representation of BSplines-Computation of B-Splines. **Fourier Approximation** : The Fourier Transform – The Fast Fourier Transform- Approximation Of Functions : Chebyshev Polynomials- Economization of Power Series.

UNIT 2 : **Numerical Solution Of Ordinary Differential Equations:** Predictor-Corrector Methods Adams – Moultan Method- Milne's Method. The Cubic Spline Method .**Boundary-Value Problems:** Finite-Difference Method- the Shooting Method- the Cubic Spline Method.

UNIT 3: Numerical Solution of Partial Differential Equations: Introduction- Finite-Difference Approximations to Derivatives.Laplace's Equation Jacobi's Method – Gauss-Seidel Method- SOR Method- The ADI Method- Parabolic Equations – Iterative Methods for the Solution Of Equations- Hyperbolic Equations.

UNIT 4: **The Finite Element Method** Introduction**:** Functional – Base Functions. Methods Of Approximation: The RayleighRitz Method – The Galerkin Method-Application to Two-Dimensional Problems. The Finite Element Method: Finite Element Method for One-dimensional problems- Application to Two Dimensional Problems.

Scope and Standard as in **"Introductory Methods Of Numerical Analysis"** by (Thirty-Third Printing (Fourth Edition February,2005) , Published by Prentice-Hall Of India Pvt.Ltd.,Delhi. S.S.Sastry

Chapter 4 : Sections 4.1,4.2,4.3,4.5,4.6.1,4.6.2,4.7, Chapter 7 : Sections 7.6,7.7,7.10 , Chapter 8 : Sections 8.1 to 8.6, Chapter 10: Sections 10.1,10.2,10.3,10.4

YOGI VEMANA UNIVERSITY COLLEGE :: KADAPA

DEPARTMENT OF APPLIED MATHEMATICS

M.Sc., MATHEMATICS

SYLLABUS

SEMESTER-II

MA 201 : TOPOLOGY

UNIT –I : **Metric spaces**-open sets-closed sets- convergence-completeness and Baire's theorem-Continuous mappings spaces of continuous functions-Euclidean and Unitary Spaces

UNIT – II: **Topological Spaces**, definition & examples-open bases and open sub bases weak topologies.

UNIT – III: **Compact spaces**- product spaces-Trychonoff's theorem and loally compact spacescompactness in Metric spaces- Acoli's Theorem.

UNIT-IV: **Separation** –T_1 Spaces and Hausdorff spaces –completely regular spaces and Normal spaces –Urysohn's lemma- Urysohn's imbedding theorem –Stone –Cech compactification - Connected spaces-Components of a space.

Scope and Standard as in "**Introduction to Topology and Modern Analysis**" by G.M. Simmons, MC Graw Hill Book company, inc. International student edition.

Chapter II, Chapter III : articles 16-19, Chapter IV: articles 21-25 , Chapter V: articles 26-30, and Chapter VI: articles 31 and 32

REFERENCE :

1. 'Topology' by K.Chandra Sekhara Rao, Narosa Publications
2. "Topology" by J.P. Chauhan, J.N. Sharma, Krishna Publications
3. "General Topology" by M.G. Murdeshwar, new age International publications

MA 202 : GALOIS THEORY

UNIT I: **Algebraic Extension of Fields:** Irreducible polynomials and Eisenstein Criterion - Adjunction of roots - Algebraic extensions - Algebraically closed fields.

UNIT II: **Normal and Separable Extensions:** Splitting fields - Normal extensions - Multiple roots - Finite fields - Separable extensions.

UNIT III: Galois Theory: Automorphism Groups and Fixed Fields - Fundamental theorem of Galois Theory - Fundamental theorem of Algebra.

UNIT IV: Applications of Galois Theory to Classical Problems: Roots of unity and Cyclotomic Polynomials - Polynomials solvable by radicals - Ruler and Compass constructions .

Scope and Standard as in **Basic Algebra by P.B. Bhattacharya**, by S K.Jain and S.R. Nagpaul, Cambridge University press.

Chapter 15: Sections 15.1, 15.2, 15.3 and 15.4, Chapter 16: Sections 16.1, 16.2, 16.3, 16.4 and 16.5, Chapter 17: Sections 17.1,17.2 and 17.3, Chapter 18: Sections 18.1, 18.3 and 18.5

REFERENCE BOOK

Topic in Algebra by I.N.Herstein.

MA 203 : PARTIAL DIFFERENTIAL EQUATIONS

UNIT I : Ordinary Differential Equations in more than two variables: Methods of solutions of dx/P = dy/Q = dz/R – Orthogonal trajectories of a system of curves on a surface Pfaffian differential forms and equations – Solution of Pfaffian Differential equations in three variables.

UNIT II : Partial Differential Equations of the First order : Partial differential equations – Origins of first order partial differential equations – Linear equations of first order – Integral surfaces passing through a given curve – Surfaces orthogonal to a given system of surfaces – Charpit's method – Jocobi's method.

UNIT III : Partial Differential Equations of the Second Order : The origin of second order equations – Linear Partial differential equations with constant coefficients – Equations with variable coefficients.

UNIT IV :Laplace's Equation : Elementary solutions of Laplce's equation – Families of equipotential surfaces –Boundary value problems –Separation of variable.

Scope and Standard as in "**Elements Of Partial Differential Equations**" by IAN Sneddon Macgraw Hill Company.

Chapter1: Sections 3,4,5,6, Chapter2: Sections 1, 2, 3, 4,5,6,10 ,13, Chapter 3: Sections 1,4,5. Chapter 4: Sections 2,3,4,5.

REFERENCE BOOK:-

1."Ordinary And Partial Differential Equations" By M.D.Raisinghania, Published

By S.Chand & Co, New Delhi.

MA 204 : ADVANCED COMPLEX ANALYSIS

UNIT I : Laurent series - Singular Points - Laurent series – Laurent's theorem- poles and Essential singular points – Behavior at an essential Singular point – Picards theorem – Behavior at infinity.

UNIT II : The Residue theorem and its Application:-The Residue theorem – Residues at infinity – Jorden's lemma – Evaluation of definite integrals – The Argument principle – The Theorems of Rouche and Hurwitz- Local behavior of analytic mappings – The Maximum Modulus principle – Schwarz's lemma.

UNIT III : Harmonic Functions *:* Laplace's Equation – Conjugate harmonic functions- Poisson's integral – Schwarz's Formula – The Dirichlet Problem.

Conformal mapping*:* General principles of Conformal mapping – Mapping of the upper half – plane onto a rectangle – The Schwarz's Christoffel transformation.

UNIT IV: Infinite product and partial fraction Expansions: Preliminary results – Infinite Products – Weierstrass theorem – Mittage – Leffler's theorem – The Gamma Function – Cauchy's theorem on partial fraction Expansions.

Scope and standard as in **"Introductory complex Analysis"** by Richard A. Silverman, Dover Publications, Inc. New York (1972), Chapters 11 to 15.

REFERENCE BOOKS :-

1.A Text book of "Functions of a Complex Variable" by J. N. Sharma.

2. A Text book of "Complex Variable Theory and Applications" by H. S. Kasana, Second edition.

MA 205 : FLUID DYNAMICS

UNIT I - Kinematics of Fluid in Motion: Real Fluids and Ideal Fluids - Velocity of a Fluid at a Point – Streamlines and Path lines - Steady and Unsteady Flows - The Velocity Potential- The Vorticity Vector - Local and Particle Rates of change - The Equation of Continuity – Worked Example - Accelerations of a Fluid- Condition at a Rigid Boundary – General Analysis of Fluid Motion.

UNIT II - Equations of Motion of a Fluid:-Pressure at a point in Fluid at Rest- Pressure at a point in a moving Fluid- Conditions at a Boundary of Two Inviscid Immiscible Fluids- Euler's Equations of Motion - Bernoulli's Equation - Worked Examples - Discussion of the case of Steady Motion under Conservative Body Forces.

UNIT III - Some Three Dimensional Flows:- Introduction – Sources - Sinks and Doublets- Images in Rigid Infinite Plane – Images in Solid Spheres – Axi - Symmetric Flows : Stokes's Stream function – Some special Forms of the stream Function for Axi-Symmetric Irrotational Motions.

UNIT IV - Some Two Dimensional Flows :- Meaning of Two – Dimensional Flow – Use of Cylindrical polar Co-ordinates – The Stream Function – The Complex Potential for Two-Dimensional – Irrotational – Incompressible Flow- Complex velocity Potentials for Standard Two – Dimensional Flows –The Milne – Thomson circle Theorem - The Theorem of Blasius Theorem

Scope and Standard as in "**Text Book of Fluid Dynamics**" by F.Chorlton, C.B.S. Publishers and Distributors, Delhi , 1985, Chapter 2, Chapter 3:Sections 3.1 to 3.7, Chapter 4 , and Chapter 5: Sections 5.1 to 5.5, 5.8 and 5.9

REFERENCE BOOKS:-

1. "**Classical Mechanics**" By Herbert Goldstain, Narosa Publishing House, Second Edition

2. "**Foundations Of Fluid Mechanics**" By S.W Yuvan Printice Hall of India Pvt.Ltd

YOGI VEMANA UNIVERSITY COLLEGE:: KADAPA
DEPARTMENT OF APPLIED MATHEMATICS
M.Sc., Mathematics
Semester - II

NON-CORE PAPER

BUISINESS MATHEMATICS

UNIT - I

Number - H.C.F. and L. C.M. of Numbers - Decimal Fractions.

UNIT - II

Surds and Indices – Percentage - Profit and loss.

UNIT - III

Linear Equations in Two Variables – Ratio and Proportion- Variation.

UNIT -IV

NUMBER SYSTEM:

Types of Number Systems – Conversion of Decimal Number to Binary Number and Vice versa -Conversion of Decimal numbers to Octal numbers and Vice versa - Converation of Hexadecimal number into Decimal number and Vice versa - Binary Airthmetic.

Scope and Standard as in **"OBJECTIVE ARITHMETIC" ,** by **R.S.Aggarwal ,** S.Chand and Company. Chapters 1,2,3,9,10,11,31,12,

Scope and Standard as in "**BUSINESS MATHEMATICS**", by P.R.Vittal , Margham Publications, Chapter 1

YOGI VEMANA UNIVERSITY COLLEGE :: KADAPA

DEPARTMENT OF APPLIED MATHEMATICS

M.Sc., MATHEMATICS

SYLLABUS

SEMESTER-III

MA 301 : FUNCTIONAL ANALYSIS

UNIT- I: Banach Spaces: The Definition and some Examples – Continuous Linear Transformations - The Hahn – Banach Theorem.

UNIT –II: The natural imbedding of N in N ** - The open mapping theorem - The conjugate of an Operator.

UNIT- III:Hilbert Spaces:The definition and some simple properties - Orthogonal complements - Orthonormal sets - The Conjugate space H *

UNIT – IV : The adjoint of Operator - Self - adjoint operators - Normal and Unitary Operators Projections.

Finite Dimensional Spectral Theory: Determinants and the Spectrum of an operator - The Spectral Theorem.

Scope and Standard as in "**Introduction To Topology And Modern Analysis"** by G.F.Simmons, Mc Graw – Hill book Company , Inc., International Student Edition.

Chapters: 9,10, Chapter 11 :Sections 2 and 3

REFERENCE BOOKS :-

1. "Functional Analysis" By G.Backmenn and Narici.
2. "Functional Analysis" By P.K.Jain IP.Ahuja and Khalil Ahmed.
3. "Introduction Functional Analysis with Application" By E.Krayszing.
4. "Functional Analysis" By B.V,Limage.
5. "A First course in Functional Analysis" By C.Goffman and G.Pederick Prentice Hall of India.

MA 302 : DISCRETE MATHEMATICS

UNIT I - Mathematical Logic : Normal forms- Disjunctive, Conjugative Principle- Disjunctive Principle – Conjunctive normal forms- Ordering and uniqueness of normal forms- Statements – Connectives -Tautologies –The Theory of inference for Statement calculus - Rules of inference - Predicate Calculus - Inference theory for predicate Calculus.

UNIT II - Relations : Properties - Equivalence Relations - Partial order relations and partially ordered sets - Semi groups and monoids - Sub semi - groups and Submonoids - Homomorphism of Monoids and Semi groups.

UNIT III - Lattices : Lattices as Partially order sets – Complete - Complemented and Distributive Lattices – Sub Lattices – Direct Product and Homeomorphisms.

UNIT IV - Boolean Algebra : Boolean algebras as lattices - Examples - Join irreducible elements - Mini terms - Boolean forms and their Equivalence - Sum of products - Canonical forms - Minimization of Boolean functions - Karnaugh maps - Application to switching algebras.

Scope and Standard as in "**Discrete Mathematical Structures With Application To Computer Science**" by J.P Trembley and P.Manohar , Mc Graw-Hill book Co.1997.

Chapter 1: Articles 1.2, to 1.6, Chapter 2: Article 2.3, Chapter 3: Article 3.2

Chapter 4: Articles 4.1, 4.2, 4.3 and 4.4 .

REFERENCE BOOK :-

1. C.L Liu, "**Elements of Discrete Mathematics"** Tata Mc Graw Hill Publishing Company Ltd. New Delhi.(Second Edition)

MA 303 : SEMIGROUPS

UNIT-I :-Introductory Ideas: Basic Definitions - Monogenic Semigroups - Ordered sets, Semi lattices and Lattices - Binary Relations, Equivalences.

UNIT-II :-Congruences-Free Semi groups - Ideals and Rees Congruences - Lattices of equivalences and congruences.

UNIT-III :-Green's Equivalences: Introduction –The equivalences $\mathcal{L}, \mathcal{R}, \mathcal{H}, \mathcal{J}$, and $\mathfrak{D}$ -The structure of $\mathfrak{D}$- Classes – Regular $\mathfrak{D}$- Classes-Regular Semigruops

UNIT-IV:- 0 - Simple Semigroups: Introduction - Simple and 0-Simple Semigroups; Principle Factors-Rees's Theorem - Primitive idempotents - Congruences on completely 0-Simple semi groups.

Scope and Standard as in **AN INTRODUCTION TO SEMIGROUP THEORY** by J.M. Howie (1976), Academic Press, (Contents of the Syllabus : **Chapters- I, II and III**).

Chapter1: Sections 1.1,1.2,1.3,1.4,1.5,1.6 & 1.7, Prepositions 8.1 ,8.2,8.3,8.4,8.5,8.6 & 8.7 of Section 1.8; Chapter 2: Sections 2.1 ,2.2 & 2.3, Prepositions 4.1 ,4.2,4.3,4.4,4.5 & 4.6 of Section 2.4 ; Chapter 3: Section 3.1, Lemmas 2.3 ,2.4,2.5,2.6 & 2.7 of Section 3.2, Theorem 3.12 to Lemma 3.3 of Section 3.3, Lemma 4.6 to 4.17 of Section 3.4.

Elective-I
35054 - A

MA 304 : OPERATIONS RESEARCH

UNIT I: Linear Programming Problem:
Mathematical Formulation: Introduction - Mathematical Formulation of the Problem
Linear Programming problem : Graphical solution Introduction- Graphical Solution Method – Some Exceptional Cases

Linear Programming : Simplex Method :- The Computational Procedure – Use of Artificial Variables**.**

UNIT II : **Transportation Problem:** Introduction – General Transportation Problem – The Transportation Table – Duality in Transportation Problem –Loops in Transportation Tables- LP Formulation of the Transportation Problem – Solution of a Transportation Problem – Finding an Intial Basic Feasible Solution – Test for Optimality – Degeneracy in transportation Problem – Transportation Algorithm (MODI Method) – Stepping Stone solution Method- Some Exceptional Cases

UNIT III : **Assignment Problem:** Introduction – Mathematical Formulation of the problem – The Assignment Method – Special cases in Assignment problems – A Typical Assignment problems – The Travelling Salesman Problem.

UNIT IV: Games and Strategies : Introduction – Two-Person Zero-Sum Games – Some Basic Terms- The Maximin – Minimax Principle – Games Without Saddle Points—Mixed Strategies – Graphic Solution of 2 x n and m x 2 Games – Dominance Property- Arithmetic Method for n x n Games – General Solution of m x n Rectangular Games**.**

Scope and Standard as in "**Operations Research**" by Kanti Swarup , P.k.Gupta and ManMohan , Sultan Chand & Sons , New Delhi.

Chapter 2: Sections 2.1 and 2.2 ;Chapter 3: Sections 3.1 to 3.3; Chapter 4: Sections 4.3 and 4.4; Chapter 10: Sections 10.1 to 10.13; Chapter 11: Sections 11.1 to 11.16, Chapter 17: Sections 17.1 to 17.9

REFERENCE BOOKS:

1. S.D. Sharma, "Operations Research"
2. H.A Taha, "Operations Research – An Introduction".
3. "Operation Research " By Pannerselvam R, Published by Prentice Hall of India New Delhi , 2002 Edition

Elective-I
35054 - B

MA 304 : CODING THEORY

UNIT I : Introduction to Coding Theory : Introduction – Basic Assumptions- Correcting and Detecting Error Patterns – Information Rate – The Effects of Error Corrections and Detection – Finding the Most Likely Codeword Transmitted – Some Basic Algebra – Weight and Distance – Maximum Likelihood Decoding – Reliability of MLD – Error – Detecting Codes – Error – Correcting Codes.

UNIT II : Linear Codes : Two Important Subspaces – Independence, Basis, Dimension – Matrices – Bases for C = < S > and $C^{"¥"}$ - Generating Matrices and Encoding – Parity – Check Matrices – Equivalent Codes – Distance of Linear Code – Cosets – MLD for Linear Codes – Reliability of IMLD for Linear Codes.

UNIT III : Perfect and Related Codes : Some Bounds for Codes – Perfect Codes – Hamming Codes – Extended Codes- The Extended Golay Code – Decoding the Extended Golay Code- The Golay Code – Reed – Mullar Codes – Fast Decoding for RM (1,m).

UNIT IV : Cyclic Linear Codes : Polynomials and Words – Introduction to Cyclic Codes – Polynomial Encoding and Decoding – Finding Cyclic Codes – Dual Cyclic Codes.

Burst Error – Correcting Codes : Introduction – Interleaving – application to Compact Disc.

Scope and Standard as in **"Coding Theory The Essentials"** by D.G.Hoffman, D.A. Leonard, C.C. Linder, K.T.Phelps, C.A.Rodger, J.R.Wall, Monographs and text books in Pure and Applied Mathematics.

Chapter 1: Sections 1.1 to 1.12, Chapter 2: Sections 2.1 to 2.12, Chapter 3: Sections 3.1 to 3.9, Chapter 4 :Sections 4.1 to 4.5 , Chapter 7: Sections 7.1 to 7.3 .

Elective -II
35055-A

MA 305 : C AND DATA STRUCTURES

(A) 'C' PROGRAMMING:

UNIT 1: Overview of C- Constants, variables and Data Types – Operators and Expressions – Managing Input and Output operations-Decision Making and Branching – Decision Making and looping –Arrays.

UNIT II :- Character Arrays and Strings - User- defined Functions - Structures and Unions – Pointers – File mangement in C.

TEXT BOOK ; Scope and Standard as in chapters 1 to 12 of 'C' programming by E.BALAGURU SWAMY, published by Tata Mc Graw Hill Book co .

(B) DATA STRUCTURE :

UNIT III : (a) **Introduction and overview:-**
concept of Data Structures- Implementations of Data Structures.
(b) **Arrays:-**
Definition- Terminolgy - One Dimensional Array - Memory allocation for an Array – Operations on Arrays – Application of Arrays.
(c) **Linked Lists:-**
Definitions - Single linked lists - Represenation of Linked list in Memory – Operation on a linked list in Memory.
(d) **Stacks And Queues:-**
Introduction – Definition- Representation- Deletion- Insertion Operation.

UNIT IV :- **Trees:-**
Basic Concepts – Binary Trees - Properties of binary Trees - Linear, Linked Representation of binary Trees - Insertion, Deletion, Traversal opertions of Binary Trees - Binary Search Trees - Help Trees.

Scope and Standard as in **"Classic Data Structures"** by SAMANTA. D Published by Prentice Hall of India. New Delhi.

Chapter 1, Chapter 2: Sections 2.1,2.2,2.3.1 and 2.3.2,
Chapter 3: Sections3.1 and 3.2; Chapter 4: Sections 4.1,4.2 and 4.3.1,
Chapter 7 :Sections 7.1,7.2.1,7.2.2,7.3.1,7.3.3,7.4.1,7.4.2,7.4.4,7.5.1,7.5.2 and 7.5.3

Elective-II
35055-B

MA 305 : BIOMECHANICS

UNIT I : Mathematical models in pharmacokinetics.

Basic Equations and their Solution ; Solution for Special Cases.

UNIT II : Models for blood flows 1

Some basic concepts of fluid dynamics ; Basic Concepts about blood, Cardiovascular system and blood Flow

UNIT III : Models for blood flow 2

Steady Non – Newtonian fluid flows in circular tubes; Newtonian Pulsatile flow in Rigid and Elastic tubes ; Blood flow through Artery with mild Stenosis

UNIT IV : Models of flows for other Biofluids

Peristaltic flow in tube and channel; Two Dimensional flow in Renal tubule; Lubrication of Human joints.

Scope and Standard as in "**Mathematical Models in Biology and Medicine"** by J.N.Kapur Affiliated East – West press Pvt.Ltd., New Delhi.

Chapter 10: Sections 10.1,10.2, Chapter 11: Sections 11.1,11.2,11.3,11.5, Chapter 12: Sections 12.1,12.3,12.4 ,

REFERENCE BOOK :-

1.Y.C.Fung , **Bio-Mechanics**, Springer – Verlag, New York Inc., 1990

YOGI VEMANA UNIVERSITY COLLEGE :: KADAPA
DEPARTMENT OF APPLIED MATHEMATICS
M.Sc., Mathematics
MATHEMATICS AND APPLICATIONS
Semester - III

NON-CORE PAPER

UNIT-I ChainRule -Time and Work.

UNIT-II Time and Distance.

UNIT-III Mensuration: Area, Volume and Surface Areas.

UNIT-IV Matrix Algebra: Matrix-Types of Matrices-Addition and subtraction of matrices-Multiplication of two matrices -Transpose of a matrix- Determinant of a matrix – Singular and Non singular matrices – Inverse of a matrix – Solving the equation by using Matrix Invertion method.

Scope and Standard as in " **OBJECTIVE ARITHMATIC**", by R.S.Aggarwal S.Chand and Company. Chapters 14,15,17,23,24

Scope and Standard as in of " **BUSINESS MATHEMATICS**" by **P.R.VITTAL** , Margham Publications. Chapter 2,

YOGI VEMANA UNIVERSITY COLLEGE :: KADAPA

DEPARTMENT OF APPLIED MATHEMATICS

M.Sc., MATHEMATICS

SEMESTER-IV

MA 401 : LEBESGUE MEASURE AND INTEGRATIONS

UNIT- I: Unions, Intersections and Compliments – Algebras of sets-Countable sets, Relations and Equivalences- Well Ordering and the Countable Ordinals, Open and Closed Sets of Real Numbers- continuous Functions – Borel sets.

UNIT - II: Lebesgue Measure : Introduction, Outermeasure, Measurable sets and Lebesgue measure, a non measurable set, Measurable functions, Little wood's three principles.

UNIT- III: The Lebesgue Integral : The Riemann integral, the Lebesgue integral of a bounded function over a set of finite measure, the integral of a non negative function, the general Lebesgue integral, convergence in measure.

UNIT- IV: Differentiation and Integration : Differentiation of Monotone function- Functions of bounded variations- Differentiation of an integral – Absolute continuity-Convex functions.

Scope and standard as in **"Real Analysis** "by H.L.Royden, Prentice Hall of India private limited, New Delhi, 2001-Third edition.

Chapter 1:Sections 1.3, 1.4, 1.6, 1.7 and 1.9, Chapter 2: Sections 2.5, 2.6, 2.7, Chapter 3, Chapter 4 and Chapter 5.

MA 402: GRAPH THEORY

UNIT I - Introduction to Graphs : Definition - Graphs As Models - Vertex Degrees - Sub graph paths and cycles - The Matrix Representation of Graphs - Fusion.

UNIT II Tress and connectivity : Definition and simple properties - Bridges -Spanning tress - Connector Problems - Shortest path Problem - Cut Vertices and connectivity.

UNIT III Euler tours and Hamiltonian cycles: Euler tours - The Chinese Postman Problem – Hamiltonian graphs - The Traveling salesman Problem.

UNIT IV Planar Graphs : Plane and Planar graphs - Euler's Formula - The platonic bodies - Kuratowski's Theorem - Non Hamiltonian plane graphs - The Dual of a plane graph.

Scope and Standard as in "**A First Look At Graph Theory**" By John Clark and Derek Allan Holton, Allied Publishers Ltd.

Chapters 1,2,3 and 5,

REFERENCE BOOKS :-

1. "Graph Theory With Application" J.A.Bondy and U.S.R.Murthy, Millon Press.
2. "Discrete Mathematical Structure and Graph Theory" – By Rao.
3. A Text Book of "Graph Theory and its Applications" – By B.Suryanarayana and G.K.Ranganath.

MA 403: NUMBER THEORY

UNIT I Arithmetical Functions and Dirichlet Multiplication: Introduction – The Mobius function $\mu(n)$ – The Euler totient function $\phi(n)$ –A relation connecting ϕ and μ - A product formula for $\phi(n)$ – The Dirichlet product of arithematical functions – Dirichlet inverses and the Mobius inversion formula – The Mangoldt function $\Lambda(n)$ – Multiplicative functions Multiplicative functions and Dirichlet multiplication – The inverse of a completely multiplicative function – Liouville's function – The divisor function $\sigma_\alpha(n)$ – Generalized Convolutions – Formal Power series – The Bell series of an Arithmetical function – Bell series and Dirichlet multiplications – Derivatives of arithmetical functions – The Selberg identity.

UNIT II Averages Of Arithmetic Functions : Introduction - The big on notation- Asymptotic equality of functions – Euler's summation formula – Some elementary asymptotic formulas – The average order of $d(n)$ - The average order of the divisor functions $\sigma_\alpha(n)$ – The average order of $\phi(n)$ – An application to the distribution of lattice points visible from the origin – The average order of $\mu(n)$ and of $\Lambda(n)$ – The partial sums of a Dirichlet product.

UNIT III Congruences: Definition and basic properties of congruences – Residue classes and complete residue systems – Linear congruences – Reduced residue systems and the Euler – Fermat theorem – Polynomial congruences modulo p. Lagrange's theorem – Applications of Lagrange's theorem – Simultaneous linear congruences – The Chinese remainder theorem – Application of the Chinese remainder theorem –Polynomial congruences with prime power moduli – The principle of cross – Classification – A decomposition property of reduced residue system.

UNIT IV Quadratic Residues and The Quadratic Reciprocity Law: Quadratic residues – Legender's symbol and its properties – Evaluation of $(-1 \mid p)$ and $(2 \mid p)$ – Gauss' lemma – The quadratic reciprocity law – Application of the reciprocity law – The Jacobi symbol.

Primitive Roots : The exponent of a number mod m. Primitive roots – Primitive roots and reduced residue systems – The non existence of primitive roots mod 2^α for $\alpha \geq 3$.

Scope and Standard as in "**Introduction to Analytical Number Theory**", by Tom. M. Apostol, Springer International Student Edition

Chapter 2, Chapter 3: Sections 3.1 to 3.10, Chapter 5, Chapter 9: Sections 9.1 to 9.7 ,

Chapter 10: Sections 10.1 to 10.3

REFERENCE BOOK :-

Niven , I and Zuckerman , H.S (1972) "**An Introduction to the Theory of Numbers**", 3rd Edition, New Yory " John Wiley and sons, Inc

Elective-III

45054-A

MA 404: MATHEMATICAL STATISTICS

UNIT I Probability : Sample space – Events – Probability – The addition rule – The multiplication rule – Bayes's Formula – Random variables – Discrete random variables – Density functions - Joint definition functions – Marginal and conditional distributions – Continuous random variables – Joint continuous Density functions.

UNIT II Some Particular Probability Distributions: Discrete variables – Continuous variables

UNIT III Sampling theory : Random sampling – Moments of Multivariate Distributions – Properties of E – sum of independent variables – Distribution of $\bar{X}$ from a normal Distribution – Distribution of X from a non –normal Distribution – Distribution of Linear functions – Distribution of the sample variance – Hypothesis testing Applications.

UNIT IV General Principles for Statistical Inference: Estimation – Testing Hypothesis – Testing goodness of fit: Multinomial Distribution – The χ^2 Test – Limitations on the χ^2 Test – Generality of χ^2

Scope and Standard as in **"Introduction to Mathematical Statistics"** by Paul G.Hoel John Wiley & sons. (Fourth Edition), 1971.

Chapters: 2,3,5,8 and 9

REFERENCE BOOKS :-

1. Hogg R.V. and Craig A.L. Introduction to Mathematical Staistics, American publication.
2. Fundamental of Mathematical Statistics, S.C.Gupta,V.K.Kapoor,Sultan Chand & sons

MA 404: THEORETICAL COMPUTER SCIENCE

UNIT-I: The Theory of Automata: Definition of an Automaton-Description of a Finite Automaton0 Transition Systems-Properties of Transition Functions-Acceptability of a string by a Finite Automation-Nondeterministic Finite state Machines –The Equivalence of DFA and NFDA Mealy and Moore models-Minimization of Finite Automata .

UNIT-II: Formal Languages: Basic Definition and Examples-Chomsky Classification of Languages- Languages and Their Relation- Recursive and Recursively Enumerable Sets-Languages and Automata

Regular Sets and Regular Grammars: Regular Expressions-Finite Automata and Regular Expressions- Pumping Lemma for Regular Sets – Application of Pumping Lemma – Closure properties of Regular set Regular sets and Regular Grammars

UNIT-III: Context Free languages: Context – free Languages and Derivations trees-Ambiguity in context free Grammars-Simplification of context free grammers –oramla forms for context-Free Grammars –Pumping lemma for context –free Languages-Decision algorithms for context-Free Languages.

UNIT-IV:Pushdown Automata : Basic Definitions- Acceptance by pda-Pushdown Automata and context Free Languages

Turing Machines: Turing Machine model –Representation of Turing Machins – Languages acceptability by Turing machines – Design of Turing Machines

Scope and standard as in "**Theory of Computer Science"** by Mishra (Automata , Languages and computation) K.L.P and Chandrasekharan, N. Published by Prenctic Hall of India , Second Edition (4^{th} printing) August 1998.

Chapter 2, Chapter 3, Chapter 4, Chapter 5, Chapter 6: Sections 6.11 6.2 and 6.3, Chapter 7: Sections 7.1 7.2, 7.3 and 7.4

REFERENCE : 1. Theoretical computer Sciences – Juraj Hromkovic Springer publication

2.Discrete Mathematics & Graph Theory, by Satynarayan Bhavanari.K. Syam Prasad, PHI PVT.Ltd., New Delhi Second Edition,2014.

Elective-IV
45055-A

MA 405: MATHEMATICAL MODELING

UNIT-1:- Mathematical Modelling Through Ordinary Differential Equations of First Order Linear Growth And Decay Models - Non Linear Growth And Decay Models - Compartment Models-Mathematical Modeling in Dynamics through Ordinary Differential Equations of First Order - Mathematical Modelling of Geometrical problems through Ordinary Differential Equations of First order.

UNIT-II:- Mathematical Modelling Through Systems of Ordinary Differential Equations of the First order.

Mathematical Modelling in population Dynamics – Mathematical Modelling of Epidemics through systems of Ordinary Differential Equations of First order – Compartment Models Through systems of Ordinary Differentional Equations – Mathematical Modelling In Economics based on Systems of Ordinary Differntal Equations of first order-Mathematical Modelling in Medicine, Arms race Battles and International Trade in terms of systems of Ordinary Differential Equations - Mathematical Modelling in Dynamics through systems of Ordinary Differential Equations of First order.

UNIT III :-Mathematical Modelling Through Ordinarry Differential Equations of Second order.

Mathematical \Modelling of planetary motions- Mathematical Modeling of Circular Motion And Motion of Satellites- Mathematical Modelling Through Linear Differential Equatins of Secnd Order-Miscellaneous Mathematical Models Through Ordinary Differential Equations of the Second Order.

UNITIV :- (A) Mathematical Modelling through Difference Equations:-

Basic Theory of Linear Difference Equations with constant Co-effcients - Mathematical Modelling through Difference Equations in Economics and Finance – Mathematical Modelling through Difference Equations In Population Dynamics and Genetics.

(B) Mathematical Modelling Through Partial Differential Equations:- Mass-Balance Equations –Momentum-Balance Equations.

Scope and Standard as in **"MATHEMATICAL MODELLING"** by J.N.Kapur, Wiley Eastern Limited (1988)

Chapter 2, Chapter 3, Chapter 4, Chapter 5: Sections 5.2 to 5.4, Chapter 6 : Sections 6.2 & 6.3

Elective-IV
45055-B

MA 405: FUZZY SETS AND FUZZY LOGIC

UNIT I : Fuzzy Sets : An overview – Basic Types and Concepts – Characteristics and significance of the Paradigm – Properties of α- Cuts – representation of Fuzzy sets – Extension Principle for Fuzzy Sets.

UNIT II :Operations on Fuzzy Sets : Types of Operations – Fuzzy complements – t-norms, t-conforms – combinations of operations- aggregation of Operations – Fuzzy Arithmetic – Fuzzy Nembers- Linguistic Varibles – Arithmetic Operations on Intervals – Arithmetic Operations on Fuzzy Numbers – Lattice of Fuzzy Numbers – Fuzzy Equations.

UNIT III: Fuzzy Relations : Crisp versus Fuzzy Relations – Projections and Cylindric Extensions – binary Fuzzy Relations – Binary Relations on a Single Set- fuzzy Equivalence Relations – Fuzzy Compatibility Relations - Fuzzy Ordering Relations – Fuzzy Morphisms – Sup – I Compositions of Fuzzy Relations – inf- w_i Compositions of Fuzzy Relations – Fuzzy Relation Equations - General Discussion – Problem Partitioning – Solution Method – fuzzy Relation Equations Based on sup – I compositions – Fuzzy Relation Equations Based on inf- w_i Compositions – Approximate Solutions – The use of Neural Networks.

UNIT IV :Possibility Theory : Fuzzy Measures – Evidence Theory- Possibility Theory – Fuzzy sets and Possibility Theory – Possibility Theory Versus – Orobability Theory – Fuzzy logic – Classical Logic – Multivalued Logics – Fuzzy Propositions – Fuzzy Quantifiers – Linguistic hedges – Inference from Conditional Fuzzy Propositions – Inference from Conditional and Qualified Propositions – Inference from quantified propositions.

Scope and standard as in **"Fuzzy sets and Fuzzy logic Theory and Applications"** by George J. Klir / Bo Yuan, PHI, 2001. Chapters 1 to 8,

DEPARTMENT OF APPLIED MATHEMATICS
Scheme of Examination for I, II , III & IV Semesters
Course: Mathematics
(With effect from Under CBCS 2018 – 2019)

Paper code	Title of the Paper	No of credits		Marks		Total Marks
				Internal	External	
SEMESTER -I						
15051	Algebra	5		30	90	120
15052	Real Analysis	5		30	90	120
15053	Ordinary Differential Equations	5		30	90	120
15054	Complex Analysis	5		30	90	120
15055	Numerical Methods	5		30	90	120
SEMESTER -II						
25051	Topology	5		30	90	120
25052	Galois Theory	5		30	90	120
25053	Partial Differential Equations	5		30	90	120
25054	Advanced Complex Analysis	5		30	90	120
25055	Fluid Dynamics	5		30	90	120
25056 Non-Core	**Business Mathematics**	**0**		**25**	**75**	**100**
SEMESTER -III						
35051	Functional Analysis	5		30	90	120
35052	Discrete Mathematics	5		30	90	120
35053	SemiGroups	5		30	90	120
35054-A Operations Research 35054-B Coding Theory		5	Elective -I	30	90	120
35055-A 'C' & Data Structures 35055-B Biomechanics		5	Elective -II	30	90	120
35056 Non Core	**Mathematics and Applications**	**0**		**25**	**75**	**100**
The student has to choose one from each of the Elective I and Elective II						
SEMESTER -IV						
45051	Lebesgue Measure Integration	5		30	90	120
45052	Graph Theory	5		30	90	120
45053	Number Theory	5		30	90	120
45054-A Mathematical Statistics 45054-B Theoretical computer science		5	Elective -III	30	90	120
45055-A Mathematical Modelling 45055-B Fuzzy sets and Fuzzy logic		5	Elective -IV	30	90	120
The student has to choose one from each of the Elective III and Elective IV						

Course Total Marks: 2400 (Core papers)

- **200 Non –Core**

Semester –I Theory : 600 marks **(25 Credits)**
Semester –II Theory : 600 marks **(25 Credits)**
Semester –III Theory : 600 marks **(25 Credits)**
Semester –IV Theory : 600 marks **(25 Credits)**

Examination Pattern: Each theory paper consists of section A **and** Section B .Section A consists of eight short questions, students has to Answer five out of eight questions and each short question carries **6** marks. Section B consists of four essay type questions with internal choice from each Unit carrying **15** marks.

- **The marks will not be considered for awarding the grade point but the candidate should pass since these are part of CBCS.**

PAPER CODE:

M.Sc. Degree Examination, Month – Year
I / II / III / IV Semesters
Department of Applied Mathematics
(With effect from under CBCS 2018-19)

Time: 3Hours **Max.Marks:90**

(No additional Sheet will be supplied)

Part –A **5 x 6 = 30**

Answer ***any five*** Questions
Each Question carries ***Six (6)*** Marks

1.
2.
3.
4.
5.
7.
8.

Part – B **4 x 15 = 60**

Answer ***All*** Questions
Each Question carries ***Fifteen (15) Marks***

Unit-I

9.

{OR}

10.

Unit-II

11.

{OR}

12.

Unit – III

13.

{OR}

14.

Unit – IV

15.

{OR}

16.

M.Sc., Mathematics Degree Examinations

Second / Third Semesters

Paper-VI – Business Mathematics / Mathematics and Applications

(No additional sheet will be supplied)

(NON-CORE SUBJECT)

Time : 3 hours Max. Marks : 75Marks

Part-A $5 \times 5 = 25 Marks$

Answer **Any Five (5)** of the following

Each question Carries **Five (5) marks**

1.
2.
3.
4.
5.
6.
7.
8

Part-B $4 \times 12\,{}^{1}/_{2} = 50$Marks

Answer **ALL** The Questions.

Each question Carries **$12\,{}^{1}/_{2}$Marks**

9.

{OR}

10

11.

{OR}

12.

13.

{OR}

14.

15.

{OR}

16.

M.Sc. Zoology syllabus

(With effect from Academic year 2018-19 for first semesters)

Structure of M.Sc. Zoology course

A two years M.Sc., programme is formulated for developing competent Zoology. The programme obliges students to read original publications and envisages significant inputs in Laboratory work, communication skills, creativity, planning, execution and critical evaluation of the scientific data. The course titles have been carefully chosen to represent the core courses and the specialization introduced in the two years course of Zoology are :- Invertebrate & Vertebrate , Gamete and Development biology, Endocrinology, Genetics & Evolution, Cell biology & Microbiology, Tools & Techniques, Metabolic regulations & cell functions, Animal Physiology, Biostatistics & Bioinformatics, Environmental Biology, Animal behaviour & Neurobiology, Enzymology, Toxicology & Pharmocalogy, Animal Biotechnology, Immunology and Molecular Biology inconsonance with the objectives of the University. The courses formulated have a Zoological slant than biological and are up to date. The course is fine tuned in order to enhance the job opportunities of the students.

M.Sc., Zoology

I Semester

S**. No**	Course	Marks		Total Marks
		Internal	External	
ZTH101	Structural anatomy of Invertebrate and vertebrate	25	75	100
ZTH102	Genetics & Evolution	25	75	100
ZTH103	Cell Biology & Microbiology	25	75	100
ZTH104	Tools and Techniques in Biology	25	75	100
ZTH105	Structural anatomy of Invertebrate and vertebrate & Genetics & Evolution (Practical-1)			100
ZTH106	Cell Biology & Microbiology & Tools and Techniques in Biology (Practical-2)			100

II Semester

S.**No**	Course	Marks		Total Marks
		Internal	External	
ZTH201	Metabolic Regulation & Cell Function	25	75	100
ZTH202	Developmental Biology	25	75	100
ZTH203	Animal Physiology	25	75	100
ZTH204	Biostatistics and Bioinformatics	25	75	100
ZTH205	Metabolic Regulation & Cell Function & Developmental Biology (Practical-1)			100
ZTH206	Animal Physiology & Biostatistics and Bioinformatics (Practical-2)			100

Non-core: ZTH 207: **Animal diversity and Economic Zoology**

III Semester

S.**No**	Course	Marks		Total Marks
		Internal	External	
ZTH301	Environmental Biology	25	75	100
ZTH302	Molecular Biology	25	75	100
ZTH303	Endocrinology	25	75	100
ZTH304	Enzymology	25	75	100
ZTH305	Environmental Biology & Molecular Biology (Practical-1)			100
ZTH301	Endocrinology & Enzymology (Practical-2)			100

Non-core: ZTH 307: Biodiversity and Wild Life Management: 100

IV Semester

S**. No**	Course	Marks		Total Marks
		Internal	External	
ZTH401	Animal Biotechnology	25	75	100
ZTH402	Toxicology And Pharmacology	25	75	100
ZTH403	Neurobiology And Animal Behaviour	25	75	100
ZTH404	Immunology	25	75	100
ZTH405	Animal Biotechnology & Toxicology And Pharmacology (Practical-1)			100
ZTH406	Neurobiology And Animal Behaviour & Immunology (Practicals-2)			100

EVALUATION

Evaluation is done by continuous assessment and semester- end examinations. Theory, practical (Lab work) will be carried out under the supervision of faculty.

I Semester

1. Four theory papers	4X100 =	400
2. Structural anatomy of Invertebrate and Vertebrate & Genetics & Evolution		100
3. Cell Biology & Microbiology & Tools and Techniques in Biology		100
	Total =	600

II Semester

1. Four theory papers	4X100 =	400
2. Metabolic Regulation & Cell Function & Developmental Biology		100
3. Animal Physiology & Biostatistics and Bioinformatics		100
	Total =	600
Non – Core: **ZTH 207**: Animal diversity and Economic Zoology		100

III Semester

1. Four theory papers	4X100 =	400
2. Environmental Biology & Molecular Biology		100
3. Endocrinology & Enzymology		100
	Total =	600
Non – Core: **ZTH 307**: Biodiversity and Wild Life Management		100

IV Semester

1. Four theory papers	4X100 =	400
2. Animal Biotechnology & Toxicology and Pharmacology		100
3. Neurobiology and Animal Behaviour & Immunology		100
	Total =	600

Grand total Marks = 600+600+600+600= **2400**

Non-core 200 Marks will not be counted for deciding percentage/grade

YOGI VEMANA UNIVERSITY :: KADAPA

M.Sc. Zoology

Revised Syllabus Effective from the Academic Year 2018-19

Semester- I

ZTH 101 : STRUCTURAL ANATOMY OF INVERTEBRATA & VERTEBRATA

UNIT -I

1.1 Species concept, International code of Zoological nomenclature, Taxonomical procedures, New trends in taxonomy
1.2 Acoelomata, Pseudocoelomata, Coelomata, Protostomia and Dueterostomia
1.3 Patterns of feeding and digestion in Porifera and Coelenterata
1.4 Feeding in Polychaeta, Mollusca and Echinodermata

UNIT-II

2.1 Structure of Gill, Lungs and Trachea
2.2 Circulatory system in Annelids, Arthropods and Mollusca
2.3 Advanced nervous system- Annelida, Arthropoda and Mollusca
2.4 Larval forms of Crustacea and Echinodermata

UNIT-III

3.1 Vertebrate integument and its derivatives: skin structure and functions, glands, scales, horns, claws, nails, hoofs, feathers and hairs
3.2 Evolution of heart
3.3 Evolution of aortic arches
3.4 Comparative account of respiratory organs

UNIT-IV

4.1 Evolution of Urinogenital system in vertebrate series
4.2 Organs of Olfaction, taste and lateral line system
4.3 Comparative anatomy of the brain in relation to its functions
4.4 Spinal cord and cranial nerves in mammals

List of Practicals

1. Museum study of all phylum wise representatives (Protozoa to Echinoderm)
2. Museum study of all class wise representatives (Cyclostomes & Mammals)
3. Virtual dissection of crab nervous system
4. Virtual dissection of *Poiceloceros* digestive, reproductive and nervous system
5. Virtual dissection of cockroach reproductive and nervous system
6. Virtual dissection of weberian ossicle and brain in *Labeo rohita*
7. Virtual dissection of cranial- Nerves of *Labeo rohita*
8. Virtual dissection of cranial Nerves of frog/ toad
9. Virtual dissection of circulatory (arterial & venous) system in *Calotes*
10. Virtual dissection of Urinogenital system in *Calotes*.

SUGGESTED READING MATERIAL

1. Hyman, L.H. The Invertebrates. Vol.1. Protozoa through Ctenophora, Mc Graw Hill Co., New York.
2. Barrington, E.J.W. Invertebrate structure and function. Thomas Nelson and Sons Ltd., London.
3. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York&London.
4. Hyman, L.H. The Invertebrates. Vol.8. Mc Graw Hall Co., New York and London.
5. Hyman, L.H. The Invertebrates. Vol.2 Mc Graw Hall Co., New York and London.
6. Barmes, R.D. Invertebrate Zoology, III edition. W.B. Saunders Co., Philadelphia.
7. Russel-Hunter, W.D. A biology of higher invertebrates, the Macmillan Co. Ltd., London.
8. Hyman, L.H. The Invertebrates smaller coelomate groups, Vol. V. Mc. Graw Hill, Co., New York
9. Read, C.P. Animal Parasitism. Prentice Hall Inc., New Jersey~! .
10. Sedwick, A. A student text book of Zoology, Vol.II and III. Central Book Depot, Allahabad.
11. Parker, T.J., Haswell, W.A. Text Book of Zoology, Macmillan Co., London.
12. Alexander, R.M. The Chordata. CambridgeUniversity Press, London
13. Barrington, E.J.W. The Biology of Hemichordata and Protochordata. Oliver and Boyd, Edinbourgh.
14. Bourne, G.H. The structure and functions of nervous tissue. Academic Press, New York.
15. Carter, G.S. Structure and habit in vertebrate evolution –Sedwick and Jackson, London.
16. Eecles, J.C. The understanding of the brain. McGraw Hill Co., New York and London.
17. Kingsley, J.S.Outlines of Comparative Autonomy of Vertebrates. Central Book Depot, Allahabad.

ZTH 102: GENETICS & EVOLUTION

UNIT – I

1.1 Principles of Mendelian Inheritance- Identification of DNA as a genetic material, Gene as a unit of expression.

1.2 Interaction of genes: Multiple alleles, ABO groups & Rh factor, Epistasis; Incomplete dominance, codominance; Complementary genes, duplicate genes, lethal genes

1.3 Linkage, Recombination and gene mapping

1.4 Mutations: a) spontaneous and b) induced mutations; c) Molecular basis of mutations

UNIT – II

2.1 a) Numerical and Structural abnormalities of human chromosomes and syndromes
b) Human karyotype and human genome

2.2 Sex linked inheritance

2.3 Pedigree analysis

2.4 Eugenics: a) Positive eugenics, Artificial insemination, sperm banks
b) Negative eugenics, Amniocentesis, consanguinity, Genetic counseling

UNIT – III

3.1 Theories of organic evolution- Emphasis on Darwinism and Lamarckism

3.2 Neo-Darwinism

3.3 Role of isolating mechanisms

3.4 Models of speciation (Allopatric, sympatric and parapatric)

UNIT – IV

4.1 A detailed account on destabilizing forces (i) Natural selection (ii) Mutation (iii) Genetic drift
4.2 Phylogenetic gradualism & punctuated equilibrium
4.3 Micro & Macro evolution
4.4 Gene Evolution and Amino acid sequence and phylogeny

List of Practicals

1. Blood grouping
2. Rh factor demonstration
3. Mendelian ratios and its related Problems
4. Karyotyping
5. Syndrome charts – demonstration
6. Demonstration of Barr bodies
7. Problems on Hardy Weinberg's law

SUGGESTED READING MATERIAL

1. Genetics – Monrve W. Strickberger. 3rd Ed., May, 2000.
2. Genetics – K.B. Ahluwallia – 1985.
3. Principles of Genetics – E.J. Gardner. M.J. Simmons & D.P. Snustad.
4. Molecular Biology of genes – Watson, J.D., N.H. Hopkins, J.W. Roberts, J.A. Steitz &A.M.
5. Weiner. The Benjamin Cummings publishing company. Inc. Tokyo.
6. Basic Human Genetics – E.J. Mange, Arthur P. Mange. Indian Print, 1997.
7. Genetic disorders of Man by M.R. Goodman.
8. An introduction to modern genetics by Ch. Waddinsgton.
9. Dobzhansky, Th. Genetics and origin of species, Columbia University press.
10. Dobzhansky, Th., F.J. Ayala, G.L. Stebbins and J.M. Valentine EVOLUTION: Surjeet publications, New Delhi latest edition.
11. P.A. Moody Introduction to Evolution II ed/latest: Kalyani publishers, New Delhi.
12. Hartl, D.L. A primer of population genetics, Sinauer Associatesm Inc., Massachusetts.
13. Peter Volpe E. Understanding Evolution, University Book stall, New Delhi.
14. An introduction to genetic analysis. Griffiths, A.J.F., J.H. Miller, D.T. Suzuki, R.C. Lewontin & W.M. Gelbark, W.H. Freeman and Company, New York.

ZTH 103: CELL BIOLOGY & MICROBIOLOGY

UNIT – I

1.1 Cell organelles- Ultrastructure and functions: Cell Membrane, ER and Golgi complex,
1.2 Cell organelles- Ultrastructure and functions: Nucleus, Mitochondria, Ribosomes and Lysosomes
1.3 Cell Division and Regulation- Mitosis, Meiosis, Cell Cycle and its regulation
1.4 Cell death and proliferation – Apoptosis: definition, morphological and biochemical differences between apoptosis and necrosis, mechanism (internal and external signals) and significance. Brief account of biology of cancer.

UNIT – II

2.1 Cell signaling: Models of cell-cell signaling (steroid receptors, nitric oxide and carbon monoxide)

2.2 Functions of cell surface receptors (G-protein coupled receptors, Tyrosine kinases, cytokine receptors, receptors linked to other enzymatic activities), Pathways of intracellular signal transduction (cAmp pathways, cyclic cGMP, phospholipids and Ca^{2+}, Ras, Raf and MAP kinases)

UNIT-III

3.1 History and Scope of Microbiology

3.2 Microbial nutrition, growth and their control

3.3 Normal microbial flora of human body-skin, nose, respiratory tract, stomach, intestine, urinogenital tract.

3.4 Microbial diseases and their control

a) Bacterial diseases - Tuberculosis, Plague, Anthrax,

b) Viral diseases - AIDS, Rabies, Hepatitis

c) Fungal diseases - Cutaneous mycoses, Sub-cutaneous mycoses and Systemic mycoses, d) Protozoan diseases - Amoebiasis and Malaria

UNIT-IV

4.1Microbiology of fermented food (Diary Products, Meat and Fish, Microorganisms as sources of food

4.2 Industrial Microbiology (Types of fermentation process, Alcoholic beverages)

4.3 Industrial productions - Lactic acid and Glutamate

4.4 Therapeutic compounds – Antibiotics (Penicillin), Steroids and Industrial enzymes (Amylase and Protease).

List of Practicals

1. Mitosis – Onion root tips
2. Meiosis in flower buds/ Grasshopper testis
3. Giant chromosome in Chironomus Larva
4. Effect of colchicine on mitosis
5. Staining techniques–simple, Gram's staining
6. Isolation of microorganisms
7. Wet mount preparations
8. Antibiotic sensitivity tests

SUGGESTED READING MATERIAL

1. Cell Biology (Fundamentals and Applications) By Gupta / Jangir, 2001; Agrobios, India.
2. Cell and Molecular Biology by EDR De Robertis and EMR De Robertis Jr, Indian Edition, B.I. Publicaitons, Pvt. Ltd.
3. The Cell (A Molecular Approach) by Geoffrey M. Cooper, 2nd Edn. 2000, ISBN.
4. Text Book of Microbiology, by R. Aananthnarayan &C.K. Jayaram Panikar, 4th Edition, Orient Longmen, Hyderabad, 1990.
5. General Microbiology by C.B. Powar & H.F. Daginawala 1st Edition, Himalaya Publishing House, Bombay, 1982.
6. Elements of Microbiology, by M.J. Pelzar, Jr & E.C.S Chan International students Edition, 1981, MCGRAW-Hill international Book Company, New Delhi.
7. Microbiology C.M. Presscots, J.P. Harley & D.A Klein Mc Graw Hill. WCB

ZTH 104: TOOLS AND TECHNIQUES IN BIOLOGY

UNIT-I

1.1 Microscopy: Types of microscopes – Phase contrast microscope, Fluorescence microscope; Electron microscope – TEM and SEM

1.2 Centrifugation – basic principles, Types of rotors, high speed and ultracentrifuge

1.3 Principles of spectroscopy, Laws of Light absorption, applications of Colorimetry, Spectrophotometry

1.4 Measurement of pH and biological Buffers

UNIT-II

2.1 Chromotography – paper chromatography – thin layer chromatography

2.2 Ion exchange chromatography and affinity chromatography

2.3 Introduction to FPLC and HPLC

2.4 Radio isotope techniques – types of radio isotopes, detection and measurement of radiaoactivity, Applications of radio isotopes in biological sciences and safety measures

UNIT-III

3.1Microtomy and staining procedures– types of microtomes, types of stains, staining procedures of biological materials

3.2 Electrophoresis: SDS-PAGE, Agarose gel electrophoresis

3.3 Blotting techniques

3.4 ELISA

UNIT-IV

4.1 Design and functioning of tissue culture laboratory methodology

4.2 Culture media preparation

4.3 Cell proliferation measurements

4.4 Cell viability testing and cell harvesting methods

List of Practicals

1. Separation of biological compounds by paper chromatography
2. Preparation of Buffers and Measurement of pH
3. Separation of biological compounds of by TLC
4. Absorption spectra of proteins and nucleotides
5. Separation of mitochondria and differential centrifugation
6. Separation of biomolecules using HPLC
7. Preparation of cell culture media
8. Separation of proteins by SDS-PAGE

SUGGESTED READING MATERIAL (ALL LATEST EDITIONS)

1. Animal Cell Culture – A practical approach, Ed.John. R.W.Masters, IRL Press.
2. Introduction TO Instrumental analysis, Ronert Braun. McGraw Hill International
3. A Biologists Guide to Principles and Techniques of Practical Biochemistry, K. Wilson & K.W. Goulding, ELBS Edn.
4. Advanced Micripipette Techniques for cell physiology. K.T. Brown and D.G. Flamming IBRO,Hand Book Series.A Wiley Interscience publications,John Wiley and Sons,New York

5. Neuro anatomical Techniques, N.J. Stransfed and T.A. Miller Springer Verlag, New York Heidelberg, Berlin, 1980.
6. Principles of Neuropsychopharmacology by Robert S. Feldman, Jerrold S. Meyer and Unida quenzer. Sinancer Associates Inc. Publishers. Sunderland, Massachusetts, 1997.
7. General Zoological Microtechniques – F.M. Weesner.

PRACTICALS

ZPR 105: Practicals related to theory papers ZTH 101 and ZTH 102
ZPR 106: Practicals related to theory papers ZTH 103 and ZTH 104

Semester- II

ZTH 201: METABOLIC REGULATION & CELL FUNCTION

UNIT – I

1.1 Chemical bonds (Covalent, Hydrogen bonds, Ionic bonds, Vanderwall's interactions)
1.2 Thermodynamic principles in biology
1.3 Outline classification of organic compounds (carbohydrates, proteins and lipids)
1.4 Orders of protein structure (primary, secondary, tertiary and quaternary)

UNIT – II

2.1 Glycolysis, TCA cycle and their biological importance
2.2 Pentosephosphate pathway, gluconeogenesis
2.3 Regulation of carbohydrate metabolism (Glycolysis and TCA cycle)
2.4 Mitochondrial electron transport system, Oxidative phosphorylation

UNIT – III

3.1 Beta-oxidation of palmitic acid; Biosynthesis of long chain fatty acids (Palmitic acid)
3.2 Oxidative deaminaiton, decarboxylation and transamination of amino acids.
3.3 Biosynthesis of Urea and detoxification of ammonia
3.4 Biosynthesis of polyamines

UNIT – IV

4.1 Nucleotides and types
4.2 Biosynthesis of Nucleotides
4.3 Degradation of Nucleotides
4.4 Clinical disorders of purine metabolism

SUGGESTED READING MATERIAL

1. Robert K.Murrey, D.K. Granner, P.A. Mayes and V.W. Rodwell; Harper's Biochemistry McGraw Hill Publishers.
2. Biochemistry by A.L.Lehninger, Kalyani publishers, New Delhi.
3. D. Voet and J.G. Voet, Biochemistry, J. Wiley & Sons.
4. David L. Nelson and Michael M. Cox, Lehninger; Principles of Biochemistry, McMillan Worth Publications.

List of Practicals

1. Estimation of glucose
2. Estimation of soluble and structural proteins
3. Estimation of carbohydrates
4. Estimation of amino acids
5. Estimation transport of Glucose
6. Estimation of Blood glucose
7. Estimation of Lipids
8. Estimation of Triglycerides

ZTH 202: DEVELOPMENTAL BIOLOGY

UNIT I

1.1 Germ line determination: Germ plasm and the determination of the primordial germ cells.
1.2 Germ cell determination in Nematodes, Insects and Amphibians.
1.3 Germ cell migration in Drosophila
1.4 Germ cell migration in Amphibians, Reptiles, Birds and Mammals

UNIT II

2.1 Gametogenesis: Morphological basis in animals, semen composition, formation, sperm function, Spermatogenesis
2.2 Leydig cells: Morphology, Differentiation, function and its regulation.
2.3 Oogenesis and Vitellogenesis: Ovulation, super ovulation and ovum transport in mammals.
2.4 Fertilization: Biochemistry of fertilization and post fertilization events.

UNIT III

3.1 Creating Multi-cellularity: Cleavage types, comparative account of gastrulation, Neurulation
3.2 Germ layers: Ectoderm, Mesoderm and Endoderm
3.3 Tetrapod limb development
3.4 Metamorphosis in Insects and Amphibians

UNIT IV

4.1 Biology of sex determination: Testis determining genes, ovarian development, secondary sex determination in mammals, Environmental sex determination
4.2 Body axes: Establishment of body axes in mammals
4.3 Proximate tissue interaction
4.4 Genes and Morphogenesis

List of Practicals

1. Observation of developmental stages in frog and chick
2. Observation of different cleavage stages in the eggs of *Lymnea* (fresh water snail)
3. Role of shell during developmental of chick
4. Protein turnover during development of chick
5. Phosphorous metabolism in developing chick embryo
6. Calorific values during the development of chick

7. Ontogeny of excretory pattern in developing chick
8. Vitellogenesis in Crab
9. Fecundity index in Crab
10. Induced breeding in Frog
11. Spermatozoa observation in different vertebrates

Reference Books:

1. Austen, C.R. and Short, R.V. Reproduction in Animals
2. Schatten and Schatten. Molecular Biology of Fertilization
3. F.T. Longo, Fertilization, Chapman & Hall
4. R.G. Edwards, Human Reproduction
5. S.F. Gillbert, Development Biology, Sinauer Associates Inc., Massachusetts
6. Ethan Bier the Coiled Spring Harlsor Laboratory Press, New York.

ZTH 203: ANIMAL PHYSIOLOGY

UNIT – I

1.1 Feeding mechanisms and regulation
1.2 Comparative physiology of digestion of carbohydrates, protein and fats
1.3 Gastro-intestinal Hormones in regulation of digestion
1.4 Vitamins and their role in cellular metabolism

UNIT – II

2.1 Respiration- Types of Respiration, Respiratory organs, Mechanism of Respiration
2.2 Circulation of body fluids and types of hearts
2.3 Patters of nitrogen excretion among different animal groups and their evolutionary significance
2.4 Osmoregulation in different animal groups (aquatic and terrestrial)

UNIT – III

3.1 Principles of Thermoregulation
3.2 Homeothermic animals and Poikilothermic animals
3.3 Hibernation and Aestivation
3.4 Biological rhythms

UNIT – IV

4.1 Bioluminesence- Chemistry and functional significance
4.2 Chromatophores and regulation of their function
4.3 Structure and function of muscles, Theories of muscle contraction.
4.4 Physiology of receptors (Photo, Phono and chemo receptors)

List of Practicals

1. Assay of lipase
2. Assay of amylase
3. Assay of pepsin
4. Assay of ascorbic acid
5. Demonstration of cell fragility in different media (Iso, hypo and hyper)

6. Muscle contraction demonstration
7. Study of Myogenic and Neurogenic hearts
8. Demonstration of rate of oxygen consumption in crab/fish.

SUGGESTED READING MATERIAL

1. C.L. Prosser. Comparative Animal Physiology. W.B. Saunders & Company
2. R. Eckert. Animal Physiology. Mechanisms and Adaptation. W. H. Freeman & Company
3. W.S. Hoar. General and Comparative Animal Physiology
4. Schiemdt-Nielsen. Animal Physiology. Adaptation and Environment. Cambridge
5. C.L. Prosser. Environment and Metabolic Physiology Wiley-Liss, New York.

ZTH 204: BIOSTATISTICS AND BIOINFORMATICS

UNIT – I

1.1 Definition - scope of biostatistics
1.2 Measures of central tendency – arithmetic mean, median and mode
1.3 Measures of dispersion -range, mean deviation, standard deviation, Standard error
1.4 Co-efficient of variation, types of correlation, linear regression analysis

UNIT –II

2.1 Concepts of probability, laws; Normal probability distribution and its application
2.2 Tests of significance: Students t-Test (simple, paired), F- test
2.3 Application of $\chi 2$ (chi-square) test in biology and testing the goodness of fit.
2.4 Analysis of Variance (ANOVA), SPSS

UNIT – III

3.1 History of Computers, classification of computers, computer generations
3.2 Input, output processing and storage devices –, hard disk, CD – ROM, DVD etc.
3.3 Operating system – Introduction – types of operating systems
3.4 MS – Office (ACCESS, EXCEL, WORD, POWER POINT), applications of computers in biology

UNIT –IV

4.1 Internet basics; WWW, HTML and HTTP
4.2 Scope, importance and status of Bioinformatics
4.3 Biological databases (Gene bank and Protein sequence database)
4.4 Sequence analysis: Pair wise and multiple sequence alignment; human genome project

List of Practicals:

1. Problems related to Mean, mode and median
2. Problems related to test of significance
3. Analysis of variance (ANOVA)
4. Probit analysis
5. Regression curves
6. Generation of graphs using MS-Excel
7. Power point presentations
8. Data analysis using SPSS
9. Sequence data retrieval in Fasta format from NCBI database
10. Searching with Blast

11. Secondary structure Prediction
12. Viewing of PDB files using Rosmol
13. Aligning sequence using ClustalX

SUGGESTED READING MATERIAL

1. Computers to-day by Suresh K. Basandra (1999), Published by Galagotia Publications, Pvt. Ltd., New Delhi
2. Microsoft Office, by Setultz, 1997.
3. Database processing by D.M. Kroenke, Galgotia Publications, 1990.
4. Introduction to Biostatistics – By Sokal – Rohlf (2^{nd} Edn) freeman International Editor, 1971.
5. Bio – Statistics – An introductory text – Goldstein, A The Macmillan Co., New York,1971.
6. Bio – Statistics - By Lewis Alvin E. Affiliated East – West press (P)Ltd., 1971.
7. Statistical analysis in Biology by Mather, K Chapman and Hall, London, 1972.
8. Probit analysis by finney, D.J.S. Chand & Co., Ltd,. New Delhi
9. Biostatistics by Lewis Alvin (1971) Affiliates East West Press Pvt., Ltd., New Delhi.
10. Statistical methods in Biology by Bailey Norman T.J. (1965) The English Language Book Society & the English university Press Ltd.
11. Bioinformatics. Murthy, C.S.V. Himalaya Publishing House, Hyderabad
12. Bioinformatics by Andreas D. Baxevanis and B.F. Francis Ouellette, 2^{nd} Ed., 2002.
13. Basic Bioinformatics by S. Ignaeimuthi, S.J. Narosa publications, 2005
14. Introduction to Bioinformatics, S. Sundara Rajan and R. Balaji, Himalaya Publishing House, 2003.

PRACTICALS

ZPR 205: Practicals related to theory papers ZTH 201 and ZTH 202
ZPR 206: Practicals related to theory papers ZTH 203 and ZTH 204

Semester- III

ZTH 301: ENVIRONMENTAL BIOLOGY

UNIT – I

1.1 A general account on Biomes and their environments
1.2 Fresh water: Classification and Characteristics, eutrophication, seasonal changes
1.3 Marine: Classification and Characteristics
1.4 Terrestrial: Characterization of Forests- Grass lands – Tundra –Desert

UNIT – II

2.1 Dynamic view of ecosystem and Energy Flow patterns in different ecosystems
2.2 Estimation of Energy Budget, Biomass and Productivity
2.3 Biogeochemical cycles- hydrological (water), oxygen, nitrogen, phosphorus and sulphur cycles.
2.4 Natural calamities and Disaster management in India

UNIT – III

3.1 Air Pollution: Criteria and Standards in India, Health hazards and Toxicology – Green House gases and Green House effect

3.2 Water Pollution: Criteria and Standards in India, Health hazards and Toxicology

3.3 Environmental epidemiological studies- Community environmental epidemiology and Occupational environmental epidemiology. Environmental health hazards- epidemiological episodes in India and abroad.

3.4 Environmental Laws: Environmental Laws in India- Legislation and Execution

UNIT-IV

4.1Biomonitoring; Scope and biological monitoring programmes; Mussel Watch Program

4.2 Bio-indicators and environmental monitoring, Environmental impact assessment

4.3 Bioremediation; Need and scope of bioremediation.

4.4 Environmental applications of bioremediation

List of Practicals:

1. Estimation of dissolved oxygen content in different water samples
2. Effect of Photoperiodism on CO_2 levels in different water samples
3. Estimation of Organic matter in water and soil samples
4. Estimation of BOD in different water samples
5. Calculation of energy budget of an ecosystem
6. Analysis of OP compounds in water samples through TLC
7. Estimation of inorganic phosphate levels and biomass in surface and sediment waters
8. Determination of Calcium in a sedimentary bed and surface waters of freshwater pond

SUGGESTED READING MATERIAL

1. Practical methods in Ecology & Environmental Science, R.K. Trivedy, Goel, Trisal, 1997.
2. Environmental Physiology of desert organism. Ed.by N.F. Hadley – Dowden Huchinson and Ross, Inc.Penn.USA.
3. The Ecology of waste water treatment – H.A. Hawkes pergoman press, 1963.
4. Biochemical ecology and water pollution – P.R. Dugan, plenum press, London, 1972.
5. Pesticides in the environment – R. White Stevenns, Marcel-Dekker Inc. New York, 1971.
6. Environmental Science Research Volumes:
   Vol.1. Indicators of environmental quality – W.A. Thomas, 1972.
   Vol.3. Environmental pollution by pesticides – C.A. Edwards, 1974.
   Vol.5 Environmental dynamics of pesticides – R. Hague and V.H. Preed, 1975.
7. Ecology & Environment – P.D. Sharma, 1991.
8. Field Biology & Ecology – Allen H Benton & E. Werner, JR, 1980.
9. Encyclopedia of environmental pollution and control, enviromedia, Karad, Vol.1&2, R.K Trivedi.
10. Ecotechnology for pollution control and environmental management, enviromedia, Karad, R.K. Trivedi.
11. Health hazards and human environment, World Health Organization (WHO)1972.
12. Current pollution researches in India – R.K. Trivedy and P.K. Goel. Karad.
13. Chemical and biological methods for water pollution studies – R.K. Trivedy and P.K. Goel, 1984.

14. "Prime Minister Narendra Modi releases country's first-ever National Disaster Management Plan", The Times of India, 1 June 2016
15. Parliament of India (23 December 2005), "Disaster Management Act, 2005, [23rd December, 2005.] NO. 53 OF 2005" (PDF), Ministry of Home Affairs (India)
16. Natural Hazard and Disaster Management Hardcover – May 2008 by B. C. Jat
17. Disaster Management Hardcover – 6 Jul 2013 by Vinod K. Sharma
18. Disaster Management: Global Challenges and local solutions by Rajib Shaw / R. R. Krishnamurthy.
19. Disaster Management and Strategies Concept & Methods, Risk Reduction & Insurance, Experiences & Case Studies by Ashu Pasricha / Kiyanoush Ghalavand / Jai Narain Sharma
20. Disaster Management (3 Vols.) Man-made Disasters by K. K. Singh / Lotfi Aleya / Vinod Singh.
21. Industrial Pollution – V.P. Kudesia, 1990.
22. Animal Physiology – Adaptation & Environment. 4th Edition – Knut Schmidt – Nielsen – CambridgeUniversity Press.
23. Environmental Biology and Toxicology-P.D. Sharma, Rastogi Publications, Meerut (India), 1998.
24. Biodegradation & Bioremediation – 2nd editon, Martein Alexander – Academic Press, 1999 USA.
25. Water Treatment and purification technology – W.J. Ryan, Agrobios (India), Jodhpur, 2002.
26. Methods in Environmental Analysis – Water soil and air by P.K. Gupta – Agrobios (India), Jodhpur, 2001.

ZTH 302: MOLECULAR BIOLOGY

UNIT-I

1.1 Central dogma of Molecular biology; Chromosomal Organization
1.2 Nuclear and mitochondrial genome
1.3 Structure of gene (Cistron, Muton, Recon)
1.4 Watson and Crick Model; Types of DNA; Properties of DNA

UNIT-II

2.1 Replication in Prokaryotes and Eukaryotes; General principles, enzymology, various modes (conservative, semi conservative and dispersive) and models of replication (rolling circle, θ-mode replication - uni and bidirectional),
2.2 DNA synthesis by reverse transcription
2.3 Post replicational modifications and Inhibitors of replication
2.4 DNA damage and repair mechanisms: Photo reactivation, excision repair, recombination & SOS repair

UNIT III

3.1 Transcription: Types of RNA, enzymes and molecular mechanisms involved in Transcription (RNA Polymerases, promoters, initiation, elongation and termination of RNA synthesis)
3.2 Post transcriptional modification (Cap, Poly A formation and splicing), Ribozymes
3.3 Translation: General features (Genetic code, codon, degeneracy and universality) molecular mechanism of translation

3.4 Post translational modification; Role of antibiotics in protein synthesis

UNIT IV

4.1 General principles of gene regulation with reference to Lac and trp
4.2 Tryptophan Operon, Britten and Davidson model for Eukaryotic regulation
4.3 DNA sequencing, DNA finger printing, Polymerase chain reaction
4.4 Polymerase chain reaction (PCR)

List of Practicals:

1. Estimation of DNA by diphenylamine method
2. Determination of purity and quantity of DNA
3. Determination of melting temperature (Tm) of DNA
4. Estimation of RNA by orcinol method
5. PAGE electrophoresis of proteins
6. Problems related to molecular biology
7. Southern and Western blotting
8. Electro-elution of DNA
9. Polymerase chain reaction

SUGGESTED READING MATERIAL

1. Molecular Biology by David Freifelder, 1993
2. Molecular Biology of Gene-by J.D.Watson, 1988
3. Harper's review of Biochemistry by D.W. Martin et al 1990
4. Biochemistry by A.L. Lehninger
5. Cell and Molecular Biology-E.D.P. De Robertis and E.M.F. De Robertis
6. Concepts in Molecular Biology-S.C. Rastogi, V.N. Sharma and AnandaTandon (1993)
7. Genes VII by Benjamin Lewin
8. Genes VIII and IX by Benjamin Lewin.

ZTH 303: ENDOCRINOLOGY

UNIT-I

1.1 Introduction to Endocrinology- Historical back ground, characteristic features of hormones
1.2 Classification and chemical nature of hormones
1.3 Mechanism of hormone action (Peptide and Steroid hormones)
1.4 General account of Pheromones

UNIT-II

2.1 Structure and functions of hormones of Pineal, Pituitary, thyroid and Parathyroid
2.2 Structure and functions of hormones of Adrenals, Pancreas and Gastrointestinal tract
2.3 Hormones in female sexual cycle, Pregnancy and lactation
2.4 Hormones of Testis and regulation of spermatogenesis

UNIT-III

3.1 Biosynthesis and secretion of hormones corticosterioid hormones-peptide hormones-catecholamines
3.2 Hormone receptors; receptor structure and signal transduction mechanism-G-protein family
3.3 Hormones in crustaceans - growth, development and reproduction.
3.4 Hormones in insects - growth, development and reproduction.

UNIT-IV

4.1 Growth hormones and growth factors
4.2 Hormones and homeostasis (Calcium, glucose, Phosphate, water)
4.3 Hormonal regulation of carbohydrate, nitrogen and lipid metabolism
4.4 Hormones as pharmaceuticals

List of Practicals:

1. Observation of the histological section of the pituitary, adrenals, pancreas and gonads
2. Isolation and extraction of pituitary gland from fish
3. Estimation of glucose levels in the blood of frog/rat exposed to adrenaline and insulin
4. Estimation proteins in the reproductive tissues of a fish injected with pituitary extract
5. Estimation of SDH activity in the heamolymph of eyestalk ablated crab
6. Estimation of oxygen consumption in eyestalk ablated crab
7. Demonstration on the effect of ligature on the development of larvae of insects
8. Estimation of glucose in alloxon-induced diabetes
9. Effect of adrenalectomy on total proteins in the liver of albino rats

SUGGESTED READING MATERIAL

1. Barrington. E.J.W. General and comparative Endocrinology Cambridge Press, Oxford.
2. Bentley, P.J. Comparative Vertebrate Endocrinology, Cambridge Press, Oxford
3. Williams, R.H. Text Book of Endocrinology, W.B. Saunders Co., Philadelphia.
4. Martin, C.R. Endocrine Physiology. OxfordUniv. Press, Oxford.
5. Prakash S. Lohar. Endocrionology-Hormones and human health-2005. MJP Publishers-Chennai

ZTH 304: ENZYMOLOGY

UNIT – I

1.1 Classification of enzymes and nomenclature
1.2 Enzyme specificity (optical specificity, group specificity)
1.3 Quantitative measurement of enzyme activity
1.4 Isolation of enzymes, Intracellular distribution of enzymes

UNIT – II

2.1 Bioenergetics- Kinetic theory and collision theory
2.2 Mechanism of enzyme action (Lock and key; Induced fit model), catalytic site, Role of metal ions.
2.3. Effect of reactant concentration (Rate constant, First order, Second order and Zero Order reactions)
2.4 Effect of enzyme concentration, pH and temperature

UNIT – III

3.1 Effect of substrate concentration, Determination of kinetic constants (K_m and V_{max})

3.2. Inhibition of enzyme activity (competitive, non-competitive, uncompetitive, mixed inhibition and inhibitor constant K_i)

3.3 Kinetics of Allosteric enzymes

3.4 Regulation of enzyme activity (Metabolic regulation), Catalytic efficiency of enzymes (Feedback inhibition, covalent modification)

UNIT – IV

4.1 Enzymes in clinical diagnosis

4.2 Immobilized enzymes and their applications

4.3 Isozymes

4.4 Enzyme engineering

List of Practicals:

1. Effect of pH on SDH activity and determination of ionizable groups
2. Effect of temperature on SDH activity and determination of activation energy using Arrhenius equation
3. Determination of kinetic constants such as Km and Vmax
4. Inhibitor sensitivity (determination of IC_{50})
1. Effect of inhibitors on SDH activity and determination of inhibitors constant
2. Estimation of GOT and GPT in the serum samples
3. Isolation and purification of arginase
4. Isolation of LDH isozymes using electrophoresis
5. Determination of Ks (substrate constant) for any allosteric enzyme using Hill equation
6. Characterization of any selected enzyme using bioinformatic tools (sequence determination, homology search, structure, genomic sequence, cDNA sequence, dendrogram, metabolic function.

SUGGESTED READING MATERIAL

1. Harper's Biochemistry by Robert K. Murray, Peter A. Mayer, D.K. Granner, V.W. Rodwell, Lange Medical Book.
2. Enzyme kinetics by D.V. Roberts, Cambridge University Press.
3. Enzyme Kinetics by I.W. Segel.
4. Biochemical calculations by I.H. Segel 2nd Ed. John Wiley & Sons.
5. Biochemistry by D. Voet and J.G. Voet, J.Wiley & Sons.

PRACTICALS

ZPR 305: Practicals related to theory papers ZTH 301 and ZTH 302

ZPR 306: Practicals related to theory papers ZTH 303 and ZTH 304

Semester -IV

ZTH 401: ANIMAL BIOTECHNOLOGY

UNIT-I

1.1 General Introduction and Achievements of Biotechnology

1.2 Enzymes used in gene cloning - Restriction endonucleases, DNA ligases, Kinase, Phosphatase, Nucleases, Polymerases, Reverse transciptase

1.3 Cloning vectors (Plasmids, Phages, cosmids, yeasts Shuttle vectors), viral vectors (SV40, Adenovirus and Baculovirus) used in Gene cloning.

1.4 Cloning and selection strategies of recombinants (antibiotic selection, blue white screening, colony hybridization, Fluorescence in-Situ Hybridization (FISH) and immunological test.

UNIT-II

2.1 Preparation of cell lines, types of cell lines. Types of Stem Cells, Stem Cell Therapy

2.2 Applications of cell culture in Veterinary– Disease diagnosis, virus vaccines, hormones

2.3 Application of Biotechnology in Medicine- Production of monoclonal antibodies (Hybridoma technology), Production of vaccines and Production of Growth Hormone

2.4 Gene therapy: Introduction, principle of gene transfer and examples (Adenosine deaminase deficiency disease, Duchenne Muscular dystrophy disease and Cystic fibrosis)

UNIT-III

3.1 Livestock improvement: Manipulation of reproduction in animals (Artificial insemination, multiple ovulations, *in vitro* fertilization, Embryo transfer technology)

3.2 Methods of gene transfer – Microinjection, electroporation, lipofection and viral mediated gene transfer techniques

3.3 Generation of chimeric, transgenic and knockout mice and other animals and their characterization. Gene editing- Gene silencing-CRISPR-associated protein-9 nuclease (Cas9) technology

3.4 Potential application of transgenic animals: models for various diseases/disorders, production of peptides and proteins of biopharmaceutical interest (molecular farming)

UNIT-IV

4.1 Growth hormone transgenics and stem cell technology for betterment of aquaculture. Sex reversal in fishes and their applications, Production of monosex populations. Aquaculture and fish seed production: Hypophysiation, hCG injections

4.2. Marine bio/fish resources and its applications in pharmaceutical and Nutraceutical Industries

4.3. Fresh water and marine (oyster) pearl culture technology, pearl culture in India, uses of pearl culture

4.4. Intellectual Property Rights: Introduction; Types of IP; Patents and its types, Trademarks, Copyright & Related Rights, Protection of GMOs; ethical and legal issues in Biotechnology.

List of Practicals:

1. Instrumentation in animal biotechnology laboratory
2. Preparation of different types of culture media
3. Isolation of genomic DNA
4. Bacterial Plasmid DNA Isolation
5. Restriction digestion and ligation of vector and insert gene
6. Bacterial transformation using plasmid
7. Cell counting using hemocytometer
8. Staining and viability testing of animal cells
9. Media preparation and membrane filtration
10. Preparation of single cell suspensions from spleen and thymus
11. Sterilization techniques (Physical and chemical)

SUGGESTED READING MATERIAL

1. Animal Biotechnology-M.M. Ranga, Agrobios (India)-2000
2. Biotechnology-Fundamentals & Applications-S.S.Purohit & S.K. Mathur, Agro Botonics-1999
3. A text book on Biotechnology-(II Ed.) H.D. Kumar. EWP-Private Ltd., New Delhi-1998
4. A text book of Biotechnology-R.C. Dubey.S.Chand & Company Ltd., New Delhi-1996 Biotechnology-V. Kumaresan. Saras Publication-1994
5. Animal Biotechnology – Recent concepts and developments. P. Ramadass, MJP Publications, Chennai, 2009
6. Venkitaraman: Economic Zoology (Sudarsana Publishers, 1983)
7. Srivastava: A text book of Applied Entomology, Vol. II and III (Kalyani Publishers, 1988, 1991)
8. Shukla & Upadhyaya: Economic Zoology (Rastogi Publishers, 1999-2000)
9. Dunham R.A. Aquaculture and Fisheries Biotechnology and Genetic Approaches.CABI Publishing,UK.
10. Animal Transgenisis and Cloning. Edited by L. M. Houdebine, Wiley, USA.

ZTH 402: TOXICOLOGY AND PHARMACOLOGY

UNIT-I

1.1 Origin and scope of Toxicology and Principles of Toxicology
1.2 Distribution, Excretion and Absorption of toxicants
1.3 Bio accumulation, bio-magnifications and Biotransformation of Toxicants
1.4 Teratogens and their effects on mammalian development

UNIT-II

2.1 Classification of pesticides, mechanisms of pesticide toxicity and detoxification mechanisms.
2.2 Toxicity Evaluation (LC50 & LD50) and factors affecting the Toxicity
2.3 Toxic effects of metals (Cadmium, Lead and Mercury)
2.4 Sources of radiation, types of radiation and physiological hazards of radiation.

UNIT-III

3.1 Scope and Importance of Pharmacology – dosage forms and routes of drug administration.
3.2 Pharmacokinetics – absorption, distribution, metabolism and excretion.

3.3 Pharmacodynamics – mechanisms of drug action, combined effect of drugs and factors modifying drug action.
3.4 Response of cells to drugs

UNIT- IV

4.1 Response of central nervous system to depressants: alcohols and Opium
4.2 General anaesthetics – Properties of anaesthetics (Ether and Barbiturates)
4.3 Effects of analgesics and antipyretics
4.4 Pharmacologic agents in allergic diseases- Histamines and antihistamines

List of Practicals:

1. Determination of LC_{50} and LD_{50} of selected toxicants in different animals.
2. Effect of temperature on the ciliary activity in the normal and pesticide/ metal exposed fresh water muscles
3. SDH activity in activity in different tissues of frog/fish with reference to malathion/mercury/cadmium
4. Effects of toxicants on the rate of oxygen consumption of aquatic animals
5. Effects of toxicants on total proteins of fish/ frog
6. Teratogenic effects of pesticides on mice
7. Pesticidal effect on morphology of tissue
8. Routes of drug administration
9. Assay of paracetamol and ibuprofen by using UV-Vis spectroscopy by linear curve method.
10. Detection of calcium levels in *calcical-300* by atomic absorption spectroscopy
11. Simultaneous determination of *ibuprofen* and *paracetamol* by UV spectrophotometry
12. Qualitative and quantitative determination of vitamin c in *citrus limon* by high performance liquid chromatography
13. Identification of drugs using TLC.

SUGGESTED READING MATERIAL

1 Toxic interactions-R.S.Goldstein, W.R. Hewitt and J.B.Hook. Academic Press-1990
2 Pesticides and human Welfare-D.L.Gunn and J.G.R. Stevens. OxfordUniversity Press-1978
3 Pesticides action and Metabolism-O' Brien
4 Environmental toxicology of Pesticides-F. Mastimura, G.M.Boush and T. Misato
5 The Encyclopedia of Americana-Vol.15
6 Introduction to Biochemical Toxicology-E. Hodgson & F.E. Gutherie
7 Casarett & Doul's –Toxicology-The basic science of poisons-C.D.Klassen, Mary, O.A & John Doull
8 Pharmacologic principles of Medical practice John C. Krantz Jr C. Jellaff carr.
9 An introduction to pharmacology and therapeutics James Andrew Gunn
10 Crash course: Pharmacology Darson
11 Pharmacology, Brenner stevans
12 Text book of Pharmacology- Laurence Bennett
13 Pharmacology-H.P. Rang, M.M Dale,J.M. Relter, P. Moore, Cherchill Livingston
14 Text book of Pharmacology- Satoskar
15 The Pharmacological basis of therapeutics Good man & Grisons

ZTH 403: NEUROBIOLOGY AND ANIMAL BEHAVIOUR

UNIT-I

1.1 Micro anatomy of neurons and types of nerve cells.
1.2 Autonomic nervous system – Sympathetic Division, Parasympathetic Division.
1.3 Bioelectrical properties of neurons (Resting membrane potential- Nearnst equation; Sodium and potassium pump; Propagation of nerve impulse.
1.4 Synapses: Structure and Integration (Types of synapses; Ultra structure of synapse Chemical transmission; Electrical transmission)

UNIT-II

2.1 Chemical composition of the nervous system-cerebrospinal fluid-CNS barriers
2.2 Synthesis –storage-release and inactivation mechanisms and functions of the following neurotransmitters; Acetylcholine & Catecholamines (Norepinephrine, Epinephrine, Dopamine)
2.3. Amino acid Neurotransmitters-Glutamate and GABA
2.4 Neuropeptides (Oxytocin and Vasopressin)

UNIT – III

3.1 General introduction: An over view of concept of Animal behaviour
3.2 Visual Perception, Auditory perceptionand Olfactory Perception
3.3 Animal aggression and Homing territoriality
3.4 Social organization, Advantages, Social organization in insects, primates

UNIT-IV

4.1 Conditioning Learning (Classical and Operant conditioning and, Multiple-response learning)
4.2 Cognitive Learning (Insight Learning, Sign Learning, Latent Learning)
4.3 Kinds of remembering (Redintegrative memory –Recall – Recognition-Relearning-Retrieval process-Theories of Memory).
4.4 The nature of forgetting (Decay through disuse- Interference effects, motivated forgetting, improving memory)

Practicals in Neurobiology

1. Heteropolar and multipolar neuron
2. Sensory neurons
3. Coelentarata nerve net
4. Pyramidal cell from cortex
5. Motor neuron from spinal cord
6. C.S. of spinal cord
7. Bipolar cell from olfactory bulb
8. Neuromuscular junction
9. Stretch receptors in cray fish
10. Organization of sepia central nervous system
11. Synapse enlarge
12. Stellate ganglion in sepia
13. Isolation and identification of different regions of mice brain
14. Spinal reflexes in decerebrated frog

Practicals in Animal Behavior

1. Habituation learning in snails
2. Spacial learning in albino rats
3. Locomotor activity in albino rats
4. Spotters
5. Insight learning in chimpanzee
6. Insight learning in raccoon
7. A chimpanzee using a stick to obtain an apple
8. Thorndike puzzle box

9. Instrumental conditioning
10. Imprinting
11. Feeding behaviour
12. Bee language
13. Courtship behaviour
14. Classical conditioning
15. Social behaviour
16. Pheromones in ants
17. Round and waggle dance of scout honey bee
18. Spatial leaning in bee wolf
19. Symbiosis adaptation
20. Aggressive mimicry

SUGGESTED READING MATERIAL

1. Neurobiology. Shepherd, G.M.OxfordUniversity press, London.
2. Basic Neurochemistry-G.J. Siegal, R.W. Albers, B.W. Agranoff, R. Katzman (1981) Little, Brown and company. Boston.
3. Introduction to Nervous system-T.H. Bullock, R. Cork, A. Granner (1977); W.H Free-man&Co.
4. Principles of Neural Science –E.R. Kandel and J.H. Schwertz. (1981); Elsevier/North Holland. NY. Oxford.
5. Mechanism of Drug Action on the Nervous System- M.A.B. Brazil, R.W. Ryall. (1979); cambridge University Press. Cambridge, London and New York.
6. The Bio Chemical basis of Neuropharmacology-J.R. Cooper, F.E. Bloom, &R.H. Roth. (1982); Oxford University Press, NY and London.
7. Principles of Neuro Phychopharmacology- Robert S. Feldman, Jerrold S. Meyer and Lind F. Quenzer. Sinauer Associates, Inc. Publishers. Sunderland. Massachusetts.
8. Alcock, J. Animal behaviour: An evolutionary approach. Sinauer Assoc., Sunderland, Mass.USA.
9. Bradbury, J.W. and S.L.Vehrencamp. Principles of animal communication. Sinauer Assoc. Sunderland, Mass. USA.
10. Clutton-Brock, T.H. the evolution of parental care. PrincetonUniv. Press, Princeton, NJ, USA.
11. Eibl-Eibesfeldt, I. Ethology. The biology of behaviour. Holt, Rinehart and Winston, New York.
12. Gould, J.L. The mechanisms and evolution of behaviour.

ZTH 404: IMMUNOLOGY

UNIT – I

1.1 Immunity – Types of Immunity, Innate and Acquired Immunity

1.2 Cells of the immune system: Lymphoid cells, Mononuclear cells, granulocytic cells, Mast cells

1.3 Organs of the immune system – primary and secondary lymphoid organs, lymphatic system

1.4 Antigens: Antigenic determinants or epitopes, immunogenicity, Haptens

UNIT – II

2.1 Innate (Non-specific immunity): Anatomical barriers, phagocytosis, NK cells, Interferons

2.2 Humoral immunity: Immunoglobulins (fine structure of immunoglobulins and immunoglobulin classes); the complement system- Classical and alternate pathway. Inflammation

2.3 Cell mediated immunity: Mechanism of cell mediated immunity

2.4 Brief account on Antigen presentation, Major histocompatability complex

UNIT – III

3.1 Antigen – Antibody interactions: Affinity, Avidity, Cross – reactivity, precipitation reactions, and Agglutination reactions.
3.2 Hypersensitivity – Coombs classification, types of hypersensitivity
3.3 Tolerance
3.4 Transplantation

UNIT – IV

4.1 Autoimmune disorders: Single organ autoimmune disease (Thyroiditis, Pernicious Anaemia), Systemic autoimmune diseases (Rheumatiod arthritis, Systemic Lupus Erythematosus (SLE).
4.2 Primary immune disorders (SCID, Digeorge's syndrome)
4.3 Immunodeficiency diseases (AIDS), HIV's mechanism of Immunosupression
4.4 Immunization (Active and passive immunity), types of vaccines

List of Practicals:

1. Preparation of differential cell types (Macrophages, live cells, astrocytes)
2. Double diffusion technique
3. Radio immunodiffusion
4. ELISA Test Demonstration (Tridot)
5. Agglutination test
6. Rocket immuno electrophoresis
7. Immuno electrophoresis demonstration

Reference books:

1. Kuby, J. (1998) Immunology, W.H. Freeman and Company, New York.
2. Roitt, I.,Brostoff, J. Male, D. (1999/2000) Immunology, 4th Edition. Harcourt Brace and Company Asia, Pte. Ltd., Singapore.
3. Harpers Review of Biochemistry, Murray, Granier, Mayes and Rodwell, Lange Medical Publicaitons,25th Ed.
4.. Human Physiology by Stuart Era Fox, W.M.C. Brown Publishers, USA 1984 or Recent Edition.
5. An introduction to Immunology by C.V. Rao, Narosa publishing house, 2002.
6. Immunology introductory textbook by Nandini Shetty, Wiley Eastern Ltd.

PRACTICALS

ZPR 405: Practicals related to theory papers ZTH 401 and ZTH 402
ZPR 406: Practicals related to theory papers ZTH 403 and ZTH 404

For 2nd Semester (Non-core) (CBCS) with effect from 2018-19
ZTH 205: **Animal diversity and Economic Zoology**

Unit I: Characterisation of Invertebrate phyla from Protozoa to Echinodermata

Unit II: Characterisation of Vertebrate phyla from Fishes to Mammals

Unit III: Beneficial animals: Corals - Earthworm - Vermiculture - Beneficial Insects (Apiculture, Lac culture). Aquaculture – Prawns - Lobsters - Crabs - Pearl oysters – Fishes)

Unit IV: Harmful animals: Disease causing organisms - Vectors – Poisonous organisms – Fouling organisms - Pests.

Books:

1. Hyman, L.H. The Invertebrates. Vol.8. Mc Graw Hall Co., New York and London
2. Hyman, L.H. The Invertebrates. Vol.2 Mc Graw Hall Co., New York and London
3. Kingsley, J.S.Outlines of Comparative Autonomy of Vertebrates. Central Book Depot, Allahabad
4. Economic Zoology, Dr. G. S. Sukla and Dr.V.B. Upadhyay, Rastogi Publications, 5th Edition, 2013
5. Economic Zoology by Venkitaraman PR, Publication: Kottayam V. Publishers 1989
6. Text Book Of Economic Zoology by Venkitaraman,P R, 1983

For 3rd semester (Non-core)
ZTH 305: Biodiversity and Wild Life Management

Unit: I

1. Introduction: Definition, History of Biodiversity
2. Importance of Biodiversity
3. Biodiversity resources of India

Unit: II

1. Biodiversity documentation and Nomenclature
2. Biodiversity laws
3. Biodiversity hotspots in India

Unit: III

1. Importance of wild life management and wild life sanctuaries in India
2. Management of rare and endangered species
3. Deforestation and effects on wild life

Unit: IV

1. Special management programme of wild animals in India
2. Wild life trade: assessment and documentation: preventive measures
3. Wild life legislation

Reference Books:

1. IUCN (1994), Guidelines for protected area management categories. Cambridge, UK and Gland, Switzerland: IUCN
2. IUCN-UNEP-WWF (1980), World conservation strategy, living Resources, conservation for sustainable development, international union for conservation of nature and natural resources.
3. Sharma, B.D. (1994), high altitude wild life of India, Oxford and IBH publication, New Delhi, 289.
4. Red data list of threaten animals, list part 1. Vertebrates, Govt. of India, Z. S. I. publ.
5. Gaston, K.J. and spicer, J.I.(1988),Biodiversity: An introduction, Blackwell science, Oxford.
6. Ghosh, A.K. (1986), India and world conservation strategy,Z.S.I.,Govt.of India,Kolkata.
7. Ghosh, A.K. (2008), Biodiversity conservation: Issues on concern,In:Zool.Res.in Human welfare, Ramkrishna and chatterjee(Eds.),Z.S.I.,Govt.of India,Kolkata,19-22
8. Jeffries, M.J. (2006), Biodiversity and conservation, 2nd ed., Rouledge, London and New York.

Department of Zoology
Model Question Paper
Pre-PhD Examinations
Paper – I, Research Methodology

Time: 3 hours Maximum Marks: 100

Answer all questions
Each question carries 20 marks

Unit -I

1. What is review of literature? Write the different methods used for the collection of research data **(OR)**

   Discuss the scope of Biostatistics in biological research

Unit -II

2. Describe the principle, procedure and applications of Fluorescence Microscope.

   (OR)

   Describe the principle, and applications of Spectrophotometer

Unit -III

3. Discuss the different types of Chromatography used in separation of biological molecules

   (OR)

   What is the density gradient centrifugation? Write the principle and applications

Unit - IV

4. Discuss different types of Blotting techniques used in molecular biology

   (OR)

   Write the principle and procedure for ELISA? Discuss its role in Diagnosis of a disease.

Unit -V

5. Write the details of Design and functioning of cell/tissue culture laboratory

   (OR)

   Applications of radio isotopes in biological sciences

Department of Zoology
Pre-Ph.D Examination Syllabus
Paper-I (Research Methodology)

(Common to all the research scholars of the department)

UNIT-I

1. **Review of literature:** Methods of data collection, Note making, Interpretation and report writing.
2. **Analysis of data:** Introduction to biostatistics, Arithmetic mean, median and mode, standard deviation and co-efficient of variation, Test of significance: students t- test, F-test and $\chi 2$ –test.

UNIT-II

1. **Microscopy:** Microscopy: Types of microscopes – Phase contrast microscope, Fluorescence microscope; Electron microscope
2. **Spectroscopy:** Laws of Light absorption, applications of Colorimetry, Spectrophotometry and spectrofluorimetry

UNIT-III

1. **Chromatography:** Paper chromatography – thin layer chromatography, Ion exchange chromatography and affinity chromatography
2. **Centrifugation:** Types of centrifuges, Preparative ultra centrifugation – differential gradient centrifugation – density gradient centrifugation

UNIT-IV

1. **Molecular biology:** DNA sequencing, Polymerase chain reaction, cDNA library, blotting techniques (Southern/Northern/Western)
2. **Immunology:** Radio immuno assays (RIA) and ELISA

UNIT-IV

1. Design and functioning of cell/tissue culture laboratory methodology
2. **Radio isotope techniques** – types of radio isotopes, detection and measurement of radiaoactivity – GM counter, Scintillation counter, auto radiography, applications of radio isotopes in biological sciences

Reference Books:

1. A Biologists Guide to Principles and Techniques of Practical Biochemistry, K. Wilson & K.W. Goulding, ELBS Edn.
2. Molecular Biology by David Freifelder, 1993
3. Introduction to Biostatistics – By Sokal – Rohlf (2nd Edn) freeman International Editor, 1971.
4. Bio – Statistics – An introductory text – Goldstein, A The Macmillan Co., New York,1971.
5. Research Methodology: Methods and Techniques 9second revised edition) by C. R Kothari, New age international Publications

YOGI VEMANA UNIVERSITY COLLEGE :: KADAPA

DEPARTMENT OF COMPUTER APPLICATIONS (M.C.A)

Name of the Course: Computer Applications

(With Effect From Under CBCS 2018-2019)

Scheme of Examination for I, II, III, IV, V & VI Semesters

Paper Code	Title of the Paper	No. of Credits	Marks		Total Marks
			Internal	External	
SEMESTER I					
13001	Problem Solving and Programming using C	4	25	75	**100**
13002	Data Base Management Systems	4	25	75	**100**
13003	Computer Organization	4	25	75	**100**
13004	Mathematical Foundations for Computer Applications	4	25	75	**100**
13005	Accountancy & Financial Management	4	25	75	**100**
13001P	Programming in C Laboratory	4		100	**100**
13002P	Data Base Management Systems Laboratory	4		100	**100**
13003P	Computer Organization Laboratory	4		100	**100**
SEMESTER II					
23001	Data Structures	4	25	75	**100**
23002	Computer Networks	4	25	75	**100**
23003	Advanced Data Base Management System	4	25	75	**100**
23004	Operating systems	4	25	75	**100**
23005	Probability & Statistics	4	25	75	**100**
23001P	Data Structures Laboratory	4		100	**100**
23002P	Computer Networks & Operating systems Laboratory	4		100	**100**
23003P	Advanced Data Base Management Systems Laboratory	4		100	**100**
SEMESTER III					
33001	Object Oriented Programming through Java	4	25	75	**100**
33002	Software Engineering	4	25	75	**100**
33003	Network Programming	4	25	75	**100**
33004	Optimization Techniques	4	25	75	**100**
33005	Artificial Intelligence	4	25	75	**100**
33001P	Object Oriented Programming through Java Laboratory	4		100	**100**
33002P	Software Engineering Laboratory	4		100	**100**
33003P	Network Programming Laboratory	4		100	**100**
SEMESTER IV					
43001	Web Technologies	4	25	75	**100**
43002	Dot Net Programming	4	25	75	**100**
43003	Advanced Java Programming	4	25	75	**100**
Elective-I 43004	A Formal Language Automata Theory	4	25	75	**100**
	B Information Systems				
	C Machine Learning				
	D Big Data Analytics				
Elective-II 43005	A Human Computer Interaction	4	25	75	**100**
	B Management Information System				
	C Computer Graphics				
	D PHP				
***43006-I**	**Non-Core: Introduction to Computers and MS Office**		25	75	**100**
43001P	Web Technologies Laboratory	4		100	**100**
43002P	Dot Net Programming Laboratory	4		100	**100**

43003P	Advanced Java Programming Laboratory		4		100	**100**
The Student has to choose one from each of the Elective I and Elective II						

SEMESTER V						
53001	Cryptography & Network Security		4	25	75	**100**
53002	Cloud Computing		4	25	75	**100**
53003	Data Warehousing & Data Mining		4	25	75	**100**
Elective-III 53004	A	Digital Image Processing	4	25	75	**100**
	B	wireless & Ad-hoc Networks				
	C	E-Commerce				
	D	Grid Computing				
Elective-IV 53005	A	Enterprise Application Integration	4	25	75	**100**
	B	Distributed Systems				
	C	Software Testing				
	D	Theory of Computation				
***53006-II**	**Non Core: Internet and World Wide Web**			25	75	**100**
53001P	Cryptography & Network Security Laboratory		4		100	**100**
53002P	Cloud Computing Laboratory		4		100	**100**
53001D	Mini Project		4		100	**100**
Note :1. Every Student must give the Seminar at least two times 2. Seminar will be conducted only by Internal Staff						
The Student has to choose one from each of the Elective III and Elective IV						

SEMESTER VI					
63001S	Seminar Topics from papers published in referred Journals	12	50	-	**50**
63001D	Major Project Work		50	150	**250**
	Viva -Voce			50	
Note: 1. Every Student must give the Seminar at least two times 2. Seminar will be conducted only by Internal Staff					

Course Total Marks: 4300 (Core Papers)
*** 200 (Non- Core)**

Semester- I Theory: 500 Marks, Practical 300 Marks (32 Credits)
Semester- II Theory: 500 Marks, Practical 300 Marks (32 Credits)
Semester- III Theory: 500 Marks, Practical300 Marks (32 Credits)
Semester- IV Theory: 500 Marks, Practical 300 Marks (32 Credits)
Semester- V Theory: 500 Marks, Practical 200 Marks, Mini Project 100 Marks (32 Credits)
Semester-VI Seminar: 50 Marks, Major Project: 200, Viva-Voce 50 Marks (12 Credits)

Examination Pattern: Each Theory Paper consists of Part- A and Part-B. Part-A Consists of eight short Questions, students has to answer five out of eight questions and each question carries 3 marks. Part-B consists of four essay type questions with internal choice from each Unit carrying 15 marks.

Practical Examination Pattern: Final External Laboratory experiment may given by external Practical Examiner, any one of from syllabus and need not be from the list of experiments.

*** Non Core paper marks will not be considered for awarding the grade point and credits, but the candidate should pass since these are part of CBCS**

13001: Problem Solving and Programming using C

UNIT 1:

Introductory Concepts: Types of Programming Languages, Introduction to C, Desirable program Characteristics

Introduction to C Programming: The C Character Set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Expressions Statements, Symbolic Constants

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, Conditional Operator, Library Functions.

Data Input and Output: Preliminaries, Single Character Input-The Getchar Function, Single Character Output – The Putchar Function, Enter Input Data – The Scanf Function, More About the Scanf Function, Writing Output Data – The Printf Function, More About the Printf Function, The Gets and Puts Functions **Preparing and Running A Complete C Program**: Planning a C Program, Writing a C Program, Error Diagnostics, Debugging Techniques

UNIT 2:

Control Statements: Preliminaries, Branching: The IF-ELSE Statement, Looping: The while statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Structures, The Switch Statement, The break Statement, The continue Statement, The comma Statement, The goto Statement.

Functions: A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Passing Arguments to a Function, Recursion

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables.

UNIT 3:

Arrays: Defining an Array, Processing an Array, Passing Arrays to Functions, Multidimensional Arrays, Arrays and Strings.

Pointers: Fundamentals, Pointer Declarations, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers, Passing Functions to Other Functions

UNIT 4:

Structures and Unions: Defining a Structure, Processing a Structure, User-defined Data Types (Typedef), Structure and Pointers, Passing Structures to Functions, Self-referential Structures, Unions.

Data Files: Why Files, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data Files, Concept of Binary Files

TEXT BOOKS:

1. Reema Thareja :Programming in C , Oxford university press
2. R.G. Dromey: *How To Solve It By Computer*. (PHI).
3. M.G. Venkatesh Murthy: *Programming Techniques Through C – A Beginner's Companion*. (Pearson Education)
4. E.Balagurusamy: *Programming in ANSI C*. (Tata McGraw Hill**,**)

REFERENCE BOOKS:

1. Herbert Schildt: *The Complete Reference, C* 4th Edition. (Tata McGrawHill)
2. Deitel and Deitel " C How to Program ", Addisson Wesley
3. Brian W.Kemighan & Dennis Ritchie "C Programming Language", PHI

13002: Data Base Management Systems

UNIT 1:

INTRODUCTION: History of Database Systems-Database Systems Applications-Database Systems vs. File Systems-View of Data- Data Models-Database Languages-Transaction Management- Database Systems Structure- Entity Relationship Model.

UNIT 2:

RELATIONAL DATABASES: SQL-Basic Structure-Set Operations-Complex Queries-Joined Queries-DDL-DML

Embedded SQL-Dynamic SQL-Other SQL Functions-Query by Example-Integrity and Security of searching-Relational Database Design-Normalization.

UNIT 3:

DATA STORAGE, INDEXING QUERY EVALUATION & OPTIMIZATION: Storage & File Structure-Disks-RAID-File Organization-Indexing & Hashing-B+ TREE-B Tree-Static Hashing-Dynamic Hashing-Multiple Key Access

Query Processing-Selection Operation-Sorting-Join Operation-Evaluation of Expressions-Query Optimization.

UNIT 4:

TRANSACTION MANAGEMENT: Transaction Concept-Static Implementation-Concurrency Control-Protocols-Deadlock Handling

Recovery Systems-Recovery with Concurrent Transactions-Shadow Paging-Buffer Management-Case Studies-Oracle-Microsoft SQL Server.

TEXT BOOKS

1. Abraham Silberschatz, Hentry F.Korth and S.Sudharssan,"Database System Concepts", 4th Edition, Tata McGraw Hill, 2002.
2. Raghu Ramakrishnan & Johannesgerhrke, "Data Base Management Systems", Mc Graw Hill International Edition, 2000.

13003: Computer Organization

UNIT 1:

Digital Logic Circuits – Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational circuits, Flip-flops, Sequential Circuits, Decoders, Encoders, Registers, shift Registers, Binary Counters, Memory Unit.

UNIT 2:

Register Transfer and Microoperations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

Micro Programmed Control – Control Memory, Address Sequencing, Micro program Example, Design of control Unit.

UNIT 3:

CPU Organization – General Register Organization – Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction set Computer.

UNIT 4:

Memory Organization – Memory Hierarchy, Main Memory – RAM – ROM chips, Memory Address Map, Memory Connection to CPU, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic and Instruction Pipeline, RISC Pipeline, Vector Processing.

TEXT BOOKS:

1. Morris Mano -Computer System Architecture –3rd Edition-Pearson Education .
2. Douglas V.Hall Intel 8086-Programming- McGraw-Hill International studies.

REFERENCE BOOKS:

1. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.

13004: Mathematical Foundations for Computer Applications

UNIT-I:

MATRIX ALGEBRA **-** Matrices - Rank of a matrix - Solving system of equations - Eigenvalues and Eigenvectors - Cayley - Hamilton theorem - Inverse of a matrix.

UNIT-II:

BASIC SET THEORY **-** Basic definitions - Venn diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion – Partitions - Permutation and combination – Relations - Properties of relations - Matrices of relations - Closure operations on relations - Functions - Injective, subjective and objective functions.

UNIT-III:

MATHEMATICAL LOGIC **-** Propositions and logical operators - Truth table - Propositions generated by a set - Equivalence and implication - Basic laws - Some more connectives - Functionally complete set of connectives - Normal forms - Proofs in propositional calculus - Predicate calculus.

UNIT-IV:

FORMAL LANGUAGES**-**Languages and grammars - Phrase structure grammar - Classification of grammars - Pumping lemma for regular languages - Context free languages. FINITE STATE AUTOMATA**-**Finite state automata - Deterministic finite state automata (DFA) - Non deterministic finite state automata (NFA) - Equivalence of DFA and NFA - Equivalence of NFA and Regular Languages.

TEXT BOOKS:

1. David Makinson, “Sets, Logic and Maths for Computing”, Springer Indian Reprint, 2011.
2. Grimaldi, R.P and Ramana, B.V. "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, 2006.

REFERENCE BOOKS:

1. Hopcroft J.E and Ullman,J.D, “Introduction to Automata Theory, Languages and Computation”, Narosa Publishing House, Delhi, 2002.
2. Kenneth H. Rosen, “Discrete Mathematics and Its Applications”, Tata McGraw Hill, 4th Edition, 2002.
3. Sengadir, T. “Discrete Mathematics and Combinatorics" Pearson Education, New Delhi, 2009.
4. Trembley, J.P. and Manohar, R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, New Delhi, 2007.
5. Venkataraman, M.K., “Engineering Mathematics”, 2nd Edition, Volume-II, National Publishing Company, 1989.

13005: Accountancy & Financial Management

UNIT-I:

Accounting Definition, Branches of Accounting- Financial Accounting, Cost Accounting and Managerial Accounting; Significance of Accounting in Business Systems; Financial Accounting Process-Journalizing, Ledger Posting, Balancing of Ledger Accounts, Methods of Depreciation, Preparation of Trial Balance, Income Statement and Balance Sheet.

UNIT-II:

Ratio Analysis – Types of Ratios and their Usefulness; Preparation and Interpretation of Fund Flow and Cash Flow Statements; Budgetary Control – Nature and Scope.

UNIT-III:

Marginal Costing- Nature, Scope and Importance , BEP Analysis and its uses and Limitations, Managerial uses of Marginal Costing. Standard Costing- Nature and Scope.

UNIT-IV:

Financial Management Functions, Capital Budgeting Techniques-Traditional and DCF. Computer based operational, Tactical and Strategic Accounting and Financial Information Systems With Tally Package.

TEXT BOOKS:

1. Jain and Narang, —Accountancyǁ Vol 1, Kalyani Publishers, 1983.
2. Jain and Narang, — Cost Accountingǁ, Kalyani Publishers.
3. R.K.Sharma and Shashi K Gupta, —Management Accountingǁ, Kalyani Publishers.

PRACTICALS

13001P: Programming in C Laboratory

Do the following Assignments in C:

1. Write a program in C to demonstrate decision control structures.
2. Write a program in C to demonstrate loop control structures.
3. Write a program in C to demonstrate case control structure.
4. Write a program in C to demonstrate functions.
5. Write a program in C to demonstrate pointers concept.
6. Write a program in C to demonstrate arrays concept.
7. Write a program in C by using standard library functions to demonstrate string concept.
8. Write a program in C to demonstrate structures concept.
9. Write a program in C to demonstrate usage of files.
10. Write a program in C to perform matrix operations.
11. Write a program in C to perform operations on single linked lists.
12. Write a program in C to perform sorting using selection sort method.
13. Write a program in C to perform sorting using bubble sort method.
14. Write a program in C to perform linear search operation.
15. Write a program in C to perform binary search operation.

13002P: DATABASE MANAGEMENT SYTEMS LABORATORY

1. Programs in SQL covering all the SQL Queries.
2. a) Write a program in PL/SQL to determine Statistical functions.
   b) Write a program in PL/SQL to demonstrate functions.
   c) Write a program in PL/SQL to demonstrate cursors.
   d) Write a program in PL/SQL to demonstrate parameterized cursors.
   e) Write a program in PL/SQL to demonstrate procedures.
   f) Write a program in PL/SQL to demonstrate packages.
   g) Write a program in PL/SQL to demonstrate overloading packages.
   h) Write a program in PL/SQL to demonstrate exceptions.
   i) Write a program in PL/SQL to demonstrate triggers.

13003P: COMPUTER ORGANIZATION LABORATORY

I. CYCLE : Digital Logic Design Experiments :

1. TTL Characteristics and TTL IC Gates
2. Multiplexers & Decoders
3. Flip-Flops
4. Counters
5. Shift Registers
6. Binary Adders & Subtractors
7. A L U

II . CYCLE: 8085 Assembly Language Programming :

1. 8085 Assembly Language Programming according to theory course microprocessors-I using the following trainers :

Keyboard Monitor o f 8085μP Trainer.

Serial Monitor of 8085μP Trainer with Terminal

8085 Line Assembler of 8085μP Trainer with PC as Terminal

8085 Cross Assembler using In-Circuit Emulator (ICE) with 8085μP Trainer and PC as Terminal

Graded Problems are to be used according to the syllabus of COMPUTER ORGANIZATION

2. PENTIUM CLASS PC ARCHITECTURE FAMILIARIZATION HARDWARE & SOFTWARE PARTS DEMONSTRATION

23001: Data Structures

UNIT 1:

Introduction: Primitive and Composite data Types, Abstract Data Type, Data Structure, Storage Structure, File Structure, Complexity of an algorithm, Big O Notation. Arrays; Sparse matrix representation and operations. Linked lists: Single double, Circular lists and Operations.

UNIT 2:

Stacks: Representation, Operations, Array and Linked List Implementation, Applications.

Queues: Representation, Operations, Array and Linked list Implementation of single, multiple, priority, dqueue and circular queues, Applications.

UNIT 3:

Trees: Definitions and concepts, Storage representation and manipulation of general trees, Binary trees, Conversion of general tree to binary tree, AVL tree, Tries, B-Trees, Tree traversing techniques

File Organization: Sequential file organization; ISAM, Direct Files, Inverted Lists, Multi lists.

Graphs: Representation, Warshall and Minimal algorithm, Traversal and other operations,

Topological sorting; Minimum Spanning tree;

UNIT 4:

Hashing: Access table handling, choosing a hash function, Collision resolution methods, Analysis of hashing.

Internal Sorting Techniques: Selection sort, Bubble sort, Merge sort, Quick sort, heap sort and Radix sort.

External Sorting Techniques: Run lists, Tape sorting, sorting on disks, generating extended run lists. Searching Techniques: Linear and Binary search.

TEXT BOOKS:

1. J.P. Trembly and P.G. Sorensen, —An Introduction to Data Structures with Applications‖, Tata McGraw Hill, Second edition.

Reference Books:

1. E. Horowitz and S. Sahani, —Fundamentals of Data Structures‖, Galgotia Book Source, 1996.
2. Sartaj Sahni, —Data Structures, Algorithms, and Applications in C++‖, Tata McGraw-Hill International Editions, 1999

23002: Computer Networks

UNIT 1:

Introduction, Uses of Computer Networks, Network Hardware, network software, Reference Models, Example Networks, Example Data Communication Services.

Physical Layer: Transmission media, Guided media, unguided media, Wireless transmission, Telephone system, Narrowband ISDN, Broadband ISDN and ATM, Communication Satellites.

UNIT 2:

Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Elementary data link protocols – An unrestricted Simplex protocols, A simplex Stop and Wait Protocol, Sliding Window Protocol – one bit sliding window protocol, Go back-N ARQ, Selective repeat protocol, Media Access Sub Layer: Static Channel Allocation, Dynamic Channel allocation, Aloha, , IEEE Standard 802.4 token bus, IEEE Standard 802.5 token ring. Comparison 802.4 and 802.5.

UNIT 3:

Network Layer: Network layer design issues, Routing algorithms – classification of routing algorithms, routing tables, Shortest path routing, flooding, Hierarchical routing, Distance Vector routing, Link state routing, Broadcast routing, Multicast routing.

Congestion control algorithms, open loop control, closed loop control, Internetworking design principles, Types of Internetworking, IP Protocol, IPV4 addressing, subnet addressing.

UNIT 4:

Transport layer: The Transport Service, Elements of Transport Protocols, Internet Transport Protocols(TCP and UDP).

Application Layer: Network Security, Secret key algorithms DES, Domain Name System, Electronic Mail, the World Wide Web.

TEXT BOOKS:

1. Computer Networks -- Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

Reference Books:

1. Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH

23003: Advanced Data Base Management Systems

UNIT-I:

The Entity – Relationship Model-Constraints-Entity-Relationship Diagrams, Design Issue-Weak Entity Sets-Database Design for Banking Enterprise- The Unified a Modeling Temporal Data- User Interfaces and Tools-Triggers-Authorization in SQL.

UNIT-II:

OBJECT- DATABASES AND XML: Object-based databases – Complex data types, structured types and inheritance in SQL, table inheritance, array and multiset types in SQL, object identity and reference types in SQL, implementing O-R features, Persistent programming languages, OO vs OR. XML – Structure of XML, Document Schema, Querying and Transformation, API in XML, XML applications.

UNIT-III:

Query Processing: Measures of Query Cost-Selection Operation-Sorting-Joint Operation-Evaluation of Expressions-Query Optimization: Transformation of Relational Expressions-Estimating Statistics of Expression Results-Choice of Evaluation Plans.

UNIT-IV:

Transactions: Transaction concept, Transaction State-Implementation of Atomicity and Durability-Concurrent Executions – Serializability - Recoverability - Implementation of Isolation - Testing for Serializability, Concurrency Control: Lock Based Protocols- Timestamp-Based Protocols-Validation-Based Protocols-Multiple Granularity- Multiversion Schemes-Deadlock handling-Insert and Delete Operations-Weak Levels of Consistency-Concurrency in Index Structures,

Recovery System: Failure Classification-Storage Structure-Recovery and Atomicity-Log-Based Recovery-Recovery with Concurrent Transactions-Buffer Management-Failure with lose of Nonvolatile Storage-Advanced Recovery Techniques-Remote Backup Systems.

TEXT BOOKS:

1. Silberschatz A. Korth H F, and Sudarsan S, *Database System Concepts*, 5th edition, McGraw-Hill 2002. (Chapters 1to 4, 6 to 10 and 13 to 17)

REFERENCE BOOKS:

1. Date C J, *An Introduciton to Database Systems, 7th edition, Pearson Educaiton, 2000.*

2. Elmasri R, and Navathe S B, *Fundamentals of Database Systems,* 4th edition, Pearson Education, 2004.

3. Ramakrishnan R, and Gehrke J, *Database Management Systems, 2nd edition, McGraw-Hill, 2000.*

4. *Mannino M V, Database Application Development and Design,* McGraw-Hill, 2001.

23004: Operating systems

UNIT 1:

Operating System-Basic elements of computers, instruction execution, operating system objectives and functions. Evaluation of operating systems, System components, Operating-System services, System Calls, Virtual Machines.

Process and Threads- Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication

UNIT 2:

Concurrency; principles of concurrency mutual exclusion, The Critical Section Problem, Critical Regions, semaphores, monitors, message passing, Readers/Writers Problems

Deadlocks - System Model, Dead locks Characterization, Methods for Handling Dead locks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

UNIT 3:

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

UNIT 4:

I/O management and Disk Scheduling; I/O Devices, Organization of I/O Functions, I/O Buffering, Disk Scheduling, Disk Cache

File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI.

REFERENCE BOOKS:

3. Operating System A Design Approach-Crowley,TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI
5. Operating Systems, Dhamdhere, TMH

23005: Probability & Statistics

UNIT 1:

Probability distributions:

Concept of a random variable – discrete and continuous random variables, probability mass function and density function. Probability distribution and its properties. Concept of mathematical expectation and variance of a random variable. Theoretical distributions. Binomial, Poisson, Normal – Properties and applications.

UNIT 2:

Testing of Hypotheses:

Population and sample, point and interval estimates of population parameters from sample data, Confidence interval of mean from normal distribution. Statistical hypothesis, null and alternative hypothesis, level of significance, test statistic and p-value of a test. Tests based on normal distribution – the Z test for means and proportion. Small sample tests – Student‘s t-test for one sample and two sample problems and paired t-test, F-test for comparing two variances, Chi-square test and its applications – methods and problems.

UNIT 3:

Regression and Correlation:

Simple linear regression model, scatter diagram, fitting a line using the method of least squares, estimation of the regression coefficient, mean and variance of the estimators, measure of the quality of fit using coefficient of determination. . Multiple linear regression and its applications.

Correlation coefficient – positive and negative correlations and Pearson‘s formula. Relation between correlation and regression coefficients. Simple applications and problems.

UNIT 4:

Design of experiments:

Basic designs for conducting experiments – the Completely Randomized Design (CRD), Randomized

Block Design (RBD) and the Latin Square Design (LSD) and their applications. Analysis using one-way

and two-way ANOVA.

Statistical Quality Control:

Causes of variation, random and assignable causes of variation. The principle of Shewart control chart, charts for attribute and variable quality characteristics. Construction and operation of p-chart, c-chart, X-Bar and R-chat.

TEXT BOOKS:

1. Walpole r E, Myers R H, Myers S L, and Ye K, probability and Statistics for engineers and scientists, 7th edition, Pearson Education, 2002.
2. Johnson R A, Probability and Statistics for Engineers, 6th edition, PHI, 2000.

REFERENCE BOOKS

1. Hogg R V, and Craig A L, Introduction to Mathematical statistics, American Pub.
2. Blake I e, An Introduction to Applied Probability, John Wiley.
3. Lipschutz S, Probability (Schaum Series) McGraw-Hill.
4. Montgomery D C, Introduction to Statistical Quality Control, Wiley.
5. Montgomery D C, Design and Analysis of Experiments, 5th edition, Wiley.

PRACTICALS

23001P: Data Structures Laboratory

The following assignments shall be implement in C

1. Create a singly linked list and perform operations on it.
2. Create a doubly linked list and perform operations on it.
3. Create a stack and perform operations on it.
4. Create a queue and perform operations on it.
5. At least three classical applications of linked lists.
6. At least three classical applications of stacks.
7. At least three classical applications of queues.
8. Create a binary tree and traverse it in in-order, pre-order and post-order using iterative and recursive methods.
9. Create a binary search tree and perform search, insert and delete operations.
10. Create an AVL tree and perform search, insert and delete operations.
11. Create a priority queue and perform insert and delete opeations.
12. Implement graph traversals: BFS and DFS
13. Implement Dijkstra‘s algorithm.
14. Implement Prim‘s algorithm.
15. Implement Kruskal algorithm.
16. Represent sparse matrices using multi-linked structures and perform addition, subtraction and multiplication operations.
17. Implement quick, heap, radix and address calculation sorting techniques.

23002P: Computer Networks & Operating Systems Laboratory

Computer Networks Lab:

1. Implement The Shortest path routing algorithm.
2. Implement Distance Vector Routing algorithm
3. Implement the Link state routing algorithm.
4. Implement data encryption and decryption shifting algorithm.

Operating System Lab:

1. Demonstrate creation of Threads and Synchronization in C++
2. Implement Banker‘s Algorithm for deadlock prevention in C++
3. Design and develop C++ program for FCFS & SJF CPU Scheduling compare for same set of jobs.

Process	Burst Time
P1	10
P2	1
P3	2
P4	1
P5	5

4. Design and develop C++ program for Round Robin Scheduling for a given set of jobs (above table) and Show average waiting time, turnaround time.
5. Demonstrate producers and Consumers problem for Inter process communication in C++.
6. Design and develop C++ program for FIFO page replacement algorithm for following set of page references 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 and show no. of page faults.
7. Design and develop C++ program for LRU page replacement algorithm for following set of page references 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 and show of no. of page faults and belady‘s anomaly if it occurs.
8. Design and develop C++ program for Optimal page replacement algorithm for following set of page references 1,2,3,4,2,1,5,6,2,1,2,3,5,5,3,4,1 and show of no. of page faults and belady‘s anomaly if it occurs.

23003P: Advanced Data Base Management Systems Laboratory

1. Write a PL/SQL Block for demonstrating the GOTO statement
2. Write the PL/SQL Block for generating the prime numbers & also counting the no. of prime number using procedure concept.
3. Write a PL/SQL Block for calculating area & Perimeter of a rectangle.
4. Write a PL/SQL Block to find out Factorial of a given number using functions.
5. Write a PL/SQL program for illustrating the stored procedures
6. Write a PL/SQL Block for illustrating implicit cursors.
7. Write a PL/SQL Block for demonstrating explicit cursors.
8. Write a Trigger on insert before operation with suitable relation.
9. Write a Trigger on update operation before with suitable relation
10. Write a PL/SQL Block for illustrating the pre-defined exceptions.
11. Write a PL/SQL Block for demonstrating user defined exceptions.
12. write a PL/SQL block for illustrating the creation and usage of a package specification & package body.

33001: Object Oriented Programming Through JAVA

UNIT 1:

Java Basics - History of Java, Java buzzwords, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow-block scope, conditional statements, loops, break and continue statements, simple java program, arrays, input and output, formatting output, Review of OOP concepts, encapsulation, inheritance, polymorphism, classes, objects, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings, exploring string class, Enumerations, autoboxing and unboxing, Generics.

UNIT 2:

Inheritance – Inheritance concept, benefits of inheritance, Super classes and Sub classes, Member access rules, Inheritance hierarchies, super uses, preventing inheritance: final classes and methods, casting, polymorphism- dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

UNIT 3:

Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions-exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes, Guide lines for proper use of exceptions.

Multithreading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads.

UNIT 4:

GUI Programming with Java - The AWT class hierarchy, Introduction to Swing, Swing vs. AWT,MVC architecture, Hierarchy for Swing components, Containers – Top-level containers – JFrame, JApplet, JWindow, JDialog, Light weight containers – JPanel, A simple swing application, Overview of several swing components- Jbutton, JToggleButton, JCheckBox, JRadioButton, JLabel, JTextField, JTextArea, JList, JComboBox, JMenu, Java‘s Graphics capabilities – Introduction, Graphics contexts and Graphics objects, color control, Font control, Drawing lines, rectangles and ovals, Drawing arcs, Layout management - Layout manager types – border, grid, flow, box.

Event Handling - Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Semantic and Low-level events, Examples: handling a button click, handling mouse and keyboard events, Adapter classes.

TEXT BOOKS:

1. Java: the complete reference, 7th editon, Herbert Schildt, TMH.
2. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education / Java: How to Program P.J.Deitel and H.M.Deitel, 8th edition, PHI.

REFERENCE BOOKS:

1. Core Java, Volume 1-Fundamentals, eighth edition, Cay S.Horstmann and Gary Cornell, Pearson education.
2. Java Programming, D.S.Malik, Cengage Learning.
3. Object Oriented Programming with Java, B.Eswara Reddy, T.V.Suresh Kumar, P.Raghavan, Pearson-Sanguine.
4. An introduction to Java programming and object oriented application development, R.A. Johnson- Cengage Learning.
5. Advanced Programming in Java2, K.Somasundaram, Jaico Publishing House.
6. Starting out with Java, T.Gaddis, dreamtech India Pvt. Ltd.
7. Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.
8. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.
9. An introduction to programming and OO design using Java, J.Nino, F.A.Hosch, John Wiley & Sons.
10. Java and Object Orientation, an introduction, John Hunt, second edition, Springer.
11. Maurach‘s Beginning Java2,D.Lowe, J.Murach, A. Steelman, SPD.
12. Programming with Java, M.P.Bhave, S.A.Patekar, Pearson Education

33002: Software Engineering

UNIT 1:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: A layered technology, A process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models: The waterfall model, Incremental model, Rad model, Spiral model, Evolutionary process models, The Unified process.

An Agile View of process: Agility, Agile process models- Scrum process model, Extreme programming (XP).

UNIT2:

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT 3:

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Metrics for Process and Products : Software Measurement, Metrics for software quality.

UNIT 4:

Risk Management: Reactive vs Proactive risks strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.
3. Designing Flexible Object Oriented systems with UML-Charles Ritcher
4. Object Oriented Analysis & Design, Sat/.inger. Jackson, Burd Thomson

REFERENCE BOOKS:

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt,Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

33003: Network Programming

UNIT-I:

Unix Utilities-Introduction to Unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who, w, finger, arp, ftp, telnet, rlogin, text processing utilities and backup utilities, detailed commands to be covered are cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio.

Problem solving approaches in Unix: Using single commands, using compound Commands, shell scripts, C programs, building own command library of programs. Working with the Bourne shell: what is a shell, shell responsibilities, pipes and input Redirection, output redirection, here documents, the shell as a programming language, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

UNIT-II:

Unix Files: Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2. the standard i/o (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar,fgets, gets), formatted I/O, stream errors, streams and file descriptors, file and directory maintenance (chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd), Directory handling system calls (opendir, readdir, closedir,rewinddir, seekdir, telldir)

UNIT-III:

Unix Process, Threads and Signals: What is process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, system call interface for process management-fork, vfork, exit, wait, waitpid, exec, system,

Threads-Thread creation, waiting for a thread to terminate, thread synchronization, condition variables, canceling a thread, threads vs. processes, Signals- Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions.

UNIT-IV:

Interprocess Communication Overview: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, file and record locking, other Unix locking techniques, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC (system-V)-message queues, semaphores and shared memory.

Message Queues-Unix system-V messages, Unix kernel support for messages, Unix APIs for messages, client/server example.

Semaphores-Unix system-V semaphores, Unix kernel support for semaphores, Unix APIs for semaphores, file locking with semaphores.

TEXT BOOKS:

1. Unix Network Programming, W.R.Stevens Pearson/PHI.

2. Unix Concepts and Applications, 3rd Edition, Sumitabha Das, TMH.

3. Advanced Unix Programming, 2nd Edition, M.J.Rochkind, Pearson Education.

REFERENCE BOOKS:

1. Unix system programming using C++, T.Chan, PHI.

2. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education

3. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education

4. Unix and Shell programming, B.A.Forouzan and R.F.Gilberg, Thomson

33004: Optimization Techniques

UNIT – I

Linear Programming Problem: Introduction – Mathematical Formulation of the Problem Linear Programming Problem Graphical Solution: Some Exceptional Cases – General Linear Programming Problem – Canonical and Standard Forms of LPP. Simplex Method**:** The Computational Procedure of Simplex Method, Big-M Method, Two-Phase method, and some simple problems.

Duality in Linear Programming: Formulating a Dual Problem – Primal – Dual Pair in Matrix Form – Duality and Simplex Method – Dual Simplex Method – Degeneracy and Some related problems

UNIT – II

Transportation Problem: Introduction – General Transportation Problem – The Transportation Table – Duality in Transportation Problem – Loops in Transportation Tables – LP Formulation of the Transportation Problem – Solution of a Transportation Problem – Finding an Initial Basic Feasible Solution – Testing for Optimality – Degeneracy in Transportation Problem – Transportation Algorithm (MODI Method), Unbalanced Transportation Problem.

Assignment Problem: Introduction – Mathematical Formulation of the Problem – The Assignment Method – Special Cases in Assignment Problems – The Traveling Salesman Problem

UNIT – III

Sequencing Problem**:** Introduction – Problem of Sequencing – Basic Terms Used in Sequencing – Processing n Jobs through Two Machines - Processing n Jobs through K Machines - Processing 2 Jobs through K Machines

Games and Strategies**:** Introduction – Two – Person Zero – Sum Games – Some Basic Terms – The Maximin – MiniMax Principle – Games without Saddle Points – Mixed Strategies – Graphic Solution of 2 X n and m X 2 Games – Dominance Property – Arithmetic Method For n X n Games – General Solution of m X n Rectangular Games

UNIT – IV

Network Scheduling by PERT / CPM: Introduction – Network and Basic Components – Rules of Network Construction – Critical Path Method, PERT, Probability Considerations in PERT, PERT Calculations – Distinction between PERT and CPM, Some Samples Problems

TEXT BOOK:

1. Operations Research by – Kranti Swarup, Gupta, Manmohan – Sultan Chand & Sons, New Delhi, 2003 (11th Edition)

REFERENCE BOOKS:

1. Hiller F.S. &Liberman G.J.: Introduction to OperationsResearch 2nd Edn.:- Holand Day Inc. London, 1974

2. Tara H.A.: Operation Research, 3rd Edn.- McMillan Publishing Company, 1982

3. Beightler C.S. & Phillips D.T.: Foundations of Optimization,- Prentice Hall, 1979

4. McMillan claude Jr.: Mathematical Programming, 2nd Edn.- Wiley Series, 1979

5. Gillett B.G.: Introduction to Operation Research - A Computer oriented Algorithmic approach- McGrow Hill Book Comp., 1976

6. N.S. Kambo: Mathematical Programming Techniques

33005: Artificial intelligence

UNIT 1:

Problems and Search: What is Artificial Intelligence?, The AI Problems, The Underlying Assumption, What is an AI Technique, The Level of the Model, Criteria for Success.

UNIT 2:

Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

Heuristic Search Techniques: Generate and Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means Ends Analysis.

UNIT 3:

Knowledge Representation:- Knowledge Representation Issues, Representations and Mappings, Approaches to knowledge Representation, Issues in Knowledge Representation.

UNIT 4:

Using Predicate Logic:- Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.

Representing Knowledge Using Rules:- Procedural Versus Declarative knowledge, Logic Programming, Forward versus Back ward Reasoning, Matching, Control Knowledge.

TEXT BOOK:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Tata McGrawHill

REFERENCE:

1. Artificial Intelligence – A modern approach, Stuart Russel, Peter Norwig, Pearosn Education.

PRACTICALS

33001P: Object Oriented Programming Through JAVA Laboratory

1. Programs to illustrate constructors.
2. Programs to illustrate Overloading & Overriding methods in JAVA.
3. Programs Illustrate the Implementation of Various forms of Inheritance. (Ex. Single, Hierarchical, Multilevel inheritance...)
4. Program which illustrates the implementation of multiple Inheritance using interfaces in JAVA.
5. Program to illustrate the implementation of abstract class.
6. Programs to illustrate Exception handling
7. Programs to create packages in Java.
8. Program to Create Multiple Threads in Java.
9. Program to Implement Producer/Consumer problem using synchronization.
10. Program to Write Applets to draw the various polygons.
11. Create and Manipulate Labels, Lists, Text Fields, Text Areas & Panels
12. Handling Mouse Events & Keyboard Events.
13. Using Layout Managers.
14. Create & Manipulate the Following Text Areas, Canvas, Scroll bars, Frames, Menus, Dialog Boxes.
15. Programs, which illustrate the manipulation of strings.
    a. Ex. 1. Sorting an array of Strings.
       2. Frequency count of words & Characters in a text.
16. Programs, which illustrate the use of Streams.
17. Java Program that reads on file name from the user and displays the contents of file.
18. Write an applet that displays a simple message.
19. Write an applet that computes the payment of a loan based on the amount of the loan, the interest rate and the number of months. It takes one parameter from the browser: Monthly rate; if true, the interest rate is per month; Otherwise the interest rate is annual.
20. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the + - X % operations. Add a text field to display the result.
21. Write a Java program for handling mouse events.
22. Write a Java program for creating multiple threads
23. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
24. Write a Java program that lets users create Pie charts. Design your own user interface (with AWT)
25. Write a Java program that allows the user to draw lines, rectangles and ovals.
26. Write a Java program that illustrates how run time polymorphism is achieved.

33002P: Software Engineering Laboratory

Create UML diagrams for the following:

1. ATM Application
2. Library Management System
3. Online Book Shop
4. Railway Reservation System
5. Banking System
6. Document Editor
7. Abstract Factory design pattern
8. Builder design pattern
9. Facade design pattern
10. Bridge design pattern
11. Decorator design pattern
12. Chain of responsibility

33003P: Network Programming Laboratory

1. Write a Shell Script program sum of the digits of the given number.
2. Write a Shell Script program for reverse of the given number.
3. Write a Shell Script program to find the factorial of a given number.
4. Write a Shell Script program to print multiplication table.
5. Write a Shell Script program to find the Fibonacci series.
6. Write a Shell Script program to find whether a person is eligible for vote or not.
7. Write a Shell Script program to find the biggest of three numbers.
8. Write a Shell Script program to read a word if it is start with capital vowel or small vowel or end with digits.
9. Write a Shell Script program to menu driver which has the following options.
10. Write a Shell Script program to perform an Arithmetic operation.
11. Write a Shell Script program to perform addition of n specified numbers.
12. Write a Shell Script program for text command.
13. Write a Shell Script program to search a string in a file.
14. Write a Shell Script program to display the file contents (or) Write a file on execute based on user choice.
15. Write a Shell Script program to print the file name if it has read and write and execute permissions.
16. Write a Shell Script program to display all words which are entered as command line arguments.
17. Write a Shell Script program to print all positional parameters passed to programs and number of arguments.
18. Write a Shell Script program which takes two file names as arguments, if their contents are same then delete the second file.
19. Write a Shell Script program to check read permissions to the file if does not have add the read permission.
20. Write a Shell Script program the files are copied from one file to another file using if then fi.
21. Write a Shell Script program to display all sub-directories in the current directories.
22. Write a Shell Script program to check how many users are working on the same system.
23. Write a Shell Script program to rename the *.cpp file to *.c files.
24. Write a Shell Script program for file test.

43001: Web Technologies

UNIT 1:

Introduction to XHTML : Introduction – First XHTML –XHTML Validation service – Headers – Linking– Images – Unordered Lists – Nested and Ordered Lists – Basic XHTML Tags – Intermediate XHTML Tables and Formatting – XHTML Forms – Internal Linking – Creating and Using Image maps – meta Elements – frameset element – Nested framesets.

Cascading Style Sheets – Introduction –Inline Styles – Embedded Style Sheets – Conflicting Styles– Linking External Style Sheets – Positioning Elements – Backgrounds – Element dimensions – Text flow and the Box Model – User Style Sheets

UNIT 2:

Java Script: Introduction to Scripting: Introduction – A Sample Program: Printing a Line of Text in a Web Page – Obtaining user with prompt Dialogs

Functions: Introduction – Program Modules in JavaScript – Programmer-Defined Functions – Function Definitions – Random Number Generation – Example – Scope Rules – JavaScript Global Functions – Recursion vs. Iteration

Arrays: Declaring and Allocating Arrays – Examples Using Arrays – References and Reference Parameters – Passing Arrays to Functions – Sorting Arrays – Searching Arrays : Linear Search and Binary Search – Multidimensional Arrays.

Objects: Introduction – Thinking About Objects – Math Object – String Object – Date Object – Boolean, Number, document, window Object

UNIT 3:

Dynamic HTML – Object Model and Collections: Introduction – Object Referencing – Collections all and

Children – Dynamic Styles – Dynamic Positioning – Using the frames Collection – navigator Object Event Model – Event Onclick – Event onload – Error Handling with onerror – Tracking the Mouse with Event onmousemove – Rollovers with onmouseover and onmouseout – Form Processing with onfocus and onblur – More Form Processing with onsubmit and onreset – Event Bubbling – More DHTML Events.

Filters and Transitions: Flip filters: flipv and fliph – Transparency with the chroma Filter – Creating Image

masks – Miscellaneous Image filters: invert, gray and xray – Adding shadows to Text – Creating Gradients with alpha – Making Text glow – Creating Motion with blur – Using the wave Filter – Advanced Filters: dropshadow and light – blendTrans Transitions – revealTrans Transitions

UNIT 4:

XML (Extensible Markup Language): Introduction – Structuring Data – XML Namespaces Document Type Definitions (DTDs) and schemas– XML vocabularies- Document Object Model – DOM methods – Simple API for XML - Extensible Style Language(XSL) – Simple Object Access Protocol(SOAP)

Web Servers (IIS, Apache): Introduction – HTTP request Types – System Architecture – Client side scripting vs Server Side Scripting - Microsoft Internet Information Server (IIS) – Apache Web Server – Requesting documents

TEXT BOOKS:

1. 1.DEITEL & DEITEL: Internet & World Wide Web - How to Program, Pearson Education -Third Edition

REFERENCE BOOKS

2. Ivan Bayross : HTML, DHTML , Java Script , Perl, CGI, BPB
3. Web Technologies by Achyut S Godbole and Atul Kahate, TMH

43002: Dot Net programming

UNIT 1:

Fundamentals of Visual Basic, Exception handling, windows forms, Control Classes, Different Types of Boxes, Labels, Buttons, Panels. (Chapters 1 to 7)

UNIT 2:

WINDOWS FORMS: Different types of Bars, Menus, Views. **OBJECT - ORIENTED PROGRAMMING**: Classes and objects constructors and distructors, inheritance, modifiers, Interfaces, Polymorphism, Vate Binding, Graphics handling and File handling. (Chapters 8 to 13)

UNIT 3:

WEB FORMS: Working with webforms, Web forms and HTML, The Web control class, Web Forms and Boxes, Web Forms and Buttons, Validation Controls, Ad Rotators, Web Forms and HTML controls. (Chapters 14 to 19)

UNIT 4:

DATA ACCESS WITH ADO.NET: Accessing data with the server explorer, Data adapters and Data sets, Binding Controls to databases, Handling databases in code, Database access in Web Applications. Creating user Controls, Web user Controls, and Multithreading creating Windows services, Web Services and Deploying applications. (Chapters 30 to 25)

TEXT BOOK:

1. VB.NET PROGRAMMING (BLACK BOOK) BY STEVEN HOLZNER (Dreamtech-3003)

REFERENCE BOOKS:

1. VB.NET PROGRAMMING BY T. GADDIS (Dreamtech)
2. Microsoft Visual Basic. Net step by step By Halvosrson (PHI)
3. OOP with Microsoft Visual Basic.Net By Reynold Hacrtte (PHI)

43003: Advanced JAVA programming

UNIT 1:

FILES AND STREAMS: Introduction, Data Hierarchy, Files and Streams, Creating a Sequential-Access File, Random-Access Files, Reading Data Sequentially from a Random-Access File.

NETWORKING: Introduction, Manipulating URLs, Reading a File on a Web Server, Establishing a Simple Server, Establishing a Simple Client, Client/Server Interaction with Stream Socket Connections, Connectionless Client/Server Interaction with Datagrams, Client/Server Tic-Tac-Toe Using a Multithreaded Server, Security and the Network. (Chapter 17 and 21 of Book 1)

UNIT 2:

JDBC DATABASE ACCESS: JDBC Basics, New Features in the JDBC 2.0 API (Chapter 26 and 27 of Book 2)

UNIT 3:

REMOTE METHOD INVOCATION (RMI): Introduction, Case Study: Creating a Distributed System with RMI, Defining the Remote Interface Implementing the Remote Interface, Define the Client, Compile and Execute the Server and the Client.

UNIT 4:

SERVLETS: Overview of Serves, Interacting with Clients, The Life Cycle of a Servlet, Saving Client State, The servletrunner Utility, Running Servlets. (Chapters 34 to 39 of Book 2)

TEXT BOOKS:

1. JAVA How to Program Third Edition - Deitel & Deitel
2. The JAVA Tutorial Continued Compione, Walrath, Huml, Tutorial Team - Addison Wesley

REFERENCE BOOKS:

1. Java tutorial continued – campione (addison wesley)
2. The complete reference java 2 (fourth edition) by - patrick naughton & herbet schildt (TMH)
3. Programming java - decker&hirsh field vikas publisking (3001) (thomson learning) (second edition)
4. Introduction to java programming - Y.Daniel Liang PHI(3002)
5. Object oriented programming through JAVA2 by - Thamus WU (Mc.Graw Hill)
6. JAVA 2 - Dietel & Dietel (Pearson Education)
7. Introduction to JAVA –Bala Guru Swamy

43004A: Formal Language Automata Theory

UNIT 1:

Fundamentals : Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton, transition diagrams and Language recognizers.

Finite Automata : NFA with € transitions - Significance, acceptance of languages. Conversions and Equivalence : Equivalence between NFA with and without € transitions, NFA to DFA conversion, minimisation of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Melay machines.

UNIT 2:

Regular Languages : Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

Grammar Formalism : Regular grammars-right linear and left linear grammars, equivalence between

regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms.

Right most and leftmost derivation of strings.

UNIT 3:

Context Free Grammars : Ambiguity in context free grammars. Minimisation of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

Push Down Automata : Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL and DPDA.

UNIT 4:

Turing Machine : Turing Machine, definition, model, design of TM, Computable functions.

TEXT BOOKS:

1. "Introduction to Automata Theory Languages and Computation" Hopcroft H.E. and Ullman J. D.Pearson Education
2. Introduction to Theory of Computation –Sipser 2nd edition Thomson

REFERENCE BOOKS:

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation ,John C Martin, TMH
3. "Elements of Theory of Computation" Lewis H.P. & Papadimition C.H. Pearson /PHI.

4 Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekaran, 2nd edition, PHI

43004B: Information Systems

UNIT I

Overview of System analysis and design: Development life cycle, Requirements determination, Logical design, Physical design, Program design, Risk and feasibility analysis, SRS, prototyping

UNIT II

Information requirement analysis: Process modelling with physical and logical data flow diagrams, Data modelling with entity relationship diagrams, Addition modelling method, Developing proposal: feasibility studies, cost benefit analysis.

UNIT III

System design: Process descriptions, Input/output controls, object modelling, Database design, and User Interface design, Documentation

UNIT IV

Introduction to - Project management, scheduling, measurement of quality and productivity, ISO and capability maturity models, Strategic planning, system audit. Quality assurance: reviews, walkthroughs, and inspection.

REFERENCE BOOKS:

1. Analysis & Design of Information Systems, Senn,MH.
2. Information Systems :Analysis & Design, Ram Bansal 'Vigyacharya',New Age International
3. Analysis, Design of Information System,Rajaraman, PHI
4. System Analysis & Design, Parthasarathi,EPH
5. System Analysis, Design & MIS, EXCEL BOOKS
6. Analysis, Design & implementation of Information Systems, Sharma, VIKAS
7. System Analysis & Design Hand Book, V.K. Jain, Wiley Dreamtech

43004C: Machine Learning

UNIT - I

Introduction - Well-posed learning problems, designing a learning system Perspectives and issues in machine learning

Concept learning and the general to specific ordering – Introduction, A concept learning task, concept learning as search, Find-S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination algorithm, Remarks on Version Spaces and Candidate Elimination, Inductive Bias.

Decision Tree Learning – Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Learning Algorithm Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning. **UNIT - II**

Artificial Neural Networks Introduction, Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptions, Multilayer Networks and the Back propagation Algorithm. Discussion on the Back Propagation Algorithm, An illustrative Example: Face Recognition **Evaluation Hypotheses** – Motivation, Estimation Hypothesis Accuracy, Basics of Sampling Theory, A General Approach for Deriving Confidence Intervals, Difference in Error of Two Hypotheses, Comparing Learning Algorithms.

UNIT - III

Bayesian learning - Introduction, Bayes Theorem, Bayes Theorem and Concept Learning Maximum Likelihood and Least Squared Error Hypotheses, Maximum Likelihood Hypotheses for Predicting Probabilities, Minimum Description Length Principle , Bayes Optimal Classifier, Gibs Algorithm, Naïve Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief Networks, EM Algorithm. **Computational Learning Theory –** Introduction, Probably Learning an Approximately Correct Hypothesis, Sample Complexity for Finite Hypothesis Space, Sample Complexity for Infinite Hypothesis Spaces, The Mistake Bound Model of Learning.

Instance-Based Learning – Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

UNIT - IV

Pattern Comparison Techniques, Temporal patterns, Dynamic Time Warping Methods, Clustering, Codebook Generation, Vector Quantization

Pattern Classification: Introduction to HMMS, Training and Testing of Discrete Hidden Markov Models and Continuous Hidden Markov Models, Viterbi Algorithm, Different Case Studies in Speech recognition and Image Processing

Analytical Learning – Introduction, Learning with Perfect Domain Theories: PROLOG-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operations.

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, MGH

2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.

REFERENCE BOOKS:

1. Machine Learning : An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

43004D: Big Data Analytics

UNIT 1:

Introduction to Big Data: Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity), Data in the Warehouse and Data in Hadoop, Why is Big Data Important? Patterns for Big Data Development

UNIT 2:

Introduction to Hadoop: Hadoop- definition, Understanding distributed systems and Hadoop, Comparing SQL databases and Hadoop, Understanding MapReduce, Counting words with Hadoop-running your first program, History of Hadoop, Starting Hadoop - The building blocks of Hadoop, NameNode, DataNode, Secondary NameNode, JobTracker and Task Tracker, MapReduce -A Weather Dataset, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes.

UNIT 3:

HDFS: Components of Hadoop -Working with files in HDFS, Anatomy of a MapReduce program, Reading and writing

The Hadoop Distributed Filesystem -The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop Filesystem, The Java Interface, Data Flow, Parallel Copying with distcp, Hadoop Archives

UNIT 4:

MapReduce Advanced Programming: Writing basic MapReduce programs - Getting the patent data set, constructing the basic template of a MapReduce program, Counting things, Adapting for Hadoop‘s API changes, Streaming in Hadoop, Improving performance with combiners, Advanced MapReduce – Chaining MapReduce jobs, joining data from different sources, creating a Bloom filter

TEXT BOOKS:

1. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,—Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Datall, 1st Edition, TMH,2012.
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O‘reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop in Practice by Alex Holmes, MANNING Publ.

REFERENCE BOOKS:

1. Data Divination: Big Data Strategies, 1st Edition, Pam Baker, Bob Gourley, Cengage

43005A: Human Computer Interaction

UNIT1:

Introduction: Importance of user Interface – definition, importance of good design.Benefits of good design. A brief history of Screen design,The graphical user interface – popularity of graphics, the concept of direct manipulation,graphical system, Characteristics, Web user – Interface popularity, characteristics-Principles of user interface.

UNIT 2:

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT 3:

Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT 4:

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. User Interface Design, Soren Lauesen , Pearson Education.

43005B: Management Information System

UNIT I

The meaning and role of MIS: What is MIS? Decision support systems, systems approach, the systems view of business, MIS organization within the company, Managers view of Information systems. Management organizational theory and the systems approach - Development of organizational theory, organizational behavior, management - information and the systems approach – Data processing and the computer – components of computer system – computer based information system –Applications Information systems for decision making: Evolution of an information system - Basic information systems - decision making and MIS - MIS as a technique for making programmed decisions - decision assisting information systems –DSS

UNIT II

Strategic and project planning for MIS: General business planning - appropriate MIS response - MIS planning general - MIS planning details.

Conceptual system design: Define the problems - set system objectives - establish system constraints - determine information needs - determine information sources - develop alternative conceptual designs and select one - prepare the conceptual design report.

Detailed system design: Inform and involve the organization - aim of detailed design - project management of MIS detailed design - identify dominant and trade off criteria - sketch the detailed operating subsystems and information flows – automation - inputs, outputs, and processing - software, hardware and tools - propose an organization to operate the system - document the detailed design - revisit the manager-user.

UNIT III

Implementation, evaluation and maintenance of the MIS: Plan the implementation - acquire floor space and plan space layouts - organize for implementation - develop procedures for implementation train the operating personnel - computer related acquisitions - develop forms for data collection and information dissemination - develop the files - test the system - evaluate the MIS - control and maintain the system.

Pitfalls in MIS development: Fundamental weaknesses - soft spots in planning - design problems - implementation

UNIT IV

Systems concepts and control: Systems classifications – concepts – control: Key system concept – business organization as a system – control and system design

Management science and systems modeling for MIS: What is Management science? – What are models? – Kinds and use of models for analysis of systems characteristics – simulation – construction of models Case studies

TEXT BOOK:

1. Information systems for modern management, 3rd Edition by R.G Murdick, J.E Ross and J. R clagget, PHI-2004.

REFERENCE BOOKS:

1. Management Information Systems, 9/e, Laudon & Laudon, V.M.Prasad, Pearson, 2005,
2. Management Information Systems , C.S.V.Murthy, Himalaya Publications, 2004

43005C: Computer Graphics

UNIT 1:

A survey of computer graphics: computer aided design-presentation graphics-computer art- entertainment-education and training-visualisation-image processing-graphical user interface, overview of graphics systems, output primitives

UNIT 2:

Bresenham technique – Line Drawing and Circle Drawing Algorithms - DDA - Line Clipping - Text Clipping.

Two dimensional transformations – Scaling and Rotations - Interactive Input methods - Polygons– Splines – Bezier Curves - Window view port mapping transformation.

UNIT 3:

3D Concepts - Projections – Parallel Projection - Perspective Projection – Visible Surface Detection Methods - Visualization and polygon rendering – Color models – XYZ-RGB-YIQ-CMY-HSV Models - animation – Key Frame systems - General animation functions - morphing.

UNIT 4:

Multimedia hardware & software - Components of multimedia – Text, Image – Graphics – Audio – Video – Animation – Authoring.

Multimedia communication systems – Data base systems – Synchronization Issues – Presentation requirements – Applications – Video conferencing – Virtual reality – Interactive video – video on demand.

TEXT BOOKS:

1. Hearn D and Baker M.P, "Computer graphics – C Version", 2nd Edition, Pearson Education, 2004.
2. Ralf Steinmetz, Klara steinmetz, "Multimedia Computing, Communications and Applications", Pearson education, 2004

REFERENCE BOOKS:

1. Siamon J. Gibbs and Dionysios C. Tsichritzis, "Multimedia programming", Addison Wesley, 1995.
2. John Villamil, Casanova and Leony Fernanadez, Eliar, "Multimedia Graphics", PHI, 1998.

43005D: PHP

UNIT1:

INTRODUCTION: Introduction to Open sources – Need of Open Sources–Advantages of Open Sources– Application of Open Sources. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode

OPEN SOURCE DATABASE: MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time– Sorting Query Results – Generating Summary – Working with metadata – Usings equences – MySQL and Web.

UNIT2:

Introduction to PHP : Evaluation of Php Basic Syntax Defining variable and constant Php Data type Operator and Expression, Handling Html Form With PHP, Capturing Form Data Dealing with Multi-value filed Generating File uploaded form Redirecting a form after submission

UNIT3:

Decisions and loop :

Making Decisions Doing Repetitive task with looping Mixing Decisions and looping with Html

Function :

What is a function Define a function Call by value and Call by reference Recursive function

String

Creating and accessing String Searching & Replacing String Formatting String String Related Library function

UNIT4:

Array :

Anatomy of an Array Creating index based and Associative array Accessing array Element

Looping with Index based array Looping with associative array using each() and foreach() Some useful Library function

Working with file and Directories:

Understanding file& directory Opening and closing a file Coping ,renaming and deleting a file Working with directories Building a text editor File Uploading & Downloading

TEXT BOOKS:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002
3. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGraw- Hill Publishing Company Limited, Indian Reprint 2009.

REFERENCE BOOKS:

1. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002
2. Wesley J. Chun, “Core Phython Programming”, Prentice Hall, 2001
3. Martin C. Brown, “Perl: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
4. Vikram Vaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata McGraw -Hill Publishing Company Limited, Indian Reprint 2009.

PRACTICALS
43001P: Web Technologies Laboratory

1. Create your own Resume using HTML 5 Tags
2. Debug and validate your HTML document (Resume) using W3C validator and fix the issues.
3. Add Styles to your Resume using CSS 3 Properties.
    a. Add External, Internal and Inline CSS styles to know the priority.
    b. Add CSS3 Animation to your profile.
4.
    a. Add functionalities that use any 2 of HTML 5 API‟s.
    b. Create a student Registration form for Job Application and validate the form fields using JavaScript
5.
    a. Create a CGPA Calculator in Web Brower using HTML, CSS and JavaScript. Use functions in JavaScript.
    b. Create a Quiz Program with adaptive questions using JavaScript.
6. Create a Pan Card Validation form using Object Oriented JavaScript, consider the 10th character to be an alphabet.
    a. Get the user‟s First Name, Last Name and other required fields as input
    b. Assume the last digit of the Pan Number to be an alphabet
    c. Validate the PAN Number
7.
    a. Create an online Event Registration form and validate using JQuery
    b. Create an online video Player which will allow you to play videos from the system and also create custom playlist using JQuery.
8. Construct a JSON Structure for a bookstore and validate it using JSON Validator such as http://jsonlint.com/ and parse the Json file to list the books under the category “Fiction”. Use Javascript or JQuery for parsing
9. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.
10. Develop a Social Media Web Application using HTML5, CSS3, JQuery, AJAX & PHP.

43002P: Dot Net Programming Laboratory

1. Design and develop a program to process electricity bill with the given condition by choosing console application.
2. Design and develop a program to demonstrate array of strings by using console application.
3. Design and develop a program to demonstrate exception handling by using console application.
4. Design and develop a VB.Net program for login form creation by using Windows form application.
5. Design and develop a VB.Net program for calculating simple interest and compound interest by using radio buttons.
6. Design and develop a VB.Net program to demonstrate ComboBox, ListBox and CheckedListBox.
7. Design and develop a VB.Net program to demonstrate Menu creation.
8. Design and develop a VB.Net program to demonstrate Status Bar.
9. Design and develop a VB.Net program for Single Inheritance.
10. Design and develop a VB.Net program for Graphics Handling.
11. Design and develop a VB.Net program to Create a Directory and Copy the selected file to the Directory.
12. Design and develop a VB.Net program to write a File using Console application.
13. Design and develop a web form for validating whether the person is eligible for vote or not.
14. Design and develop a Registration form to demonstrate validation controls in ASP.Net.
15. Design and develop a web form for demonstration of AdRoutator control inASP.Net.
16. Design and develop a form to s Inserting, deleteting, update and Searching records from database

43003P: Advanced JAVA Programming Laboratory

1. Programme to illustrate the File Class.
2. Programme to illustrate the IO, Utility Package & Display the File Properties.
3. Programme to illustrate the File Input Stream.
4. Programme to illustrate the nio, io package.
5. Programme for simple Railway Reservation System.
6. Programme to illustrate the Client & Server.
7. Programme for DDL, DML operations on a database through JDBC.
8. Programme for DDL, DML operations of a Database through JDBC prepared Statement.
9. Programme for DDL, DML operations of a Database through JDBC to Result set Metadata.
10. Programme for RMI Methods.
11. Programme to using of servlet print the current date & time.
12. Programme to demonstrate JAVA URL class.

NON-CORE SYLLABUS

*43006-CBCS-I: Introduction to Computers and MS-Office

UNIT 1:

Exploring Computers and their Uses: Computers in our World, the Computer defined, Computer for individual users, Computer for Organizations, Computer in Society, Why was Computers so important.

Types of Storage Devices: An ever-growing need, Categorizing storage devices, Magnetic Storage Devices- How data is stored on a disk, how data is organized on magnetic disk, how the operating system finds data on a disk, Diskettes, hard disks, removable high-capacity magnetic disks, tape drivers, optical storage devices, solid-state storage devices, smart cards, solid-state disks.

Operating System Basics: Introduction to OS, Types of Operation System, Evolution of OS, purpose of operating systems, functions of an OS, Modern OS (windows 9x, Windows XP, NT, Some Windows server OS),Introduction to UNIX OS, Introduction to LINUX OS, Basic commands.

UNIT2: MS-WORD

Word Basics: Starting word, creating a new document, operating preexisting document, the parts of a word window, typing text, selecting text, deleting text, undo, redo, repeat, inserting text, replacing text, formatting text, cut, copy, paste-formatting text and document: Auto format, Line spacing margins, Boards and shading.

Header and Footer: Definition of header and footer, creating basic header and footer, creating different headers and footers for odd and even pages.

Tables: Creating a simple table, creating a table using the table menu. Entering and editing text in the table, selecting table, adding rows, deleting rows, changing row height, inserting columns, deleting columns, changing column width.

Graphics: Importing graphics, Clip Art, insert picture, Clip Art Gallery. Using word's drawing features, drawing objects, text in drawing.

Macros: Macro. Record Macros, Editing macros, running a macro.

Mail Merge: Mail Merge Concept, Main document, data sources, merging data source and main document, overview of word menu options word basic tool bar.

UNIT 3: MS-EXCEL

Excel Basics: Overview of Excel features, Getting Started, creating a new worksheet, selecting cells, Entering and editing text, entering and editing numbers, entering and editing formulas, Referencing cells, moving cells, copying cells, sorting cell data.

Formatting: Page setup, changing height and width of row & column. Auto format, changing font sizes and attributes, centering text across columns, using boarders buttons and commands, changing colors and shading, hiding rows and columns.

Introduction to Functions: Parts of Functions, Functions requiring add-ins, the function wizard, examples functions by category: Date and Time functions, Engineering Functions, Math and Trig Functions, Statistical Functions, Text Functions.

Excel Charts: Chart parts and technology, instant charts with the chart wizard, creation of different types of charts, printing charts, deleting charts, linking in excel.

UNIT 4: MS-POWER POINT

Power Point Basics: Terminology, Getting Started, Views. Creating Presentations: Using auto content wizard, Using blank presentation option, Using design template option, Adding and deleting slides, Importing image from the outside world, Drawing in power point, Transitions and build effects, Deleting a slide, numbering a slide saving presentation. Closing presentation, printing presentation elements.

TEXT BOOKS

1. Peter Norton, Introduction to Computers, Sixth Edition, Tata MC Graw Hill (2007)
2. Ran Mansfield. Working in Microsoft Office, Tata MC Graw Hill (2008)

REFERENCE BOOKS

1. Michael Miller, Absolute Beginner's guide to computer Basics, Fourth Edition, Pearson Education (2007)
2. Deborah Morly, Charles S. Parker, understanding computers to day and tomorrow , 11th edition, Thomson
3. Ed Bott, woody Leonhard, using Microsoft Office 2007, Pearson Education (2007)

53001: Cryptography and Network Security

UNIT 1:

Introduction: Security trends, OSI Security Architecture, Security Attacks, services and mechanisms, Model for Network Security.

Classical techniques: Symmetric Cipher model, Substitution Techniques, Transposition Techniques, Steganography.

Modern techniques: Simplified DES, block cipher principles, data encryption standard, strength of DES, differential and linear crypt analysis, block cipher design principles and modes of operations. Algorithms: Triple DES, international data encryption algorithm, characteristics of advanced symmetric block ciphers.

UNIT 2:

Conventional encryption: Placement of encryption function, traffic confidentially, key distribution.

Public key cryptography: Principles of public key cryptosystems, RSA algorithm, key management, Diffie-Hellmen key exchange.

Message authentication and hash functions: Authentication requirements and functions, Message Authentication, Hash functions, security of hash functions and Macs

UNIT 3:

Authentication applications: Kerbores, X.509 directory authentication service. Electronic mail security: Pretty good privacy, S/MIME.

UNIT 4:

System Security: Intruders, Intrusion detection, Password management. Malicious Software: Virus and related threats, Virus counter measures. Firewall: Firewall design principles, Trusted systems.

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice – William Stallings, Pearson Education.
2. Network Security Essentials (Applications and Standards) by William Stallings, Pearson Education.

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech Press)
2. Network Security – Private Communication in a Public World by Charlie kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Introduction to Cryptography, Buchmann, Springer.

53002: Cloud Computing

UNIT 1:

Systems modeling, Clustering and virtualization: Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

UNIT 2:

Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT 3:

Cloud Platform Architecture: Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT 4:

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

TEXT BOOKS:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

REFERNCE BOOK:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

53003: Data Warehousing & Data Mining

UNIT1:

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining.

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT2:

Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse. Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

UNIT3:

Concepts Description: Characterization and Comparison: Data Generalization and Summarization- Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT4:

Classification: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.

REFERENCE BOOKS:

1. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION
2. Data Mining Techniques – ARUN K PUJARI, University Press.
3. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
4. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.
5. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION.

53004A : Digital Image Processing

UNIT 1:

INTRODUCTION: What is Digital Image Processing, The origins of Digital Image Processing, Examples of Fields that use Digital Image Processing, Fundamentals steps in Digital Image Processing, Components of an Image Processing System

DIGITAL IMAGE FUNDAMENTALS: Elements of Visual Perception, Light & Electro magnetic spectrum, Image sensing and acquisition, Image sampling & quantization, some basic relationships between pixels, Linear and non linear operations.

UNIT2:

IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN: Background, some gray level transformations, histogram processing , enhancement using arithmetic/logic operations, basics of spatial filtering, smoothing spatial filters, sharpening spatial filters, combining spatial enhancement methods

IMAGE ENHANCEMENT IN THE FREQUENCY DOMAIN: Background, Introduction to fourier transform and frequency domain, smoothing frequency domain filters, sharpening frequency domain filters, homomorphism filtering, implementation.

UNIT 3:

IMAGE RESTORATION: A model of the image degradation, restoration process, noise models, restoration in the presence of noise only spatial filtering, periodic noise reduction by frequency domain filtering, Linear, position invariant degradation, Estimating the degradation function, inverse filtering, minimum mean square error filtering, constrained least squares filtering, geometric mean filter, geometric transformation

UNIT 4:

IMAGE COMPRESSION: Fundamentals, image compression models, elements of information theory, error free compression, lossy compression, image compression standards

TEXT BOOKS:

1. Digital Image Processing by Rafael C. Gonzalez & Richard E. Woods, Second Edition, Pearson Education.

REFERENCE BOOKS:

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Digital Image Processing by S Jayaraman, S Esakkirajan, T VeeraKumar (Tata McGraw Hill Education Pvt Ltd)
3. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
4. Digital Image Processing using Matlab, Rafeal C.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.
5. Digital Image Processing, William K. Prat, Wily Third Edition
6. Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India.

53004B: Wireless & Ad-hoc Networks

UNIT-I:

Introduction: Introduction to Wireless Networks, Various Generations of Wireless Networks, Virtual Private Networks- Wireless Data Services, Common Channel Signaling, Various Networks for Connecting to the Internet, Blue tooth Technology, Wifi-WiMax- Radio Propagation mechanism , Pathloss Modeling and Signal Coverage

UNIT-II:

Wireless Adhoc Networks: Basics of Wireless Networks, Infrastructured Versus Infrastructureless Networks – Properties of Wireless, AD hoc Networks, Types of Ad Hoc Networks, Challenges in AD Hoc Networks – Applications of Wireless AD Hoc Networks

UNIT-III:

Routing Protcols for Ad Hoc Networks:Introduction-Proactive Routing Protocols- Reactive Routing protocols-Hybrid Routing Protocols-QoS Metrics-Energy impact issues in Routing.

UNIT-IV:

Mobile Ad Hoc Networks (MANETs): Overview, Properties of A MANET, Spectrum of MANET Applications, Routing and Various Routing Algorithms. Other Wireless Technologies**:** Introduction, IEEE 802.15.4 and Zigbee, General Architecture, Physical Layer, MAC layer, Zigbee, WiMAX and IEEE 802.16, Layers and Architecture, Physical Layer, OFDM Physical layer.

TEXT BOOKS:

1. Principles of Wireless Networks , Kaveth Pahlavan, K. Prasanth Krishnamurthy, Pearson Publications, Asia, 2002
2. Mobile Cellular Communications, G.Sasibhusan Rao, “”, Pearson Publications.

REFERENCES BOOKS:

1. Guide to Wireless Ad Hoc Networks: Series: Computer Communications and Networks, Misra, Sudip; Woungang, saac; Misra, Subhas Chandra, 2009, Springer

53004C: E-Commerce

UNIT 1:

Electronic Commerce Environment and Opportunities: Background, The Electronic Commerce Environment, Electronic Marketplace Technologies. Modes of Electronic Commerce: Electronic Data Interchange, Migration to Open EDI, Electronic Commerce with www/Internet, Commerce Net Advocacy, web Commerce Going Forward. Approaches to Safe Electronic Commerce: Secure Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol (SEPP), Secure Electronic Transaction (SET), Certificates for authentication Security on web Servers and Enterprise Networks.

UNIT 2:

Electronic Cash and Electronic Payment Schemes: Internet Monetary Payment & Security Requirements. Payment and Purchase Order Process, On-line Electronic cash. Internet/Intranet Security Issues and Solutions: The need for Computer Security, Specific Intruder Approaches, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams.

UNIT 3:

Master Card/Visa Secure Electronic Transaction: Introduction, Business Requirements, Concepts, payment Processing. E-Mail and Secure E-mail Technologies for Electronic Commerce: Introduction, The Means of Distribution, A model for Message Handling, E-mail working, Multipurpose Internet Mail Extensions, Message Object Security Services, Comparisons of Security Methods, MIME and Related Facilities for EDI over the Internet.

UNIT 4:

Internet Resources for Commerce: Introduction, Technologies for web Servers, Internet Tools Relevant to Commerce, Internet Applications for Commerce, Internet Charges, Internet Access and Architecture, Searching the Internet. Advertising on Internet: Issues and Technologies. Introduction, Advertising on the Web, Marketing creating web site, Electronic Publishing Issues, Approaches and Technologies: EP and web based EP.

TEXT BOOKS

1. Web Commerce Technology Handbook, by Daniel Minoli, Emma Minoli, McGraw-Hill

REFERENCE BOOKS:

1. E-Commerce – Strategy, Technology and Applications By David Whiteley (McGraw Hill)

53004D: Grid Computing

UNIT I

Introduction – Early Grid Activities, Current Grid Activities, an overview of Grid business areas, Grid applications, Grid infrastructure – Grid computing organizations and their roles – Grid computing Anatomy – Grid computing Roadmap

UNIT II

Service-Oriented and ,Web Service Architecture- XML Messages and enveloping – Service message description mechanisms, relationship between web and grid service – Sample use cases that drive OGSA – The OGSA Platform components

UNIT III

A high level introduction to OGSI – Technical details of OGSI specification, Service data concepts - Grid Service: Naming and change Management – OGSA Basic Services: Common Management Model, Service domains, Policy and Security Architecture

UNIT IV

The Grid Computing Toolkits – GLOBUS GT3 Toolkit: Architecture - GLOBUS GT3 Toolkit: Programming Model

TEXTBOOK

1. Joshy Joseph & Craig Fellenstein, “Grid Computing”, Pearson-2004.

REFERENCE

1. Ahmar Abbas, “Grid Computing: A Practical Guide to technology and Applications”, Firewall media – 2006.

53005A: Enterprise Application Integration

UNIT I

Defining EAI : What Is EAI?, Applying Technology, How Did Things Get This Bad?, Chaos Today, Order Tomorrow.

Evolution of Stovepipes: Traditional Systems, Microcomputer Systems, Distributed Systems, Packaged Applications.

Making the Business case for EAI: The Virtual System, E-Business, Types of EAI.

UNIT II

Data-Level EAI: Going for the Data, Data-Level EAI by Example, Database-to-Database EAI, Federated Database EAI.

Consider the Data Source: Relational Data, Object-Oriented, Multidimensional, Other Data Storage Models

Application Interface-Level EAI: Application Interfaces, What's an API?, Interface by Example, Approaching Application Interfaces, The Interface Tradeoff, Packaged Applications, Custom Applications.

UNIT III

Method-Level EAI: Method-Level Example, What's a Process?: Scenarios, Rules, Logic, Data, Objects.

Method Warehousing: Leveraging Frameworks for EAI, Enabling Technology, Sharing Methods to Bind Your Enterprise.

User Interface-Level EAI: Leveraging User Interface-Level EAI, Going to the User Interface.

UNIT IV

The EAI Process—Methodology or Madness?: Applying a Procedure/Methodology, Understanding the Enterprise and Problem Domain, Making Sense of the Data, Making Sense of the Processes, The Common Business Model, Identifying Application Interfaces, Identifying the Business Events, Identifying the Schema and Content Transformation Scenarios, Mapping Information Movement, Applying Technology, Testing, Testing, Testing, Considering Performance, Defining the Value, Creating Maintenance Procedures, Method or Madness?

TEXT BOOKS

1. David S. Linthicum, Enterprise Application Integration, Addison Wesley Information Technologies Series, printed December 2003.

53005B: Distributed Systems

UNIT 1:

Characterization of Distributed Systems-Introduction-Examples-Resource Sharing and the Web-Challenges. System Models-Architectural-Fundamental.

Interprocess Communication-Introduction-API for Internet protocols-External data representation and marshalling--Client-server communication-Group communication-Case study: Interprocess Communication in UNIX.

UNIT 2:

Distributed Objects and Remote Invocation-Introduction-Communication between distributed objects- Remote procedure calls-Events and notifications

Case study: Java

RMI, Operating System Support-Introduction-OS layer-Protection-Processes and threads-Communication and invocation OS architecture.

UNIT 3:

Distributed File Systems-Introduction-File service architecture-Case Study: Sun Network File System-Enhancements and further developments.

Name Services-Introduction-Name Services and the Domain Name System-Directory Services Case Study: Global Name Service.

UNIT 4:

Time and Global States-Introduction-Clocks, events and process states-Synchronizing physical clocks-Logical time and logical clocks-Global states-Distributed debugging. Coordination and Agreement-Introduction-Distributed mutual exclusion-Elections- Multicast communication-Consensus and related problems.

TEXT BOOK:

1. George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 4th Edition, Pearson Education, 2005.

REFERENCE BOOKS:

1. A.tS. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.
2. M.L.Liu, —Distributed Computing Principles and Applications‖, Pearson Addison Wesley, 2004.
3. Mukesh Singhal, —Advanced Concepts In Operating Systems‖, McGrawHill Series in Computer Science, 1994.
4. Nancy A. Lynch, "Distributed Algorithms", The Morgan Kaufmann Series in Data Management System, Morgan Kaufmann Publishers, 2000.

53005C: Software Testing

UNIT-I:

Building a software Testing strategy, software Test Design Techniques, software Testing tools and selection of Test Automation products.

UNIT-II:

Software Testing Life cycle and software testing process, testing Effort estimation and test planning, software test effort estimation technique.

UNIT-III:

Pre-Development testing: requirements and Design phase, Best practices in program phase: UNIT Testing, System Testing and integration testing, case study on acceptance testing.

UNIT-IV:

Implementing and Effective Test Management Process, Building and Effective test organization, performance issues and optimization techniques.

TEXT BOOKS:

1. Renu Rajani and pradeep Oak,, software testing, tata Mc Graw Hill.

53005D: Theory of Computation

UNIT 1:

Fundamentals : Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton, transition diagrams and Language recognizers.

Finite Automata : NFA with € transitions - Significance, acceptance of languages. Conversions and Equivalence : Equivalence between NFA with and without € transitions, NFA to DFA conversion, minimisation of FSM, equivalence between two FSM‘s, Finite Automata with output- Moore and Melay machines.

UNIT 2:

Regular Languages : Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

Grammar Formalism : Regular grammars-right linear and left linear grammars, equivalence between

regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms.

Right most and leftmost derivation of strings.

UNIT 3:

Context Free Grammars : Ambiguity in context free grammars. Minimisation of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

Push Down Automata : Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL and DPDA.

UNIT 4:

Turing Machine : Turing Machine, definition, model, design of TM, Computable functions.

TEXT BOOKS:

3. "Introduction to Automata Theory Languages and Computation" Hopcroft H.E. and Ullman J. D.Pearson Education
4. Introduction to Theory of Computation –Sipser 2nd edition Thomson

REFERENCE BOOKS:

4. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
5. Introduction to languages and the Theory of Computation ,John C Martin, TMH
6. "Elements of Theory of Computation" Lewis H.P. & Papadimition C.H. Pearson /PHI.

4 Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekaran, 2nd edition, PHI

53001P: Cryptography and Network Security Laboratory

1. write a programme to implement Ceaser Cipher.
2. write a programme to implement hill cipher.
3. write a programme to implement Simplified DES.
4. write a programme to implement Double EES
5. write a programme to implement Triple DES.
6. write a programme to implement different Modes of DES.
7. write a programme to implement RSA Algorithms.
8. write a programme to implement Diffie-Hellman Key exchange Algorithm.

53002P: Cloud Computing Laboratory

1. Installation and configuration of oracle virtual box for Windows XP and Android**.**
2. Installation and configuration of Hadoop.
3. Using Hadoop for counting word frequency with map reduce
4. Service development research and users over cloud-google app
5. Service development research and users over amazon web services.
6. Cloud security Management
7. Performance evaluation of Services over Cloud-Google App
8. Performance evaluation of Services over Amazon Web Services.

53001D: MINI PROJECT

NON-CORE SYLLABUS
*53006-CBCS-II: Internet and World Wide Web

UNIT 1:

Telecommunications and Networks: The Telecommunications system, networks, network communication software, network processing strategies, Telecommunication applications

The Internet, Intranets and Extranets: What exactly is the Internet?, the evolution of the Internet, the operation of the Internet, services provided by the Internet, the World Wide Web, Internet Challenges, Intranets, Extranets.

UNIT2:

Internet Communication Protocols: Internet hosts, Servers and Clients, Port and Port Numbers, Domain Name System and DNS Servers.

Types of Internet Connections: Dial-up Connection, DSL, ISDN, Leased-lines, Cable-TV Internet, Satellite Internet, Wireless internet Connections, Connecting LAN to the Internet.

UNIT3:

Web Browsers: What is a Web Browser, Main functions, Types of Web Browsers, Main Elements of Web Browsers, Browsing the Web, Search Engines Web Directories, Navigating Web Pages, Domain Name System, Uniform Resource Locator.

UNIT4:

Email Concepts: How do you get your email, Email Addressing, Message Headers, Email Netiquette, General Information about attachments, Downloading and Storing Data:

TEXT BOOKS

1. EFRAIM Turban, R.Kelly Rainer, Richard E.Potter, —"Introduction to Information Technology" John Wiley(2008)
2. Margaret Levine Young, Internet: The Complete Reference, Second Edition, McGraw-Hill/Osborne

REFERENCE BOOKS

1. ITL Education Solutions Ltd., —Introduction to Information Technologyǁ, Pearson India (2008).

63001S: SEMINAR

63001D: MAJOR PROJECT WORK

PAPER CODE:

M.C.A Degree Examinations, Month –Year
I/II/III/IV/V Semesters
Problem solving and programming using C
(With effect from under CBCS 2018-19)

Time: 3Hours **Max.Marks:75**

(No additional Sheet will be supplied)

Part-A **5x3=15**

Answer **any five** Questions
Each Question carries **Three(3)** Marks

1.
2.
3.
4.
5.
6.
7.
8.

Part-B **4x15=60**

Answer **All** Questions
Each Question carries **Fifteen(15)** Marks

Unit-I

9**.**

(OR)

10.

Unit-II

11**.**

(OR)

12

Unit-III

13**.**

(OR)

14.

Unit-IV

15**.**

(OR)

16.

.

PAPER CODE:

M.Sc. Mathematics Degree Examinations, Month –Year

Second/Third Semesters

Introduction to Computers and MS-OFFICE

(NON-CORE SUBJECT)

Time: 3Hours **Max.Marks:75**

(No additional Sheet will be supplied)

Part-A **5x3=15**

Answer **any five** Questions

Each Question carries **Three(3)** Marks

1.
2.
3.
4.
5.
6.
7.
8.

Part-B **4x15=60**

Answer **All** Questions

Each Question carries **Fifteen(15)** Marks

Unit-I

9**.**

(OR)

10.

Unit-II

11**.**

(OR)

12

Unit-III

13**.**

(OR)

14.

Unit-IV

15**.**

(OR)

16.

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MBA Course Syllabus

I Semester

101: PRINCIPLES OF MANAGEMENT

Course Objective: On successful completion of the course the students should have :

a. **To familiarize the students with management theory, functions, principles and practices of management.**
b. **Learnt the scientific decision making process and problems and solving techniques and also learn the modern trends in management.**

Unit-I : INTRODUCTION

Management-Concept, Significance, Principles and Functions-Management and Administration – Managerial Skills- social responsibility of business, Management by Objectives(MBO) Management Thought.

Unit-II: PLANNING AND ORGANIZATION

Planning-Nature and Process of Planning- Flexibility of planning- Characteristics of sound plan-Decision Making-Nature of Decision Making-Process and Techniques-Organization-Levels - Organization Structures-Staffing Policies-Line and Staff Relations–Delegation, Centralization and Decentralization.

Unit-III : STAFFING

Nature and Importance of Staffing – Factors in Selecting Lower, Middle and Upper Level Managers – Skill and Personal Characteristics needed by Managers

Unit –IV: DIRECTING

Directing–Leadership-Leadership styles-Communication-Types of Communication-Motivation-Need Theories–Controlling–Types of Control-

Unit-V: CONTROL

Controlling-System of controlling- Methods, Tools and Techniques of control-Making Controlling Effective-Organising process-Departmentation Types-Making Organising Effective.

Reference Books

1. Agarwal R D Organisation and management – Tata McGrawhill.
2. Koontz and Weichrich Essentials of management – Tata McGrawhill
3. Aswathappa K. Human Resource and personnel Management, Text and cases-Tata McGrahills.
4. Sherlekar- S.A Management – Himalaya publishing house.
5. Robbins Stephen.p and Mary coulter – management – PH1 publisher.

102 - ORGANISATIONAL BEHAVIOUR

Course Objective: This course is designed to enable the students to understand the concepts, theories, processes and dynamics of human behavior in Organizations.

UNIT – I Organisational Behaviour: Meaning – Importance – Nature and Scope – Approaches – Key elements – Challenges and opportunities for O.B. – Contributing disciplines to O.B. – O.B. Models.

UNIT – II Individual: Individual Behaviour - Perception – Process, factors influencing perception – barriers in perceptual Accuracy – enhancing perceptual skills – Attribution - Learning – characteristics, theories and principles of Learning. Motivation – Theories of Motivation – Maslow, Herzberg, David Mcclelland and Porter and Lawler - Personality – Stages of Development, determinants of Personality.

UNIT – III Group Dynamics: Meaning, Determinants of group behaviour and types of groups – Group Dynamics – frame work of group behaviour. Developing inter – personal relations, Transactional Analysis – Johari Window.

UNIT – IV Organisational Culture: Organization Design, culture and climate. Creating an ethical organizational culture – Conflicts – Meaning, conflicts at individual, group and organisational level – sources of conflicts – functional and dysfunctional aspects – Strategies for conflict resolution.

UNIT – V Organisational Change: Organisational Change – change management and its dimensions, process. Pressures for change – resistance to change – overcoming resistance to change. Approaches to manage Organizational Change – Lewin's and Kotter's Plan for Implementing Change. – Organisational Development.

Suggested Books:

1. Fred Luthans, ***Organisational Behaviour,*** Tata McGraw Hill.
2. Stephen P.Robbins, ***Organisational Behaviour,*** Pearson Education, New Delhi, 2006.
3. Aswathappa.K., ***Organisational Behaviour*** , Himalaya Publishing House, New Delhi.
4. Donald R.Brown& Don Harwey, ***An Experimental Approach to Organisational Development,*** Pearson Education.
5. Sarma V. s. Veluri, Organisational Behavour, Jaico Publishing House.
6. Paton McCalman, ***"Change Management"***, Sage Publications.
7. VenkataRatnam, ***"Negotiaed Change",*** Sage Publications.
8. Jai, B.P.Sinha, ***"Culture and Organisational Behaviour"***, Sage Publications.
9. Arun Kumar N Meenakshi., Organisational Behavour, Vikas Publishing House.
10. Keith Davis & John Newstrom, *Human Behaviour at work*, Mc-Graw Hill.

103 – MANAGERIAL COMMUNICATION

Course Objective: To equip the student with the necessary techniques and skills of communication to inform others, inspire them enlist their activity and willing cooperation in the performance of their jobs.

Unit I Role of communication in Business – Objective of Communication – The process of Human communication, Communication barriers – Types of Communication; Written Communication – Oral Communication – Visual Communication, Audio Visual Communication – Silence – Developing Listening Skills – Improving Non- verbal Communication skills – Understanding Cultural Effects of Communication.

Unit II Managing Organization Communication – Formal and Informal Communication – Intra and Personal Communication – Models for Inter personal Communication – Exchange theory – Johari window and Transactional Analysis.

Unit III Managing motivation to influence interpersonal communication – Inter-personal perception – role of emotion in inter personal communication – communication styles – gateways to effective interpersonal communication.

Unit IV Business writing skills – Significance of Business Correspondence, Essentials of Effective Business Correspondence – Business Letter and Forms – Oral Presentations – Meetings, Telephone Communication - Use of Technology in Business Communication – E-Mail Messages.

Unit V Effective presentation and Interview Skills: Art of giving interviews in relation to placement appraisal interviews in selection and placement – Appraisal interviews – Exit Interviews – Web/ video conferencing and Tele-Conferencing.

Suggested Books:

1. K. Bhardwaj, Professional Communication, IK Int. Pub. House, New Delhi.
2. Krizan, Merrier, Logan and Williams, Effective Business Communication, Cengage, New Delhi.
3. HC Gupta, SG Telang, Business Communication, Wisdom, Delhi
4. Penrose, Business Communication for Managers, Cengage , New Delhi
5. McGrath, Basic Managerial Skills for All 5thEdtion, Prentice Hall of India.
6. Urmila Rai & S.M. Rai, Business Communication, Himalaya Publishers
7. Meenalshi Raman – Business Communication Oxford University Press
8. Lesikar I Flatley, Basic Business Communication, Tata McGrw Hill.

104: MANAGERIAL ECONOMICS

Course objective: To enable the students to understand the principles of micro economics relevant to managing an organization; to describe principles of macro economics to have the understanding of economic environment of business. This will enable the students to study functional areas of management.

Unit- I

Introduction: Nature, scope, uses, relation with traditional economics, operations research, Mathematics, Statistics, Accounting-responsibilities of a managerial economist, objectives of a firm, Basic tools in Managerial Economics-Opportunity cost principle, Incremental principle, principle of time perspective, discounting principle, Equi marginal principle.

Unit-II

Demand and Supply: Demand determinants, demand function, law of demand, assumptions, exceptions-demand distinctions/nature, elasticity of demand: price, income, cross, promotional,methods of foresting, Law of supply, determinants of supply, kinds of supply elasticity, methods of measuring elasticity of supply, cost concepts

Unit- III

Market Structure and Pricing Practices: Market structure: perfect, monopoly, monopolistic, oligopoly,nature of profit, theories, functions of profit, break even analysis-pricing methods, international price discrimination- dumping

Unit- IV

Production and Cost analysis: Production function with one variable input, two variable inputs, all variable inputs, managerial uses of production functions, ISO quant,internal,external,diseconomies of scale, concept of learning curve

Unit- V

Performance of an economy-Macro Economics: Business Cycles: features, phases, importance, Inflation: types, causes, effects, National income: measures, significance, capital budgeting, multiplier, accelerator. Fiscal and monetary policies

Reference Books

1. Managerial Economics Theory and Applications. Dr D.M.Mithani Himalaya publishers
2. Managerial Economics R.L Varshny, K.L Maheshwari sultan chand publishers
3. Managerial Economics analysis, problems P.L Mehatha sultan chand publishers
4. Managerial Economics D.N Dwivedi,Vikas Publishers
5. Managerial Economics and Financial Analysis P.Prem Chand Babu,M.MadanMohan,Himalaya
6.Managerial Economics H.L Ahuja S.Chand publisher

105: RESEARCH METHODOLOGYAND BUSINESS ANALYTICS

Course Objective: On successful completion of the course the students should familiarize with doing research work and analyzing big data which helps management in taking decisions.

Unit-I

Introduction: Meaning and Definition of Research, Nature and importance of research the role of business research, aims of social research, research process, Quantitative and Qualitative Research, Types of Research, Research design, Importance of Research Planning, Meaning of research design, Functions and goals of research design, Pilot study and case study, Concepts of a Research plan, Induction and Deduction metho, Snapshot studies, cross sectional and longitudinal studies.

Unit-II

Meaning and definition of Data and importance- sources of primary and secondary data, tools for collection of primary data, report writing : Technical report, planning report writing , research report format, main body and appendices including bibliography, oral presentation.

Sampling techniques: Advantages and limitations of sampling, essentials of a good sample , probability sampling techniques: simple random sampling, stratified random sampling, systematic random sampling, cluster sampling, area sampling, non probability sampling techniques: convenience, judgment, quota, snowball sampling.

Unit – III

Business Analytics : Computer Uses In Daily Activities, - Emergence of Digital Firm – Evolution of Business Analytics – Differences of Business Intelligence and Analytics – Business Analytics Life Cycle, Process – Business Analytics as Solution for Business Challenges – Master Data Management: Data Warehousing – Data Mining – Meta Data – Data Marts – Data Integration – Concept of OLTP and OLAP.

Unit- IV

Measures of Central Tendency and Dispersion, Skewness and Kurtosis-Correlation Analysis: scatter diagram, positive and Negative correlation, limits for coefficient of correlation, Karl pearson's coefficient of correlation, Spearman's rank correlation, Properties of Correlation, Regression analysis: concept, least square fit of a linear regression, two lines of regression, Multiple Regresssion, Properties of regression coefficients, Curve fitting analysis.

Unit- V

Statistical Inference: Introduction to null hypothesis Vs alternative hypothesis. Tests of hypothesis, procedure for testing of hypothesis, tests of significance for small samples, application, T-test, F-Test, Chi-square test, ANOVA one way and two way classifications.

Reference Books

1. N.D. vohra, 2001, Quantitative Techniques in management, Tata McGraw Hill, 2ndnedition.
2. Barry Render, Ralph M. Stair, Jr. and Michael E. Hanna, 2007, Quantitative analysisfor management, 9th Edition, Pearson publication
3. Gupta S.P. Statistical Methods. Sultan chand and sons, New Delhi.2005
4. C.R. Kothari, Research Methodoloty: Methods and Techniques, 2/e, Vishwa Prakashan, 2006.
5. Willam G. Zikmund, Business Research Methods, Thomson, 2006.
6. Carver & Nash, Data Analysis with SPSS, Cengage, New Delhi
7. James R.Evans, Business Analytics Methods, Models and Decision, Pearson, 2015
8. Shashi K.Gupta & Praneet Rangi Kalyani Pub. Business Analytics

106 – ACCOUNTING FOR MANAGERS

Course Objective: To develop an insight of concepts, principles and techniques of accounting, costing and utilization of financial and accounting information for planning, and decision-making

UNIT-I Introduction to Accounting: Book-Keeping – Branches of Accounting - Financial Accounting – Cost Accounting – Management Accounting – Need of Accounting - Objectives of Accounting – Systems of Accounting – Users of Accounting Information - Principles of Accounting - Accounting Concepts and Conventions – Accounting Standards (Fundamental Level) – Classification of Accounts – Journal – Ledger - Trial Balance – Errors in Trial balance (Theory and Problems).

UNIT-II Presentation of Financial Statements: Capital and Revenue items – Construction and Analysis of Trading, Profit & loss account and Balance Sheet – Bank Reconciliation Statement – Inventory Valuation and Depreciation – Accounting for Intangible Assets (Theory and Problems).

UNIT-III Financial Statement Analysis: Meaning – Tools of Financial Statement Analysis – Comparative Statement Analysis – Common-size Statement Analysis - Trend Analysis – Ratio Analysis – Funds Flow Statement Analysis – Cash Flow Statement Analysis (Theory and Simple Problems).

UNIT-IV Cost & Management Accounting: Costing – Elements of Costing – Classification of Costs – Cost Sheet - Marginal Costing – CVP analysis – Break Even Analysis – Standard Costing and Variance Analysis (Theory and Simple Problems).

UNIT-V Budgeting: Budget and Budgetary Control – Principles and methods – Types of budgets – Preparation of Fixed, Flexible, Cash, Master and Zero Based Budgets (Theory and Problems).
Contemporary Developments: Inflation accounting – Human Resource Accounting – Responsibility Accounting (Theory).

REFERENCES:

1. G .Prasad & V. Chandra Sekhara Rao, Accounting for Managers, Jai Bharat publications, Guntur.
2. Jelsy Joseph Kuppapally – Accounting for Managers – PHI (2008).
3. Ramachandran and Kakani, "Financial Accounting for Management", TMH, New Delhi.Jawaharlal, Accounting for Management, Himalaya, Mumbai
4. Khan and Jain, Management Accounting, Tata Mc Graw Hill, Delhi.
5. Maheswari S.N: Advanced Accountancy, Vikas Publishing House. ND
6. Grewal T.S. Introduction to Accounting, 2009, S Chand Publishers
7. RajniSofat, Preeti Hiro – Basic Accounting – Prentice Hall of India, 2008.
8. Dr. Maheswari, S.N., Accounting for Management, Sultan Chand Publishing House Pvt. Ltd., New Delhi.
9. Jain S.P, Narang K.L and Simmi Agarwal, "Accounting for Managers", Kalyani Publishers, New Delhi.
10. Wild. J.J., Subramanyam, K.R. Halsey, R.F., Financial Statement analysis, Tata McGraw Hill.
11. Prasad, G. "Financial Accounting and Analysis" Jai Bharat Publishers, Guntur.
12. Ramachandran and Kakani, "Financial Accounting for Management", TMH, New Delhi.
13. Prasad, G. "Accounting for Managers", Jai Bharat Publishers, Guntur.

107: INFORMATION TECHNOLOGY FOR MANAGEMENT

Course Objective: The primary objective of this course is to familiarize the student with basic concepts of information technology and their applications to business processes. To elevate students' awareness of information technology and develop an in depth and systematic understanding of key aspects of IT Management.

UNIT I

Introduction and definition of computer – History – Major components of a computer system – Interfacing with a computer – organisation structure - types – Introduction to computer languages – Translators : Compiler – Interpreter and Assembler. Operating Systems: Definition, Functions, Types and Classification – Elements of GUI based operating system – Windows – Use of menus – tools and commands of windows operating system – Linux and free and open software; Computer Networks: Overview and Types (LAN, WAN and MAN) – Network topologies – Internet; Data representation and computer security.

UNIT II

MS OFFICE : Applications and Features. MS Word – editing a document – Formatting – Spell Checking – Page setup – Using tabs, Tables and other features Mail Merge

UNIT III

MS-PowerPoint : Features – Slide Preparation – Home – Insert – Design – Animation – Slide Show – Review – View menu Options – Applications of MS-PowerPoint.

UNIT IV

DBMS – Concept – Advantages and Applications; MS-Excel : Basics - Home – Insert – Page Layout – Formulas – Data – Review – View Menu Options – Advantages of MS- Excel.

UNIT V

Information Technology for Management : Concept – Multimedia - Image processing systems and Document Management Systems – Trends in IT – Information Technology Systems – Contemporary Approaches to Information Systems – Relationship between Information Systems – Role of IT in Transaction Processing – Computer Aided Software Engineering (CASE) – Decision of IT for proper Management of the Organisation.

REFERENCE BOOKS

1. Rohit Khurana, Introduction to Information Technology, Pearson Education.
2. ITL education: Introduction to Computer Sciences, Pearson Publishers
3. Hunt and Shelly: Computers and commonsense, PHI publishers.
4. Dhiraj Sharma, Information Technology for Business, Himalaya Publishing House.

II Semester

201: MARKETING MANAGEMENT

Course Objective: The course is designed to obtain knowledge and understanding of the key concepts of marketing and enables to apply to the practical situations in workplace.

Unit-I

Introduction to Marketing: Definition, Nature, Scope and importance of Marketing – Marketing Concepts – Marketing Vs Selling –Marketing Mix- Marketing Environment: Meaning, Significance of Scanning Marketing Environment, Components of Micro environment, Macro environment.

Unit-II

Analyzing Marketing opportunities: Consumer behavior-Meaning- factors influencing buying behavior- consumer decision making process, Segmentation: Need- Benefits - Bases of segmentation – Target market – Product differentiation- Product Positioning, Marketing Research - Concept - Objectives - types - Process – Merits and Demerits.

Unit-III

Developing Marketing Strategies: Concept of Product- Product Classifications- Product Mix- New Product development - Product Life Cycle and Marketing Strategies, Designing Marketing Strategies for: Market leaders – Challengers - Followers and Nichers. Branding: Essentials of a good brand - types of brands - Packaging and labeling.

Unit-IV

Planning Marketing programs: Objectives - factors affecting pricing decisions- pricing methods- Pricing Strategies for existing products and New products. Channels of Distribution: Definition, Need and Types of Channels, Channel Management Decision – Retailing – Types of Retailers – Retailer Marketing Decisions – Trends in Retailing, Wholesaling.-The growth and types of wholesaling – Wholesaler Marketing Decisions – Trends in Wholesaling.

Unit-V:

Marketing Communication: Concept – importance – Promotional Mix: Advertising - Sales promotion - Personal Selling - Public Relations – Recent trends in Marketing: Social Marketing – Ambush Marketing – Green Marketing – Emotional Marketing – Online Marketing.

Reference Books

1. Marketing Management, R.S.N Pillai, Bagavathi, S.Chand
2. Business Marketing Management: B2B, Hutt & Speh, Cengage Publisher
3. Marketing Management Text & Cases, Indian Context Tapan K Panda, Excel Publisher
4. Principles of Marketing Kotler Armstrong PHI Publisher
5. Marketing Management, Rajan Saxena .TMH Publisher

202: HUMAN RESOURCE MANAGEMENT

Course Objective: To equip the students with basic concepts, methods, techniques and issues of Human Resource Management and the various functions of HRM including Quality of Work Life in the liberalized environment.

Unit-I : **HUMAN RESOURCE MANAGEMENT**

Human Resource Management- Concept, Scope, Philosophy, Significance, Objectives, Functions-Organizing HRM function-HR Planning-Job analysis, Job description, Job specification.

Unit-II: **RECRUITMENT**

Recruitment : Sources of recruitment, methods of recruitment, Selection procedure, selection tests, Placement and follow up-performance appraisal system, importance, objectives, techniques.

Unit-III: **TRAINNING AND DEVELOPMENT**

Training: Objectives, determining training needs and developing an efficient training mechanism, evaluation, career planning and developing methods.

Unit-IV: **JOB EVALUTION**

Job Evalulation techniques, Employee welfare and social security measures, grievance management, importance process and practices.

Unit – V**: QUALITY OF WORK LIFE**

Meaning, Conditions, Specific issues in QWL – Strategies for Improvement of QWL . Changing Role of HR –HRM Accounting – HRIS and HR Audit – HR in Knowledge Era.

Reference Books

1.Personnel Manaement Text and Cases C.B. Mamoria, S.V. Gankar, Himalaya publications
2.Human Resource Management text and cases V.S.P. Rao, Excel Books.
3.Human Resource Management Text and cases K. Aswathappa, McGraw-Hill
4.Human Resource Management Garry Dessler, Pearson Education.

203– FINANCIAL MANAGEMENT

Course Objective: The Course aims at familiarizing the participants with the skills related to basic principles, tools and techniques of Financial Management.

UNIT – I Foundations of Finance: Introduction to Finance – Financial Management – Nature and scope of Financial Management – Functions of Financial Management – Objectives of Financial Management – Profit Maximization v/s Wealth Maximization – Role of Financial Manager – Time Value of Money – Agency Conflict.

UNIT – II Investment Decision: Nature and significance of Investment Decision – Estimation of Cash Flows – Steps in Capital Budgeting Process – Evaluation techniques – Traditional techniques – Payback period – ARR - Discounted Cash Flow techniques – NPV – Profitability Index – IRR – Discounted Payback Period (Theory & Problems).

UNIT – III Financing Decision: Sources of Finance – Short-term sources – Long-term sources - Concept of Leverage – Operating Leverage - Financial Leverage – Combined Leverage - Measurement of Leverages.

Capital Structure: Concept - Assumptions and Definitions – Factors determining Capital Structure – Tools for designing optimum capital structure – EBIT-EPS analysis – Financial BEP and Indifference Curve analysis – CAPM - Capital Structure theories – Net Income Approach – Net Operating Income Approach – M-M Hypothesis – Traditional Approach (Theory only).

Cost of Capital: Concept – Elements of Cost of Capital – Cost of Equity – Cost of retained earnings – Cost of Preference Shares - Cost of Debt – Weighted Average Cost of Capital (Problems).

UNIT – IV Liquidity Decision: Concept of Working Capital – Components of Working Capital - Approaches for Working Capital financing - Determinants of Working Capital – Operating Cycle - Estimation of Working Capital requirements. Management of Cash – Facets of cash management – Motives for holding cash. Receivables Management – Credit policy – Credit standards and analysis. Inventory Management – Nature of inventories – Need to hold inventories – Inventory management techniques – EOQ – ABC analysis.

UNIT – V Dividend Decision: Meaning – Forms of dividends - Concept of relevance and irrelevance theories – Walter's Model – Gordon's Model – MM Hypothesis – Factors determining Dividend Policy (Theory).

REFERENCES

1. Sheeba Kapil. Financial Management, Pearson, 2011.
2. Jonthan Berk Financial Management, Pearson, 2010.
3. Van Home. James C. "Financial Management", Prentice Hall of India (P) Ltd, New Delhi.
4. Salmon,Ezra and Pringle, John.J. "An Introduction to Financial Management ", Prentice Hall of India (P) Ltd, New Delhi.
6. Khan, M.Y. & Jain P.K "Financial Management", Tata McGraw Hill Pub. Co. Ltd New Delhi.
7. Panday, I.M. "Financial Management", Vikas Publishing House (P) Ltd.
8. Chandra, Prasanna "Financial Management", Tata McGraw Hill pub.Co.Ltd, New Delhi.
9. Tulsian, P.C. "Financial Management", S. Chand.
10. Alice C Lee, J C Lee, C F Lee "Financial Analysis, Planning and Forecasting", Cambridge University Press.

204: PRODUCTION MANAGEMENT

Course Objective: The Objective of the course is to enable students to understand the production Planning and Controlling aspects of a typical production and operations organization.

Unit-I

Production Planning: Production system, objectives, classification: job shop, batch, continuous, cellular, production planning: tactical, operational, strategic, maintenance management: functions, objectives, types, productivity, ergonomics in product design, concurrent engineering

Unit-II

Design of Work systems: Work study: method study and Work Measurement, objectives of work study, work study procedure, time study, comparison of various techniques, pre determined motion time

Unit-III

Flow shop scheduling: Shop floor planning: Johnson's rule, extension of Johnson's rule, CDS Heuristics, LOB, line balancing, Inventory management: objectives, techniques, Facility location: errors in selection, steps in location selection, relative importance of location factors, facility layout , factors influencing, types of layout

Unit-IV

Quality Management: Quality relevance and role, factors controlling quality, impact of poor quality, statistical process control: process, types of variations, implementation of statistical process control, Control charts- types, acceptance sampling, quality circles: structure, vendor analysis

Unit V

Modern production management Tools: Just in time manufacturing-overview, basic principles, benefits, push/pull production, kanban system, Total quality management-scope, benefits, fundamental factors affecting quality, ISO 9000 series-benefits, steps in ISO 9000 registration, Business process reengineering-characterstics,need,advantages,Lean manufacturing: steps,components,Quality function deployment.

Reference Books

1.Production Management, Martand T. Telsang S.Chand Publishers
2.Production and Operations Management K.Aswathappa,K.Shridhara Bhat Himalaya Publishing House
3.Production and Operations Management R.Pannerselvam PHI publishers
4.Production and Operations Management S.N Chary Mcgraw Hill
5.Production and Operations Management -Text and cases Upendra kachru,Excel Books

205: OPERATIONS RESEARCH

Course Objectives: This module aims to introduce students to use quantitive methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.

Unit-I

Definition, Importance of Operations Research for Management, Nature of Operations Research, Scientific method in operation research, Characteristics and phases of Operations Research, Classification of models, Principles of modeling, Problem models of Operations Research, scope and limitations. Linear programming: formulation, terminology, applications of LPP, advantages and limitations of LPP Graphical solutions, Simplex method, Big-M method and two phase method.

Unit-II

Transportation problem, formulation, optimal solution, unbalanced transportation problem, Degeneracy, definition of Assignment problem, mathematical formulation of the assignment problem, differences of transportation and assignment , Hungarian method, unbalanced assignment problem , traveling salesman problem, solutions.

Unit-III

Network Analysis, Activity, merge event, burst event, looping, dangling, Redundancy, project Management by PERT/CPM, project crashing, PERT analysis and Computations, differences of PERT/CPM.

Unit-IV

Game theory; concepts, Characteristics, pay off matrix, maximin-minimax principle, saddle point, Dominance, Zero-sum game, two, three and more persons games, analytical method of solving two person zero sum games, mixed strategies of S_A ,S_B and value of the game, graphical solutions for (m×2) and (2× n) games, linear programming method of simplex method in game theory, Iterative method.

Unit – V

Simulation: Meaning – Definition of Simulation – Types of Simulation – Advantages and Disadvantages of Simulation – Event Type of Simulation – Monte – Carlo Simulation – Generation of Random Numbers – Simulation of Queueing System – Simulation of an Inventory System – Simulation Languages.

Reference Books

1, Shenoy, G.V. Srivastava, V. K. and Sharma S.C., “Operations Research for Management”.
2. Kantiswaroop, Man Mohan and Gupta, Operations Research.
3. Goel and Mittal, Operations Research.
4. Sharma S.K. k.,Operations Research.
5. Hamdy, A. Taha:Operations Research: An introduction, prentice Hall of India New Delhi, 2007.
6. R.Panneerselvanm PHI 2nd Ed. Operations Research

206: INFORMATION SYSTEMS FOR MANAGEMENT

Course Objective : The primary objective of this course is to familiarize the student with basic concepts of management information system and its applications to business processes. To elevate students' awareness of Information Systems and develop an in depth and systematic understanding of key aspects of IS for Management.

UNIT I

Introduction: System : Definition - Types of System - Information System : Types – Management Information System (MIS) : Meaning – Importance – Need - Characteristics – Organizational Structure of MIS – Role of the Management Information System - Impact of the Management Information System – Applications of MIS – The logic of MIS – Major MIS Elements – Technology of MIS.

UNIT II

System Development Life Cycle (SDLC) : Stages in developing SDLC – Information System Development Life Cycle – System Design – Flow Chart - Prototyping: Steps in Prototyping – Development and Implementation of the MIS - Software Development : Importance and Steps, Outsourcing: Types and Importance.

UNIT III

Structured System Analysis and Design (SSAD) – The Major Business Systems – Five Basic Elements of a Business organisation – Business Systems – objectives of a business organisation – Synergism – Tools and Techniques for System Development – System Implementation.

UNIT IV

Concept of Decision Support System (DSS) – Meaning – Architecture – Characteristics – components – structure of DSS – conceptual model of DSS – DSS Tools – DSS software - MIS and the role of DSS – Concept of Group Decision Support System (GDSS) – Components – GDSS model - Concept of Executive Support System (ESS) – Components – Architecture - Knowledge Management : Concept - Importance - Approaches – Issues – Types of knowledge Management - HR Contribution to Knowledge Management – Artificial Intelligence System – Benefits of Expert system – limitations – Domains of Artificial Intelligence.

UNIT V

Functional Information Systems: Marketing Information System – Concept – Components – Architecture - Financial Information System – Concept – Components – Architecture - Human Resource Information System – Concept – Components – Architecture - Manufacturing Information System – Concept – Components – Architecture - Strategic Information System – Concept – Components – Architecture.

REFERENCE BOOKS

1. Kenneth C. Laudon and Jane P. Laudon: Management Information System, Eighth edition Prentice Hall of India.
2. Jawadekar W.S., Management Information System, TaTa McGraw Hill Publishing Company Limited, New Delhi.
3. James A.O Brien: Management Information Systems, TaTa McGraw Hill Publishing Company Limited, New Delhi.
4. Effy OZ, Management Information System, Vikas Publishing House.
5. Gordon B. Davis and Margrethe H. Oison, Management Information System, TaTa McGraw Hill Publishing Company Limited, New Delhi.
6. C.S.V. Murthy: Management Information System, Himalaya publishing House

207 – BUSINESS ENVIRONMENT

Course Objective: The present course aims at familiarizing the students with various aspects of economic, social, political and cultural environment of India. This will help them in gaining a deeper understanding of the environmental factors influencing Indian business organizations and also the students understand the legal and regulatory framework for doing business in India.

UNIT – I Business Environment: Meaning – Importance – Nature – Environmental Factors – Changing the dimensions of Business environment – monitoring techniques of environmental scanning

UNIT – II Socio – Cultural and Technological Environment: Elements of Socio – Cultural Environment: Impact on Business – Culture and Sub culture pattern – Social responsibility of business – Technology upgradation – technology transfer – Technological Policy.

UNIT – III Economic and Political Environment: Significance and elements of economic environment – economic system – economic planning in India – Industrial Policy – New foreign trade policy – liberalization – privatization and globalization – Demonetization – Monetary and Fiscal policy – EXIM policy – critical elements of political environment.

UNIT –IV Legal Environment of Business: Political Institutions – Legislature, Executive and Judiciary – Changes of Legal Environment in India – Intellectual Property Rights – Major regulations pertaining to business.

UNIT – V Business Legislations: Consumer Protection Act 1986 – SICA Act – 1985 – FEMA Act 1999 – IT Act 2000 – Competition Act 2002 – MSME Act 2006.

Suggested Books:

1. Francis Cherunilam, ***Business Environment***, Himalaya Publishing House, Mumbai.

2. Fernando, A.C., ***Business Environment***, Pearson.

3. Suresh Bedi, ***Business Environment,*** Excel Books, New Delhi,

4. Adhikary.M. ***Economic Environment of Business***, Sultan Chand & Sons, New Delhi.

5. Aswathappa.K., ***Essentials of Business Environment***, Himalaya Publishing House, Delhi.

6. Justin Paul, ***Business Environment***, Text and Cases, Tata McGraw Hill.

7. Krishna Rao,P, ***WTO-Text & Cases***, PSG Excel Series.

8. R.S.N. Pillai and Bagavathi, "***Legal Aspects of Business***", S.Chand, New Delhi.

9. H.L.Ahuja, "***Economic Environment of Business"*** S.Chand, New Delhi.

10. G.Prasad, ***Business and Corporate Laws***, Jai Bharathi Publishers.

NON CORE PAPER (for other Departments)

209: FUNDAMENTALS OF BUSINESS MANAGEMENT

Course Objective: The course aims to acquaint with fundamentals of management and various functional areas of management.

Unit – I:

Fundamentals of Management: Concept – Significance – Functions – Principles - Role and Responsibilities of a Manager – Management is an Arts Or Science – Concept of MBO – Management vs Administration – Advantages - Limitations.

Unit-II

Introduction to Business: Concept - Nature – Features – Types of Business – Business Vs Trade – Business Communication and its importance – Goal setting – Types of Strategies.

UNIT – III:

Marketing Management: Concept of Marketing –Nature – Scope – Distinction between Marketing and selling – Marketing Mix – Steps in New Product Development – Product life Cycle – Process of Marketing Research – Marketing Strategies – e-Marketing – Social Marketing.

UNIT-IV:

HRM: Concept – Nature – Objectives – Significance - functions – Role of HR Manager – HR Planning – Recruitment Process – Sources of Recruitment – Methods of Recruitment – Job Induction – Job Description - Job Specification – Job Analysis – Job Evacuation Process – Training and Development – Career Planning and Development Methods – Leadership – Motivation – Stress Management.

UNIT- V:

Financial Management: Concept – definitions – Nature – Scope – Objectives – Significance – Financial Decisions – Sources of Finance – concept of Cost of Capital Importance – classifications of costs – Computation of Specific Source of fund cost – WACC Concept of working capital Management – Objectives – Sources of W.C – Kinds of W.C – Components of W.C – Importance – Operating cycle – Cash Conversion cycle – Estimation of working capital – Dividend Policy – Issue of Dividend and Bonus Shares.

Reference Books:

1.Philip Kotler, Marketing Management, Pearson Education.
2.Heinz Weirich and Harold Koontz, Management, TMH.
3.I.M.Pandey, Financial Management, Vikas Publishers.
4.Garry Dessler, Human Resource Management, Pearson Edition.

III Semester (MBA)

301: BUSINESS LAW

Course Objective: The course aims to acquaint students with various laws governing business operations in India.

Unit – I

The Indian Contract Act – 1872 : Nature of a Contract - Classification of Contracts - Essentials elements of valid Contract — Capacity of parties – Free Consent - Contingent Contracts – Performance of Contract - Discharge of Contracts – Breach of Contract and its Remedies.

Unit – II

Negotiable Instruments Act – 1881: Meaning - Characteristics– Promissory Note – Definition- Characteristics, Bills of Exchange: Definition – Characteristics – difference between promissory note and Bill of exchange, Cheque: Definition – Characteristics – differences between Cheque and Bill of exchange – Crossing of Cheque - Types of Endorsements, Electronic funds transfer terminology– NEFT, MICR, RTGS, CTS.

Unit- III

Sale of goods Act – 1930: Meaning of Contract of Sale of Goods- Essential Elements of Contract of Sale, Conditions and Warrantees; Performance of Contract of Sale, Unpaid Seller- Concept - Rights of Unpaid Seller. **Indian Partnership Act – 1932**: Elements of partnership - Constitution of Partnership - Forms of partnership - Types of partners– Rights, Duties and Liabilities of Partners.

Unit-IV

The Companies Act – 2013 : Meaning of a company - Characteristics - Types of Companies – Steps and Procedure for incorporation of the Company – Memorandum of Association - Articles of Association - Prospectus – Shares: Meaning- Types of Shares, Company Management: Company Meetings - types Resolutions- types , Prevention of Oppression and Mismanagement of Company.

Unit –V

Income Tax Act – 1961 (Theory only) :Meaning – Characteristics - Purpose of Income Tax, Terminology of Income Tax: Income- person– Assessee - Assessment Year- Previous year – Residential Status, Gross Total Income – Advance Payment of Tax: Concept- Procedure , Tax Deducted at Source – Assessment Procedure.

Reference Books

1. Bansal, C.L., Business and Corporate laws, 1st Edition, Excel Books, 2006.
2. Maheswari, S.N., Maheswari, Business Regulatory Framework, Himalaya Publishing House, 2006.
3. Lal, B.B., & Vashisht, N., Direct Taxes, Latest Edition, Pearson Education, 2009.
4. Kapoor, N.D., Mercantile law, Sultan Chand & Sons, 2006.

302: ENTREPRENEURSHIP & SMALL BUSINESS MANAGEMENT

Course Objective: The objective of this course is to create conceptual understanding of the topic among the students and comprehend the environment of making of an Entrepreneur and to develop perspective understanding of startups and MSMEs in the Indian context.

Unit – I Entrepreneur and Entrepreneurship: Evolution of the Concept of Entrepreneur – Characteristics of an Entrepreneur – Distinction between an Entrepreneur and Intrapreneur and a Manager – Functions of an Entrepreneur – Types of entrepreneurs, Concept of Entrepreneurship – Functions, Problems, Entrepreneurial process – Growth of Entrepreneurship in India – Recent Trends of Women Entrepreneurship – Meaning of and Need for Rural Entrepreneurship – Problems and Development of Rural Entrepreneurship.

Unit II Startup Ideas and Opportunity Assessment: Importance of Ideas – Sources of startup Ideas – Techniques for generating ideas – Steps in potential ideas – Opportunity Recognition- sources and process – Development of Programmes E – Business Ventures – Importance of Financial Management – Project Feasibility Study.

Unit – III MSME Enterprises: Definitions, Characteristics – Relationships of MSME – Relationship with large units – Export Oriented Units - Rationale – Objectives – Scope of Small Enterprises – Opportunities for an Entrepreneurial career – Role of Small Enterprises in Economic Development – Causes and Symptoms of Sickness – Cure for Sickness.

Unit IV Project preparation and Financing Ventures: Meaning of and Preparation of Project – Importance of Report – Content; Guidelines for Report preparation – Network Analysis – PERT and CPM – Sources of Finance – Concept of working Capital and Estimation – Seed Capital – Venture Capital.

Unit V Institutional support to Entrepreneurs: Commercial Banks – Other major financial institutions – Central Level Institutions – KVIC; SIDO; NSIC : National Productivity Council (NPC); EDII – State Level Institutions – DIC – SFC-state Small Industries Development Corporation (SSIDC) – Industry Associations – Confederation of Indian Industry(CII) ; Federation of Indian Chamber of Commerce Industry (FICCI); Associated Chambers of Commerce and Industry of India (ASSOCHAM)

Suggested Books:

1. Vijay Sathe, “Corporate Entrepreneurship” 1st edition, 2009, Cambridge
2. S.S. Khanka, “Entrepreneurial Development”, 2007, S. Chand & Co. Ltd.
3. Vasanth Desai, “Dynamics of Entrepreneurial Development and Management”, 2007, HPH,Millenium Edition.
4. Dr. Vasant Desai, “Small Scale Industries and Entrepreneurship”, 2006, HPH.
5. P. Narayana Reddy, “Entrepreneurship – Text and Cases”, 2010, 1st Ed. Cengage Lerning.
6. David H. Hott, “Entrepreneurship New Venture Creation”, 2004, PHI.
7. E – Book, MSME at a glance – English version, Ministry of MSME.
8. Jaynal Ud – Din Ahmed and Abdul Rashid, MSME in India, New Century Publications.

303: TOTAL QUALITY MANAGEMENT

Course Objectives: This course is designed to learn the fundamentals of Total Quality Management with emphasis on quality philosophies and tools in the managerial perspective.

UNIT- I: Total Quality Management: Definition of quality – Dimensions of quality – Quality planning – Basic concepts of total quality management – Historical review – Principles of TQM – Leadership – Customer Satisfaction –Service Quality – Gurus of TQM – TQM Framework.

UNIT- II: Management Tools: Forced Field Analysis – Affinity Diagram – Just in time – Quality Circles – Cost Benefit Analysis – Flow Charts – Run and Control Charts – Check Sheets – Histograms – Scatter Diagrams – Cause and Effect Analysis – Process Simulation.

UNIT- III: Tools for Quality: Benchmarking – Quality Function Deployment – Quality By Design – Failure Mode and Effect Analysis – Total Productive Maintenance – ISO 9000 – ISO 14000.

UNIT- IV: Six Sigma: Definition -–– Competitive Advantage -- Implementation of Six Sigma – Design for Six Sigma and Tools.

UNIT- V: Business Process Reengineering: Introduction – History and Development of Business Process Reengineering – Principles of Reengineering – The Reengineering Process – Quality and Reengineering.

Suggested Books:

1. Besterfiled, D.H. “Total Quality Management”, Pearson Education, Inc. 2003.
2. Zeiri., “Total Quality Management for Engineers”, Wood Head Publishers, 1991.
3. Evans, J. R., and Lidsay, W.M., “The Management and Control of Quality”, 5th Edition, South-Western (Thomson Learning), 2002.
4. Oakland.J.S. “Total Quality Management”, Butterworth – Hcinemann Ltd., Oxford, 1989.
5. Narayana V. and Sreenivasan, N.S., “Quality Management – Concepts and Tasks”, New Age International, 1996.
6. Kanishka Bedi., “Quality Management”, Oxford University Press, 2006.

MARKETING ELECTIVES

311: LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Course Objective: The Objective of this course is to gain the knowledge of possibilities of efficient optimization and management of operation in integrated supply chains and also the ability to apply them in the enterprise reality. The course will also strengthen the holistic view on supply chain operations, management and strategy and some current research areas in supply chain management.

UNIT I Understanding Logistics and Supply Chain Management: Concepts - Logistics Relationships - Mission of Logistics Management - Objectives of Logistics Management - Definition and importance of supply chain - Issues in Supply Chain Management - supply chain drivers.

UNIT II Customer Service and Bench marking: Elements of customer service - service driven logistics system - customer focus in supply chain management - concept of bench marking - bench marking process - benefits of bench marking and competitive bench marking.

UNIT III Managing the Supply Chain and Integration: Need for integration, managing supply chain as a network - logistics partnerships - supply chain restructuring - IT in supply chain, Coordination in supply chain - Inter functional coordination - Inter Corporate coordination.

UNIT IV Decisions of Logistics and Supply Chain: Sourcing decisions - Transportation decisions - Warehousing decisions - Material handling and packaging.

UNIT V Global Logistics and Supply chain: Organizational structure for global logistics - problems and challenges of global logistics and supply chain management - global supply chain management vs domestic supply chain management.

References:

1. Christopher Martin. (3rd Edition, 2004). Logistics & Supply Chain Management Creating ValueaddingNetworks. Pearson Education.
2. Supply chain Logistics Management, Bowersox, Closs, Cooper, 2/e,TMH, 2009
3. Supply Chain Management ,Janat Shah, Pearson
4. Supply chain management concepts and cases, Rahul V. Altekar, PHI, 2008
5. Text Book of Logistics and Supply Chain Management, Agrawal, Macmillan, 08
6. Principles of Supply Chain Management – A balanced approach, Wisner, Leong, Tan,
7. Supply Chain Management,R.P. Mohanty and S.G. Deshmukh, Jaico , 2009

312: SERVICES MARKETING

Course Objectives: After successfully completing this course, students will be able to explain the unique challenges of services marketing, including the elements of product, price, place, promotion, processes, physical evidence, and people. Design service quality measurements to build customer loyalty and evaluate the effectiveness and efficiency of customer service offerings.

Unit-I

Services Marketing : Concept – Characteristics - Classification of Services – Difference between services and goods – Contribution of services sector to the Economy; Trends in service Marketing ; Consumer behavior: Consumer purchase behaviors ; Evaluation of service alternatives –Customer satisfaction – Past purchase evaluation by customer.

Unit-II

Focus on the Consumer: Consumer Perception of Service, Building Customer Relationship, Service Recovery, Developing Services Marketing Mix : Service Product – Pricing in services – Service Promotion - Place in service – Role of People in Service Marketing – Physical Evidence of Service.

Unit-III

Service Quality: Meaning – Dimensions in Service Quality – Measurement of Service quality – Gap analysis in service quality – Benefits of Service quality; Customer Retention and customer loyality, Claim Settlement, reinsurance

Unit-IV

Marketing Planning for Services : Strategic Planning process; Bebefits of Marketing Planning for Services; Problems in Marketing Planning, Managing demand supply – Forecasting Demand and Measurement – Reshapping the demand – Ques and the associated Problems- Yield Management.

Unit – V

Aligning Service Design and Standards: Service Innovation and Design – Challenges, types of Service Innovations, Stages in Service Innovation and Development, Service Blueprinting, High performance service innovations, new Service Development Processes, Customer defined service standards –factors, types end development.

Reference Books

1. Christopher Lovelock, services marketing People, Technology, Strategy, Pearson Education.
2. Rajendra Nargundher, Services Marketing, Mc Graw Hill Publications.
3. Adrian Payne, The Essence of Service Marketing, Prentice Hall of India.
4. Ram Mohan Rao, Services marketing, Pearson Education.
5. Roland T. Rust, Anthony J. Zahorick and timothy i. Keilninghan, Services Marketing, Addison Wesley.
6. Bhatacharya, Services Marketing, Excel Publications.
7. Vasanthi Venugopal & Raghu V.N.Services Marketing Himalaya Publishing House.
8. Govind Apte, Services Marketing, Oxford University Press.
9. Valarie A.Zeithaml& mary Jo-Bitner; Service Marketing – Integrating Customer focus across the firm, TMH , Fifth Ed.2011
10. Vinnie Jauhari, Kirti Dutta: Services-Marketing, Operations and Management, Oxford University Press 2012.

313: PRODUCT AND BRAND MANAGEMENT

Course Objective: To familiarize the students with theory and practice of product and concept of brand.

Unit-I

Product Management: Product Management: Objectives, responsibilities of product manager, levels of product, product mix, product classification, PLC shapes and strategies, Innovation, diffusion and adoption process

Unit-II

Product platform and Development process: Product positioning strategies, strategies of leaders, challengers, followers, packaging management: definition, significance, essentials of a good package, functions of packaging, kinds of packaging, new product development process, reasons for adding a new product, product portfolio analysis: BCG and GE

Unit-III

Branding Concepts: Branding meaning, advantages and disadvantages, types of brands, brand loyalty, brand equity, brand extensions: horizontal and vertical, brand positioning, brand system audit, brand leveraging

Unit IV

Brand personality and performance: creating brand personality, measuring brand personality through brand personality scale, measuring brand performance, role of brand ambassadors, branding challenges and opportunities

Unit-V

Borderless branding: Brand re-launch and repositioning, brand building: on line vs. offline brand building, brand limitation, retail branding, Global branding strategies: global brand planning process, creating cross-country synergy, trademarks act, copyrights act, design act

Reference Books

1. Product & Brand Management (Text and cases) K. Venu Gopal Rao, Himalaya publishers
2. Product Management in India, Ramanuj Majumdar, PHI
3. Brand positioning & strategies for competitive advantage, Subroto Sengupta, Tata Mcgraw Hill
4. Brand Management Text and cases Harsh V Verma, Excel publishers

5.Managing Indian Brands,Ramesh Kumar,vikas publicati

314: RURAL MARKETING

Course Objectives: To help the students understand and appreciate the differences and similarities between urban and rural Indian markets. To make them understand and develop marketing strategies those are unique to rural India

Unit-I

Rural Marketing – Definitions, Scope and Significance – rural Vs Urban Marketing – Growth of Urban and rural Areas – Role of rural Marketing in Economic Development.

Unit – II

Consumer Profile and Behavior Patterns – Rural Consumer Characteristics and influences – Buying Models – Segmentation – Positioning –

Unit - III

Marketing Research Techniques in Rural Marketing. Product Strategy – Decisions with Rural Orientations and Branding – Packaging Decisions

Unit – IV

Spurious products – Innovation, Diffusion and Adoption – launching of New Product in rural Areas – Pricing Strategies.

Unit – V

Promotion Strategy – Promotional Mix with Rural Orientation – Strategies of Product Selling, Sales promotion and Publicity – Rural Advertising.

Reference Books

1. C.S.G. Krishnamacharyulu and R. Lalitha, Rural Marketing: Text and Cases, Pearson Education.

2. Sukupal Singh, Rural Marketing Management, Vikas Publications.

3. Bide & Badi, Rural Marketing, Himalaya Publications.

FINANCE ELECTIVES

321: COST ACCOUNTING FOR MANAGEMENT

Course Objective: The primary objective of this course is to familiarize the student with basic concepts, practical experience of Cost Accounting and it's support to Management in decision making process. To elevate the students' knowledge in practicing the problems of cost Accounting and it's relevance to cost control system in any organisation

UNIT I

Single/ Output/ Unit Costing: Cost Concepts – Nature and Scope – Objectives - Classification of Cost – Importance of Cost Accounting - Elements of cost – Direct Material – Direct Labor – Overheads –Problems on Cost of Direct Material – Problems on Direct labor – Problems on Over heads- Preparation of Cost sheet and Tender – Advantages of Cost Accounting – Limitations of Cost Accounting – Installing Cost Accounting System - Future of Cost Accounting. (Theory and Problems)

UNIT II

Methods of Costing: Meaning and Types; Process Costing: Meaning – features – Applications – Normal and Abnormal Losses – Process Accounts with Stocks; **Contract Costing** : Features – Recording of Costs – Contract Costing Vs Job Costing – Work-in-Progress – Certificate of Work Done – Calculation of profit on Contracts. (Theory and Problems)

UNIT III

Techniques of Costing : Decisions involving Alternative Choices – Reduction in Selling Price – Determination of Volume of Stocks – Make or Buy Decisions – Equipment Replacement Decisions - Shutdown or Continue Decision ; **Standard Costing** : Concept and Need – Types of Standards – Advantages of Standard Costing; **Variance Analysis** - Types of Variances – Problems on Materials Variance – Problems on Labour Variance. (Theory and Problems)

UNIT – IV

Operating Costing : Concept – Applications – **Transport Costing** : Concept, Applications and Problems – **Power House Costing** : Concept, Applications and Problems – **Hotel Costing** : Problems and Applications – Hospital Costing – Concept, Applications and Problems

UNIT – V

Uniform Costing : Meaning – Need and Objectives – Scope –Areas of Uniform Costing – Pre-requisites for installation of Uniform Costing - Applications ; Uniform Costing manual – Procedure for Inter-firm Comparison – Advantages and limitations; **Cost Management Techniques** : Cost Control and Reduction – Meaning - Cost Control Techniques – Cost Reduction Tools and Techniques – Cost Reporting : General Principles – Classification of Reports – Forms of Reports (Theory only).

REFERENCE BOOKS

1. Ravi M. Kishore, Cost and Management Accounting, Taxmann Allied Services Pvt. Ltd., New Delhi
2. Saxena V.K. and Vashist C.D., Advanced Cost and Management Accounting, Sultanchand and sons, New Delhi
3. Arora M.N, Cost and Management Accounting:, Himalaya Publishing House Pvt. Ltd., Hyderabad.
4. Maheswari S.N, Accounting For Management, Sultan Chand Publications Pvt Ltd., New Delhi.
5. Prashanta Athma, Cost and Management Accounting, Himalaya Publishing House.

322: TAXATION MANAGEMENT

Course Objectives: This course is designed to learn the concepts of Direct Taxation and Indirect taxation.

UNIT-I: Direct taxation – Income tax Act 1961 - Basic concepts – Residential status - Source of income - Income under the head salaries - Income from house property. **(Theory and Problems)**

UNIT-II: Profits and gains of business or profession - Capital gains - Income from other sources -Tax evasion -Income tax authorities. **(Theory and Problems)**

UNIT-III: Set-off and carry forward : Income of other persons included in assessee's total income - set-off and carry-forward of losses - Deductions from total income - Employee Tax planning. **(Theory only)**

UNIT-IV: Wealth Tax Act: Entire Act with basic provisions - basic case laws

UNIT – V: Indirect Taxation - Elements of Excise Act - Customs Act - VAT and Service Tax Act - Concept of GST. **(Theory only)**

SUGGESTED READINGS:

1. Vinod K. Singhania: - Indirect Tax Laws, Taxmann Publications.
2. Bhagawati Prasad: Direct Tax Laws and Practice.
3. V. S. Datey: Indirect taxes, Taxman Publications.
4. Vinod K. Singhania, Monica Singhania- Corporate Tax Planning and Business Tax Procedure- Tax Procedure - Taxmann Publication Pvt. Ltd.
5. Vinod K. Singhania, Kapil Singhania, 'Direct Taxes, Law and Practice', Taxmann Publication Pvt. Ltd.
6. Financial Acts of Relevant Financial Years.
7. Guide To Tax Planning, R N Lakhotia

323: FINANCIAL MARKETS AND DERIVATIVES

Course Objective: The objective of this course is to make students efficient in the area of financial markets and derivatives, giving them the knowledge of basics in derivatives, future markets, option strategies to enlighten the students with the concepts and practical application of derivatives.

UNIT-I

FINANCIAL MARKETS: Meaning – Classification – Money market – Money market instruments – Capital market – Primary market – Capital market versus money market.

UNIT-II

STOCK EXCHANGES: Meaning – Importance – Functions – Advantages – Limitations – BSE – NSE – Listing of securities – Objectives – Speculation in stock exchanges – Classification of speculators – Types of speculation – Role of SEBI – Securities trading system – Types of orders – Stock market operations – Trading settlements – Stock market quotations – On-line broking.

UNIT-III

FINANCIAL DERIVATIVES: Meaning – Definitions – Features – Classification of derivatives – Functions –Participants in financial derivatives market.

UNIT-IV

FORWARDS AND FUTURES CONTRACTS: Concept – Uses – Functions – Types of forwards and futures – Forwards and futures trading mechanisms – Forwards versus futures – Valuation of forwards and future contracts.

UNIT-V

OPTIONS: Concept – Types – Difference between options and futures – Option hedging strategies – Option trading strategies – Option pricing models – The Binomial option pricing model – One step and two step models – The Black schools pricing model.

SWAP MARKETS: Meaning – Features – Need – Types of swaps - Applications of swaps.

REFERENCE BOOKS:

1. Guptval S.L., 'Financial Derivatives', PHI, New Delhi.
2. Krishnan Bal & Natra, 'Securities Market in India', Kanughkal Publisher, New Delhi.
3. Tumbull & Jarrow, 'Derivatives Securities', Thomson Publications.
4. Sananatian, 'Derivatives', TMH, New Delhi.
5. Vohra N.D., & Bagri B.R., 'Futures and Options', TMH, Second Edition, New Delhi.
6. David Dubofsky, *Option and Financial Futures – Valuation and Uses,* McGraw Hill International Edition
7. Kumar S.S.S., 'Financial Derivatives', PHI, New Delhi.
8. Hull, John C, Options, *Futures and other Derivatives*, Prentice Hall of India 7./e 2008.
9. Keith Redhead, *Financial Derivatives – An Introduction to Futures, Forwards, Options and SWAPs,*– Prentice Hall India Pvt., Ltd.,
10. P.Vijaya Bhaskar and B.Mahapatra, *Derivatives simplified – An Introduction to Risk Management,* Response Books, Sage Publication Pvt., Ltd,.

324: MERGERS AND ACQUISITIONS

Course Objective: To familiarize the students with basic concepts, strategies, valuation, accounting of mergers and concepts of demerges

UNIT-I: INTRODUCTION:

M&A Concept – Motives for M&As – Stakeholder Expectations in M&As – Forms of M&As – Reasons for Buying a Business – Reasons for Selling a Business – History of Merger Waves – Synergies in M&As

UNIT – II: STRATEGIES IN M & A

Strategic Approaches to M&As – Strategies for Entering a New Market – Value Creation Strategy in M&As – Growth Strategy through New Project of M&A – Corporate Objectives and Strategy for M&A –

Framework for M&A Strategies – Formulating Strategies for M&As (Theory only).

UNIT-III: CORPORATE VALUATION:

Basics of Valuation – Valuation of Financial Assets – Relative Value Models – Absolute Value Models – Option Pricing Models – Valuation of Firms – Income Approach (Capitalization Method and Discounted Cash Flow Method) – Market Approach (Comparable Company Method) – Assets Approach (Adjusted Book Value Method and Liquidation Method) – Choice of Methods – The Human Aspects of M&As (Including Problems).

UNIT-IV: ACCOUNTING FOR MERGERS AND ACQUISITIONS:

Controversies and Dilemma in Accounting for M&A – Accounting for M&As – Features of Pooling Accounting – Criteria for Pooling of Interests – Incentives to Choose Pooling Over Purchase – Accounting Valuation of Goodwill – Accounting for M&A in India – IFRS-3 on International Accounting

Standards for M&A – Main Features of the IFRS-3 – The Standards (IFRS-3) for Business Combination

– Comparison between Indian GAAP and IFRS-3 (Including Problems).

UNIT-V: DEMERGER:

Conceptualization of Demerger – Definitions – Procedural Aspects of Demerger Under the Companies Act 1956 – Effects of Demerger – Applicability – Legal Aspects – Taxation Aspects – Demerger Vs. Reconstruction – Demerger Vs. Hiving Off – Advantages of Demerger – Disadvantages of Demerger (Theory Only).

SUGGESTED READINGS:

1.Andrew J Sherman: Mergers & Acquisitions, AMCAM, New York;
2.Bhangaban Das, Debdas Raskhit and Satya Swaroop Debasish: Corporate Restructuring HPH;
3.Chandra Shekar Krishnamurthi and Vishwanata S.R.: Mergers and Acquisitions and Corporate Restructuring, Response Publishers;
4. Fred Weston J, Kwang S Chung: Merger Restructuring and Corporate Control, PHI;
5.Machiraju H R: Mergers, Acquisitions and Takeovers, New age International (P) Ltd. Publishers;
6.Manju Gupta: Contemporary Issues in Mergers and Acquisitions, HPH; **7.**Nishikant Jha: Mergers, Acquisitions and Corporate Restructuring, HPM;
8.Rajinder Aurora, Kavita Shetty and Sharada Kale: Mergers and Acquisitions, oxford University Press;
9.Ravindhar Vadapalli: Merger, Acquisitions: Strategy, Valuation and Integration, PHI; **10.**Ray Kamal Ghosh: Mergers and Acquisitions: Strategy, Valuation and Integration, PHI.

HRM

331: HUMAN RESOURCE DEVELOPMENT

Course Objective: The course aims to equip students to develop themselves into a critically reflective and capable HRD practitioner, or a manager who can facilitate the learning of others. The major objective of the course tis to explain and demonstrate the contribution of HRD in an organization and enable student to develop an ability to decide learning and training needs and have competence in the design and delivery of learning programmes.

Unit – I

Human Resource Development: concept, Origin and Need for HRD; Objectives of HRD,HRI System, Systems approach to HRD: Approach to Activity Areas of HRD; HRD Interventions ; Performance appraisal, Potential Appraisal, Feedback and Performance coaching, Career Planning , Employee Welfare and Quality of Work Life, HRD Climate;HRD Audit.

Unit – II

HRD –Trends: Organization Development: OD Concept, Definitions, Characteristics ,Features of OD, OD Interventions, Approaches to OD Change Lewins Three- Steps Model, ; Assessment Centre HRD Experience in Indian Organizations, Important Challenges to Organizations, Roles of HRD Professionals Future of HRD.

Unit – III

Human Resource Training : Concept and Importance: Assessing Training Needs: Process of Training; Designing and Evaluating, Training and Development Programmers, Organizational Culture, Types, Developing Right Culture, Work Place Jealousies and Policies, Work place Spirituality for Cooperation and Peace.

Unit – IV

Types and Methods of Training On the job Training, Off the job Training , Training Methods, Lecture, Role Play, Reverse Role Plays, Rotation Role plays, Managing Diversity for HRD, Behavior Modeling, Brain Storming Case Study.

Unit – V

HRD Applications and HRD in Practice: Quality Circles Management Development and OD : HRD & OD : HRD in Large, small, Manufacturing and Service Organizations, Global Developments and Implications for HRD in India, HRD outsourcing, BPO, ITES.

Reference Books

1. Rao, T.V., Human Resource Development, Sage publications, New Delhi.
2. T.V. and Pareek, Udai, designing and managing Human Resource Systems; Oxford and IBR Pub. Ltd., New Delhi.
3. Nadler, Leonard, Corporate Human Resource Development, Van Nostrand Reinhold/ASTD, New York.
4. ILo, Teaching and Training Methods for Management Development Hand Book McGraw Hill, New York.
5. Graig, Robert l. and bittel Lester R.(ed), Training and Development Development Hand Book McGraw Hill,New York.
6. Rao T.V.(et),HRD in the New Economic Environment, TMH ,New Delhi.
7. Dr. D.K.Bhattacharya, HRD, Himalaya Publishing New Delhi
8. T.D.Tiwari and Anjuthakker, Wisdom Publications,
9. A.M.Shakhi, HRD
10, Gupta & Gupta . HRD, Deep & Deep Publications

332. MANAGEMENT OF INDUSTRIAL RELATIONS

Course Objective: To enlighten the students with the Concepts and Practical applications of Industrial Laws and Employee relations.

Unit – I: Industrial Relations: Scope and Significance – Evolution of Industrial Relations in India and comparative analysis with USA and UK– Recent Trends in Industrial Relations – Approaches to Industrial Relations – Theories of Industrial Relations.

Unit – II: Promotion of Harmonious Relations – Machinery for Prevention and Settlement of Industrial Disputes – Conciliation – Arbitration and Adjudication – Code of Discipline and Code of Conduct; Industrial Disputes Act 1947.

Unit – III: Collective Bargaining (CB) – CB Practices in India – Participative Management Forms and Levels – Schemes of Workers' Participation in Management in India – ILO and its impact.

Unit - IV: Trade Unions: Concept, Growth, functions and Objectives of Trade Unions - Trade Union Movement in India, UK and USA - Changing Role in the Context of Liberalization - Trade Union Act 1926.

Unit-V: Trade Unionism in India: Problems of Trade Union; Recognition, Leadership, Political involvement, Union rivalry; National trade Union Federations; Emerging Trends in Trade Unions in India.

Suggested Books:

1. Venkat Ratnam, C.S. – Industrial Relations, Oxford University Press.

2. SC Srivathava, Industrial Relations and Labour Laws, Vikas, New Delhi.

3. M.Arora: Industrial Relations, Excel Publications.

4. P.R.N.Sinha, Indu Bala Sinha and Seema Priyadarshini Shekar, "Industrial Relations, Trade Unions and Labour Legislation", Pearson Education, New Delhi.

5. Ramaswamy E.A. – The Strategic Management of Industrial Relations, Oxford University Press.

6. Cowling and James, The Essence of Personnel Management and Industrial Relations, Prentice Hall of India.

7. Ratna Sen, "Industrial Relations in India", Macmillan India Ltd. New Delhi.

8. Michael Armstrong, Employee Reward, Universities Press (India) Ltd.

333 - Employee Compensation and Administration

Course Objective: Explain how perceptions of compensation differ among society, stockholders, managers and employees. Understand the concept of a compensation strategy, where it comes from, how it relates to the organization's situation**.**

UNIT I :

Employee compensation: Concept and Significance: Wage Concept: Wage , Salary , Minimum Wage, Living Wage, Need-Based Minimum Wage, Money Wage and Real wage; Wage policy in India ; Theories of wages.

UNIT II :

Wage Administration Principles: Factors influencing Wage Fixation and Methods, wage Differentials: Occupational , skill, Sex, Inter-Industry, Regional and Sectional.

UNIT III :

Wage Fixation Mechanisms: Statutory Wage fixation, Wage Boards, Collective Bargaining , Adjudication, Pay Commission; Wage Fixation in Public Sector.

UNIT IV :

Incentives : Principles and procedures for installing incentive system; Types of wage Incentive System, Wage incentive Schemes in India, working of incentive schemes, Linking wage with productivity; Fringe Benefits: Concepts and Types.

UNIT V :

Wage and salary policies in Organization: Role of HR Department in wage and salary Administration, Managerial compensation, Perquisites and special Features; Recent trends in managerial compensation in Indian Organizations and MNC's.

Suggested Books :

1. Subramanian, K.N., Wages in India, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
2. Sarma. A.M, Understanding Wages Systems, Himalaya Publishing House, Mumbai.
3. Varma, Promad, Wage Determination: concepts and cases, Oxford IBH publication. Ltd New Delhi.
4. Chatterjee, N.N., Management of Personnel of in Indian Enterprises. Allied Books agency, Culcutta.
5. Aswathappa. K., Human Resource and Personnel Management. Tata Mc Graw Hill Publishing Co.,

334: EMPLOYEE WELFARE AND LABOUR ADMINISTRATION

Course Objective: To enlighten the students with the Concepts and Practical applications of employee welfare and labour administration.

Unit – I : LABOUR WELFARE

Labour Welfare : Concept, Scope and Philosophy of Lab our Welfare; principles of Lab our Welfare: Indian Constitution and Labour Welfare Historical Development of Lab our Welfare in India:

Unit – II: ILO

Impact of ILO on Lab our Welfare in India; Agencies of Lab our Welfare and Their roles: State, Management, Trade Unions and Voluntary Agencies.

Unit – III: WELFARE PROGRAMES

Labour Welfare Programmers ; Statutory and Non-Statutory, Extra Mural and Intra Mural: Canteen, Housing, Workers Education Scheme; Welfare Office: Role , Status and Functions.

Unit – IV: SOCIAL SECURITY

Social Security : Concept and Scope; Social Assistance and Social Insurance, Development of Social security in India; Social Security Measures for Industrial Employees.

Unit – V: **LABOUR ADMINISTRATION**

Labour Administration : Central Lab our Administrative Machinery in India; Chief Lab our Commissioner , Director general of Employment and Training, director general of factory Advice Service, Provident Fund Organization, ESI Scheme : Lab our Administration in AP

Reference Books

1. Moorthy, M.V., Principals of Lab our welfare in India, Sree Ram Centre
2. Sharma, A.M., Aspects of Lab our Welfare and Social Security, Himalaya Pub. House, Mumbai.
3. Ram Chandra P.Singh, Lab our Welfare Administration in Indian, Deep & deep Pub., New Delhi.

NON CORE PAPER (for other Departments)
305. ENTERPRENEURSHIP DEVELOPMENT

Course Objective: To develop necessary knowledge and skills among the students to become entrepreneurs.

UNIT – I : Entrepreneur & Entrepreneurship Development: Characteristics of Entrepreneur – Attitude; Qualities and Functions of entrepreneur-distinction between entrepreneur and intrapreneur– Importance of Entrepreneur –types of entrepreneurs- Role Models.

UNIT-II

Entrepreneurship Development - Theories of Entrepreneurship- growth of entrepreneurship in india-problems and development of rural entrepreneurship-: Role of Government in Promotion of Entrepreneurship.

UNIT – III : Idea Generation and Feasibility Planning: Sources of New Ideas – Methods of idea generation – Creative problem solving – Opportunity Recognition – Fundamentals of Feasibility Planning – Four Stages Growth Model.

UNIT – IV : Managerial Aspects of Entrepreneurship : Sources of Finance – Working Capital; Venture Capital; Seed Capital – Financing Agencies – Government grants; Subsidies; Investors; Private Offerings – Product Development – Marketing Management, HRM in SMES.

UNIT – V : Entrepreneurial Strategy : Generation of New entry Opportunity – Entry Strategy - New Entry Exploitation – Decisions under uncertainty – Risk Reduction Strategies – Growth Strategies – Innovations Strategies and Managing Newness.

Suggested Books:

1.Nanda, H., Fundamentals of Entrepreneurship, PHI, First/e, New Delhi,2009.
2.Vasanth Desai, The Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, 2009.
3.Bholanath Dutta, Entrepreneurship Management – Text and Cases, Excel Books, 2009.
4.Morse & Mitchell, “Cases in Entrepreneurship” , SAGE Publishers, New Delhi.
5.Barringer & Ireland, Entrepreneurship – Successfully Lauching New Ventures, Pearson, 2006.
6.Poornima Charantimath, Entrepreneurship Development & Small Business Enterprises, Pearson Education.
7.Khanka, S.S. “Entrepreneurial Development “ , S.Chand.

IV SEMESTER (MBA)

401-STRATEGIC MANAGEMENT

Course Objective: The objective of this course is to analyze the main structural features of an industry and develop strategies that position the firm most favorably in relation to competition and influence industry structure to enhance industry attractiveness, to recognize the different stages of industry evolution and recommend strategies appropriate to each stage and to appraise the resources and capabilities of the firm in terms of their ability to confer sustainable competitive advantage and formulate strategies that leverage a firm's core competencies.

Unit-I: **Introduction:** Concepts in Strategic Management, Strategic Management as a process –Developing a strategic vision, Mission, Objectives, Policies – Factors that shape a company's strategy – Crafting a strategy – Industry and Competitive Analysis, Porter's Five Forces Model.

Unit-II: **Environmental Scanning and leadership**: Methods. SWOT Analysis – Strategies and competitive advantages in diversified companies and its evaluation. Strategic Analysis and Choice: Tools and techniques- BCG Matrix, Space Matrix, GE Model, Grand Strategy Matrix -Strategic Leadership: Leadership and Style – Key Strategic Leadership Actions - Developing Human Capital and Social Capital – Balanced Scorecard.

Unit-III: **Strategy Formulation** : Strategy Framework For Analyzing Competition, Porter's Value Chain Analysis, Competitive Advantage of a Firm, Exit and Entry Barriers - Formulation of strategy at corporate, business and functional levels. Types of Strategies – Tailoring strategy to fit specific industry – restructuring and diversification strategies – different methods Turnaround strategy and diversification strategies.

Unit-IV: **Strategy Implementation** : Strategy and Structure, Leadership, culture connection - Strategies for competing in Globalizing markets and internet economy – Organizational Values and Their Impact on Strategy – Resource Allocation – Planning systems for implementation.

Unit-V: **Strategy Evaluation and control** – Establishing strategic controls - Measuring performance – appropriate measures- Role of the strategist – using qualitative and quantitative benchmarking to evaluate performance - strategic information systems – problems in measuring performance – Strategic surveillance - strategic audit.

REFERENCES:

1 .Vijaya Kumar P,.HittA : Strategic Management, Cengage learning, New Delhi,2010.
2. John A PearceII, AmitaMital: "Strategic Management", TMH, New Delhi, 2012.
3. Sanjay Mohapatra: "Cases Studies in Strategic Management", Pearson, New Delhi,2012.
4. Adrian Haberberg&Alison: Strategic Management, Oxford University Press, New Delhi, 2010.
5 .P.Subba Rao: "Business Policy and Strategic Management" Text and Cases, Himalaya Publishing House, New Delhi, 2011.
6. Appa Rao, Parvatheshwar Rao, Shiva Rama Krishna: "Strategic Management and Business Policy", Excel Books, New Delhi, 2012.

402: TALENT AND KNOWLEDGE MANAGEMENT

Course Objective: The main objective of this paper is to enable the students understanding the significance of Talent and Knowledge Management in today's business scenario.

Unit – I: Introduction : Meaning and importance of talent management; Designing and building a talent reservoir–Segmenting the Talent Reservoir; Talent Management Grid; Creating a talent management system; Institutional strategies for dealing with talent management.

Unit – II : Competency Management : Competency–meaning, characteristics, types–Steps in developing a valid competency model; Talent management information systems; Developing a talent management information strategy; Role of leaders in talent management.

UNIT-III: Introduction to KM & Role of IT: Meaning, Importance of Knowledge Management. ―Data –information – Knowledge – Wisdom interrelationship; Organizational knowledge: Characteristics and components of organizational knowledge; Building knowledge societies Role of Information Technology in Knowledge Management System – Knowledge management tools

UNIT-IV: Future of Knowledge Management & Industry Perspective: Companies on the road into knowledge management – knowledge management in manufacturing and service industries –Knowledge management in finance – Knowledge management in marketing – customer relationship process;Business ethics and Knowledge Management – Challenges and future of knowledge management.

UNIT-V: Knowledge Management Process: Universal appeal ; Stages of Knowledge

Management process ; Knowledge Capital Vs. Physical Capital ;The promise of Internet and the imperatives of the New Age;Study of Road Blocks to the implementation of knowledge management;10 step KM Road Map of Amrit Tiwana. Business intelligence and internet platforms – Web portals - Information architecture – Net banking in India.

Suggested Books:

1. Ed by Lance A. Berger and Dorothy R Berger. "The Talent Management Handbook", 2004, Tata McGraw Hill edition.
2. Ed by Larry Israelite, "Talent Management", ASTD Press.
3. Sajjad M Jasmuddin, "Knowledge Management", 1st ed, 2009, Cambridge.
4. Stuart Barnes, "Knowledge Management Systems", Ed, Cengage Learning
5. Irma Becerra-Fernandez, Avelino Gonzalez and Rajiv Sabherwal "Knowledge Management", 2009, Pearson Education Inc.
6. Donald Hislop, "Knowledge management in Organizations", 2009, Oxford University Press, Second edition.
7. Sudhir Warier, "Knowledge Management", Vikas Publishing House Pvt. Ltd.
8. Thorne & Pellant, "The Essential Guide to Managing", Viva Books.
9. Stuart Barnes(Ed) "Knowledge Management Systems". Cengage Learning.

MARKETING ELECTIVES

411 : INTERNATIONAL MARKETING

Course Objectives: The objective of this course is to introduce the student to Marketing Strategy Planning for International Markets. Specifically, when the student has completed this course, he/she should, Understand the various ways that businesses can get into international marketing , Understand what multinational corporations are , Understand the kinds of opportunities in international markets, and the international environments that create these , Understand the market dimensions that may be useful in segmenting international markets, entry strategies, building brand, communication decisions and export marketing.

UNIT – I

International Marketing – Definition and Scope – Significance of International Marketing, Differences between International and Domestic Marketing, International Marketing Environment.

UNIT – II

International Market Entry Strategy : Entering International Markets – Product Strategy for International Markets

UNIT-III

Building Brands for International Markets – Global Advertising. Pricing for International Markets : Environmental Influences on Pricing Decisions

UNIT – IV

, Distribution Channels & Structures – Communication Decisions for International Markets – international marketing of Services.

UNIT – V

Export Marketing : International Trade, Finance and Risk Management, export Costing and Pricing, Export Procedures and Export Documentation, Export Assistance and Incentives in India.

Reference Books

Wawen J. Keegan, Global marketing Management, Pearson Education.

Philip R. catera, John L. Grahan, International Marketing, TMH.

Rakesh Mohan Joshi, international Marketing, Oxford.

R.L. Varshney and B. Bhattacharya, International Marketing Management : An Indian perspective, Sultan Chand Publications..

412: Advertising and Sales Promotion

Course Objective: The objective of the course is to provide students with detailed knowledge on marketing mix.

Unit-I

Advertising: Advertising types, role of advertising in developing economy, advertising agency, advertising budget, evaluation of advertising effectiveness: pre testing, post testing, DAGMAR, social, cultural and ethical dimensions of advertising

Unit-II

Advertising agencies: Word of mouth advertising, advertising planning, creativity of advertisement copy, employing the internet for advertising, advertising research, agency-client interface, functions and types of agencies

Unit-III

Media Management and planning: Types of media, media scheduling decisions, media mix decisions, media evaluation and selection, media effectiveness, social and ethical aspects of media

Unit-IV

Sales promotion and sales force management: Sales promotion: objectives, types of sales promotion tools, personal selling: sales personality, retail salesman's duties, responsibilities and problems, types of salesmen, AIDAS, training sales personnel, motivating the sales force, compensating sales personnel

Unit-V

Direct marketing and Public Relations:advantages, techniques, public relations objectives, tools of public relations, event marketing : Importance, promotion of events.

Reference Books

1. Foundations of Advertising theory and practice S.A Chunawalla, K.C Sethia, Himalaya Publishing House
2. Sales & Advertisement Management, S.Raj kumar, V.Raja Gopalan, S.Chand Publisher
3. Advertising Management, Jeth Waney, Jain Oxford Publisher
4. Integrated Advertising, Promotion and Marketing communications, Krusti shah, Lon D Souza, TMH Publisher
5. Salesmanship and Publicity, Rustom S Davar, Sohrab R Davar, Nusli R Davar
6. Marketing Management, R.S.N Pillai Bagavathi S.Chand Publisher

413: RETAILING MARKETING

Course Objectives: Understand the key elements in planning, managing, and executing the retail marketing mix as they relate to the product, price, distribution, and promotion. Identify the approaches to and guidelines used to analyze and solve retailers' problems and make decisions in retail organizations.

UNIT-I

Introduction to Retailing: Retailing – Meaning functions – Types of retailers – Services of retailers – significance of retailing – Multichannel retailing;

UNIT-II

Customer buying behavior – Buying process – Types of buying decisions – Factors influencing the buying process; Retailing in India - emerging Trends in retailing.

UNIT-III

Retail store locations: Evaluation of specific areas and sites for location – Site Characteristics - Trade area Characteristics – Estimating Potential sales for a store site; Store design and layout – Objectives – Space management – Visual merchandising – Atmospherics – Website design - Elements of store design – Exterior and interior.

UNIT-IV

Retail Marketing strategy: Definition Building a sustainable competitive advantage – Growth strategies – Strategic retail planning process; Financial strategy: Objectives – Strategic Profit Model – Setting and measuring performance objectives.

Unit-V

Retail Pricing – setting retail prices – Price adjustments – Pricing strategies; Retail communication Mix; Customer relationship Management: The CRM Process – colleting customer data – Addressing customer data and identifying target customers – developing CRM Programmes; International retailing – Opportunities and challenges.

Reference Books

1. David Gilbert, Retail Marketing Management, Pearson Education
2. . A J Lamba, The Art of Retailing, TMH
3. Hasty and Reardon: Retail Management, McGraw-Hill
4. Diamond ,jay and Gerland Pimtel: Retailing, PHI

414: INDUSTRIAL MARKETING

Course Objectives: The course is designed to provide students with the ability to understand industrial markets and relevant industrial marketing strategies. The course will help the students to achieve the following objectives:

- Understand the nature and role of industrial markets
- To explain the characteristics of industrial markets and buying situations
- To help students understand how to develop and implement relevant industrial marketing strategies

Unit-I

Industrial Vs consumer marketing, charasterstics of industrial goods, types of industrial customers, , industrial market segmentation, targeting, and positioning

Unit-II

Buying and buyer behavior: factors affecting buying decision, buying objectives, vendor analysis and selection- industrial marketing research, marketing information system

Unit-III

Industrial pricing: characterstics, factors affecting pricing, pricing methods, leasing-industrial marketing

UNIT-IV

Communication: advertising, personal selling, trade fair & exhibitions

Unit-V

Distribution channels: factors affecting, use of intermediaries, types of middlemen, channel conflicts, Formulating Channel Strategies

Reference Books

Robert R.Reeder, Edward G.Brierty & Betty H.Reeder: INDUSTRIAL MARKETING; Prentice-Hall International,
Krishna Havaldar, INDUSTRIAL MARKETING, Tata McGraw-Hill
Peter M. Chisnall: STRATEGIC INDUSTRIAL MARKETING; Prentice-Hall International,
Richard M.Hill, Ralph S.Alexander & James S.Cross: INDUSTRIAL MARKETING; All India Traveller Book Seller Publishers and Distributors Francis Cherunilam : INDUSTRIAL MARKETING ,Himalaya publisher

415: CONSUMER BEHAVIOUR AND CUSTOMER RELATIONSHIP MANAGEMENT

Course Objective: The objective of this course if to explain and apply the key terms, definitions, and concepts used in the study of consumer behaviour, to demonstrate how as a marketer you can use your knowledge of consumer behaviour concepts to develop better marketing programs and strategies to influence those behaviour and to critically evaluate the effectiveness of various advertisement and promotions and their attempts to influence the behaviour of individuals**.**

UNIT – I: Consumer Behaviour: Introduction to Consumer Behaviour - Understanding consumers and market segments - evolution of consumer behaviour - consumer analysis and business strategy - models of Buyer Behavior - Howard Model, Howard Sheth Model - EKB Model - Webster and Wind Model and Sheth Industrial Buyer Behaviour Model.

UNIT – II: **Psychological Foundations of Consumer Behaviour**: Consumer Motivation - Perception - Personality and Behavior - Learning and Behavior Modification - Information Processing - Memory Organization and Function - Attitude Formation and Attitude Change - Social and Cultural Environment Economic – Demographic, Cross Cultural and Socio – Cultural Influences – Social Stratification - Reference Groups and Family - Personal influence.

UNIT – III: **Communication and Consumer Behaviour**: Components of communications process designing persuasive communication and Diffusion of Innovations - Consumer Decision Processes High and Low Involvement - Pre-purchase Processes - Post Purchase processes - Consumption and evaluation - Brand Loyalty and Repeat Purchase Bahaviour.

UNIT – IV: **Customer Relationship Management**: – Introduction - Measurement - Qualitative Measurement Methods - Quantitative Measurement Methods - CustomerRelationship Survey Design - Statistical Analysis of Customer Surveys - Using Customer Relationship Survey Results.

UNIT – V: Relationship and Partnership: Relationship Concepts - Relationship Drivers - Lasting Relationships - Customer Partnership - Internal Partnerships - External Partnerships and Relationship Management changing Corporate Cultures.

References:

1. Ramneek Kapoor, Nnamdi O Madichie: “Consumer Behaviour Text and Cases”, TMH, New Delhi, 2012. 2. Ramanuj Majumdar: “Consumer Behavior insight from Indian Market”, PHI Learning, New Delhi, 2011. 3. M.S.Raju: “Consumer Behavior Concepts, applications and Cases”, Vikas Publishing House, New Delhi, 2013.
4. David L Loudon and Albert J Della Bitta, Consumer Behaviour, 4/e, TMH, New Delhi, 2002.
5. Schiffman, L.G and KanukL.LConsumer Behaviour, 8/e, Pearson Education, New Delhi, 2003.
6. Roger D. Black Well et al, Consumer Behaviour, 9/e Cengage, New Delhi, 2012.

FINANCE ELECTIVES

421 – SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Course Objective: Investment analysis and portfolio management course objective is to help entrepreneurs and practitioners to understand the investments field as it is currently understood and practiced for sound investment decisions making.

UNIT-I: **Investment**: Meaning, Investment vs. Speculation - Characteristics of Investment – Investment Process – Securities Market: Issue of Securities: Initial Public Offer (IPO) – Right Issue - Bonus Issue – Private Placement – Listing – Trading – Settlement. Security Markets – Primary and Secondary – Types of securities in Indian Capital Market, Market Indices. Calculation of SENSEX and NIFTY (**Theory only**).

Unit-II: **Return and Risk** – Meaning and Measurement of Security Returns. Meaning and Types of Security Risks: Systematic Vs Non-systematic Risk. Valuation of Securities: Basic Concepts: Return, Risk, Intrinsic value – Valuation of fixed income Securities: Debentures and Bonds: Current Yield, Yield to Maturity (YTM), Yield to Call (YTC), Bond Duration – Valuation of Equity: Constant Rupee Dividend model – Constant Growth Model – Multiple Growth Model – Price – Earnings (P/E) Approach (**Theory and simple problems**)

UNIT-III: **Fundamental Analysis**: Economy, Industry and Company Analysis. Technical Analysis: Dow Theory - Elliot wave – Moving Average, Exponential Average, Oscillators, Rate of Change (ROC), Relative Strength Index (RSI), Moving Average Convergence Divergence (MACD) –Breadth of the Market – Momentum. (**Theory only**)

UNIT-IV: **Portfolio Analysis and Selection**: Portfolio Return and Portfolio Risk - Modern Portfolio Theory: Markowitz Theory – William Sharpe's Single Index Model – Capital Asset Pricing Model (CAPM) – Arbitrage Pricing Theory (APT) – Efficient Market Hypothesis (**Theory and problems**).

Unit-V: Portfolio Evaluation & Revision: Methods of Portfolio Evaluation – Sharpe's, Treynor's and Jensen's measures of portfolio performance evaluation - Fama's decomposition of portfolio return – Portfolio Revision: Need, Constraints, Strategies (**Theory only**).

Suggested Books:

1. Fisher DE and Jordon RJ, Security Analysis and Portfolio Management, PHI, New Delhi.
2. Hirt and Block, Fundamentals of Investment Management, TataMcGrawHill, New Delhi.
3. Reily Frank K, Investment Analysis and Portfolio Management, Cengage, New Delhi.
4. Bodie, Kane, Marcus and Mohanty, Investments, TataMcGraw Hill, New Delhi.
5. Sharppe W, Alexander, GJ, & Baily JV, Investments, TMH, New Delhi.
6. Avadhani, VA, SAPM, Himalaya Publishers.
7. Bhalla, VK Investment Management, S.Chand., New Delhi.

422: FINANCIAL RISK MANAGEMENT

Course Objective : To understand the operational practices and credit environment and to expose the students to pricing of loans and mechanism of credit risk in Banks and Insurance organisations

UNIT I

Meaning and Definition of Risk – Concepts of Risks : Definition of Perils and Hazards – Meaning of Uncertainty – Difference between Risk and Uncertainty – Risk Attitude : Causes or sources of Risks – Classification of Risks – Methods of Handling the Risk – Measuring the cost of Pure Risk – Risk Management : Definition – Features – Objectives – Significance – Principles – **Process :** Planning of Risk – Risk Identification – Risk Ananlysis – Evaluation Process - Assessment – Advantages – Limitations (**Theory and Problems**).

UNIT II

Business Risks : Definition – Causes – Methods of Handling Business Risks – Risk Management by Individuals – Risk Management by Companies; **Entrepreneurial Risk Manag**ement – Concept – Process - Methods of Handling Risk – Environmental Risk Management – Causes- Process (**Theory only).**

UNIT III

Meaning and Definition of Insurance – History of insurance Business in India – Framework of Insurance Business - Features of Insurance Contract – Functions – Importance – Essential Elements of Insurance Business - – Benefits of Insurance – **Kinds of Insurance:** Life Insurance : Definition – Classification of Life Insurance Policies – Organisation structure of LIC – Role of LIC – Calculation of Premium in Life Insurance Policies; History and Growth of GIC : Objectives – Kinds of Policies – Functions of GIC – Concept of Reinsurance - Impact of Privatisation of Insurance - IRDA : Role- Powers – Functions and Regulations (**Theory and Problems**).

Unit – IV

Meaning and Definition of Commercial Banks : History and Growth - Features – Functions – Regulations – Classification of Banks - Benefits – Limitations – Impact of Privatisation of Banks. (**Theory only**).

Unit – V

Risk Management in Insurance and Banks – Operational risks : Principles – Causes – Credit risk: : Objectives – Causes – Dimensions - BASEL I Committee : Objectives - Benefits – BASEL II and Three-Pillar Approach : Minimum capital requirement – Supervisory Review Process – Market Discipline – Key Factors for implementation of BASEL II. (**Theory only**).

REFERENCE BOOKS

1. Harrington : Risk Management and Insurance, TaTa McGraw Hill publishing House, New Delhi.
2. George : Principles of Risk Management and Insurance, Pearson Education
3. James Triesehmann, Risk Management and Insurance, Thomson Publications.
4. P.K.Gupta, Insurance and Risk Management, Himalaya Publishing House.
5. Periaswamy, P and Veeraselvam, M., Risk Management and Insurance, Himalaya Publishing House.

423: FINANCIAL SERVICES

Course Objective: To provide conceptual understanding of financial services and in-depth knowledge of banking, mutual funds and lease financing services.

Unit – I

Financial Services : Concept – Definitions – Evolution of Financial Services Sector in India – Features – functions – Constituents of Financial Services – Significance – Types of Financial Services Sector – Regulating Authorities of Financial Services Sector- Problems of Financial Services Industry – Growth of Financial Services Industry.(**Theory Only**)

Unit – II

Merchant Banking: Meaning – Origin – Scope – Functions – Registration of Merchant Banker – Issue Management – SEBI Guide Lines for Merchant Banking.

UNIT-III

Mutual Funds: Meaning – Evolution – Growth –Types – Advantages – M.F .Organization – Regulatory Aspects (**Theory Only**)

Unit-IV

Lease Financing: Meaning – Evolution – Classification of Lease – Regulatory Authority – Advantages – Disadvantages. Hire Purchase: Meaning – Features – Evolution – Lease Finance Vs Hire Purchase – sources of Law on Hire Purchase – problems. Factoring: Meaning – Types – Significance – Advantages – Disadvantages (**Theory Only**)

Unit – V

Venture Capital: Evolution – Mechanism –Types - Problems – Benefits - Housing Finance : housing Policy – H.F Organizations – Types of Housing Loans. Credit Rating: Evolution – Scope of Rating – Process of Rating – Framework- Credit Rating Agencies – Regulation of CRAS. (**Theory Only**)

Reference Books

1. Gordon and Natrajan., FINANCIAL MARKETS AND SERVICES, Himalaya Publishing House, Mumbai.
2. Madura., FINANCIAL INSTITUTIONS AND MARKETS, Thomson.
3. M.Y. Khan, FINANCIAL SERVICES, Tata Mc Graw Hill, New Delhi.
4. Varma, J.C., MERCHANT BANKING, Tata Mc Graw Hill, New Delhi.
5. Vastsara & Nigam, MANAGEMENT OF INDIAN FINANCIAL INSTITUTIONS, Himalaya Publishing House, Mumbai.

424: INTERNATIONAL FINANCIAL MANAGEMENT

COURSE OBJECTIVE: The course emphasizes the managerial aspects of international finance and seeks to impart the skills needed by multinational financial managers.

Unit-I

International Monetary System and Financial Markets: An overview of Global Financial Markets - Foreign exchange market – Functions.

UNIT-II

Structure of Forex markets – Major participants – Types of transactions and settlements -Balance of payments (BoP) – Functions of BoP – Accounting components of BoP.

Unit-III

Determination of exchange rates: Spot and forward rates – International party conditions – Purchasing power parity – Forward rate parity and interest rate parity – Fisher open condition.

Unit-IV

Foreign Exchange Exposure and Risk: Economic exposure – Transaction exposure and translation exposure –Management of exposure - Currency options and futures – Currency swaps.

Unit-V

Cross Border Investment Decisions: Working capital management in Multinational companies (MNCs) – Capital budgeting for MNCs – Capital structure of multinational firms.

Reference Books

Eiteman, Stonehill and Moffett: Multinational Business Finance (Pearson)

Alan C. Shapiro : Multinational Business Financial Management (Wiley India)

P.G. Apte : International Financial Management (TMH)

Jeff Madura : International Corporate Finance (Cengage)

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425: ADVANCED MANAGERIAL ACCOUNTING

Course Objective: Advanced Managerial Accounting focuses on the complex issues relating to cost control, profit analysis, performance measurement, compensation systems and strategic performance management. This course extends and applies the knowledge base students gained in Cost Accounting to further develop their understanding of the issues in the planning, control and evaluation of organisational activities. It focuses on the role accounting information takes in the development of performance measurement and control systems, as well as the behavioural implications of using these systems.

UNIT-I

Financial Statements: Meaning – Objectives – Types – Uses – Limitations.

Financial Statements Analysis: Meaning – Objectives – Techniques – Uses – Limitations.

Ratio Analysis: Meaning – Types – Du Pont Analysis (Including Problems).

Funds Flow Analysis: Meaning – Preparation of Funds Flow Statement – Cash Flow Analysis: Meaning – Preparation of Cash Flow Statement as per Accounting Standard No.3 (Including Problems).

UNIT-II

Human Resources Accounting: Concept – Objectives – Approaches – Limitations (Theory only).

Responsibility Accounting: Concept – Steps – Responsibility Centre – Types of Responsibility Centres – Preparation of Responsibility accounting reports (Including Problems).

UNIT-III

Inflation Accounting: Concept – Limitations of historical cost based financial statements – Methods of Inflation Accounting: Current Purchasing Power Method – Current Cost Accounting Method (Including Problems).

UNIT-IV

Income Measurement: Income Concepts - Measurement and Reporting of Revenues, Expenses, Gains and Losses (Theory only) – Analysis of Changes in Gross Profit (Including Problems).

UNIT-V

Financial Measures of Performance: Introduction – Return On Investment (ROI): Concept – Uses and Limitations – Economic Value Added (EVA): Concept – Significance of EVA – Measurement of EVA (Theory only).

UNIT - V

Balanced Score Card (BSC): Concept – Objectives – Perspectives of BSC - Multiple Scorecard Measures to a Single Strategy (Theory Only).

SUGGESTED READINGS:

1.Charles S. Gibson: "Financial Statement Analysis", Cengage Learning India Private Limited;
2.Lyn M. Fraser & Aileem Ormiston: "Understanding Financial Statements" PHI
3.Ambrish Gupta: "Financial Accounting for Management An Analytical Perspective", Pearson;
4.Earl. K. Stice & James D. Stice: "Financial Accounting Reporting & Analysis", Cengage Learning India Pvt. Ltd.
5.Carl s. Warren, James M. Reeve & Jonathan E. Duchac: "Financial Accounting Concepts, Methods and Applications" Cengage Learning India Pvt. Ltd.
6.Sharma RK & Shashi K. Gupta: "Management Accounting" Kalyani Publishers
7.Malcolm Smith, "Research Methods in Accounting" Sage Publications Ltd.
8.Rawat D.S: "Accounting Standards", Taxmann
9.Kamal Garg: "IFRS Concepts and Applications", Bharat Law House Pvt. Ltd.
10. Ghosh T.P: "IFRSs For Finance Executives", Taxmann.

HRM ELECTIVES

431: INTERNATIONAL HUMAN RESOURCE MANAGEMENT

Course Objective: The course is designed to enhance the potentials of the student to manage Human Resource in Multi National Organizations to achieve Business Standards.

Unit - I

Introduction to International Human Resource Management: Concept, Scope and Significance - Expatriate- Approaches to International Human Resource Management, Differences between Domestic and International HR Activities; Role of International HR Department - Issues and Challenges of IHRM, Organizational structure of multinational corporations,

Unit- II

Socio – Culture Contexts: Cultural Factors - Cultural Sensitivity - Culture affects Management approaches - Cross-cultural Communication - Cross Culture Differences in the Work Place – Hofstede Cross-Culture theory.

Unit – III

Recruitment and Selection: Concept – sources of Human Resources: Micro level, Macro level, Modern Sources, Techniques of Recruitment – Centralized Vs Decentralized recruitment – Selection: The Expatriate System, Reasons for Expatriate failure in foreign assignment - Selection Techniques for International Assignment: Adaptability to cultural change, Motivation for a foreign assignment and Leadership ability.

Unit – IV

Training and Development: Need for Global training - Areas of Global Training & Development, Compensation : Objectives of International Compensation Management - Complexities in International Compensation Management- - Factors Affecting International Compensation Management - Approaches to International Compensation Management, Performance Management: System of performance appraisal – Problems of Performance Appraisal – Measures for effective Performance Appraisal.

Unit -V

Introduction to International Industrial Relations: Key Issues in International Industrial Relations - Trade Unions and International Industrial Relations - Conflict Resolution in Multinational Corporations; Forms of Industrial Democracy to Multinational Corporations – Regional Integration – NAFTA, EU.

Reference Books

1. Dowling Welch, Schuler, International Human Resource Management Thomson, New Delhi.
2. Anne Wil Harzing et al., International Human Resource Management., sage, New Delhi
3. P.Subba Rao, International Human Resource Management, HPH, New Delhi
4. Briscoe, Dennis R., International HRM , Prentice Hall NJ.
5. Torrington, D., International HRM : Think Globally and Act Locally, Hemal Hempstead, Prentice Hall.

432: Strategic Human Resource Management

Course Objective: The Objective of this course is to appreciate how human resource is emerging as a key resource for competitive advantage and understanding the role of HRM in organizational performance.

UNIT I : Concept of Strategy; Types of strategies: Corporate strategy and Business strategy, Integrating Human Resource Strategy with Corporate and Business and Strategies.

UNIT II : Human Resource Environment: Technology and Organization Structure; Worker Values and Attitudinal Trends; Management Trends, Demographic Trends: Trend's in the utilization of human resources and international developments.

UNIT III : Strategic International Human Resource contributions: Strategic Human Resource Activity Typology; Classifying Human Resource Types : Integration of strategy and human resource planning: The Human Resource manager and Strategic Planning. Strategic, Human Resource Planning**.**

UNIT IV: Strategic Human Resource Processes: Workforce Utilization and Employment Practices; Efficient Utilization of Human Resources; Dealing with employee shortages: Selection of employees; Dealing with employee surpluses and special implementation challenges. Reward and development systems: Strategically Oriented Performance Management Systems: Strategically oriented compensation systems and employee development.

UNIT V: Impact of Human Resource Practices: Individual high performance practices; Systems of high –performance human resource practices: individual Best practices vs. Systems of Practices and Universal Practices vs. Contingency Perspectives. Human Resource Evaluation: Over view of the Evaluation: Approaches to Evaluation: Evaluation Strategic Contributions of Traditional Areas: and Evaluation Strategic Contributions in Emerging Areas.

Suggested Books :

1. Greer, Charles R. (2003) Strategic Human Resource Management – A General Managerial Approach New Delhi: Pearson Education (Singapore) Ple. Ltd.
2. Mabey, Chrisopher and Salaman, Graeme, Strategic Human Resource management, Beacon, New Delhi.
3. Salaman, Graeme, Human Resource Strategies, Sage Publications, New Delhi.
4. Porter, Michael S., Competitive Advantage: Creating and Sustainig Superior Performance, Free Press, New York.

433 : LABOUR LEGISLATIONS

Course Objective: To have a broad understanding of the legal principles governing the employment relationship at individual and collective level. To familiarize the students to the practical problems inherent in the implementation of labour statutes.

Unit – I: Industrial Jurisprudence; Definition, Industrial Jurisprudence in India, Principles of Industrial Jurisprudence: Social Justice, Natural Justice, Equity, National Economy, Dynamism, Constitutional Norms, Welfare, Res Judicata, Laches, Vicarious Liability. Writs and appeals under the Indian Constitution, Labour Legislation: Growth, Ojectives and Classification.

Unit – II: The Factories Act, 1948, The mines Act 1952 and its rules .

Unit – III: The Plantation Labour Act, 1951, The Contract Labour (Regulation and Abolition) Act 1970.

Unit – IV: The Apprentices Act 1961, The Child Labour (Prohibition and Regulation) Act 1986.

Unit – V: The A.P Shops and Establishments Act 1988. The Dock Workers (Regulation and Abolition) Act 1948.

Reference Books

1. Malik, P.L Industrial Law, Eastern Book Company, Lucknow
2. Goswami, V.G. Labour and Industrial Relations Law, Central Law Agency, Allahabad
3. Agarwal, S.L, Labour Relations Law in India, Mc Milan Company of India Ltd., New Delhi
4. Sharma A.M. Industrial Jurisprudence, Himalaya Publishing House, New Delhi
5. Mishra P.N., Labour and Industrial Laws, Central Law Publishing, Allahabad
6. Vaidyanathan, N, IOL Conventions and India, Minverva Associates, Calcutta
7. Sinha, P.R.N, Industrial Relations and Labour Legislations, Oxford and I.B.H Publishing Co., New Delhi
8. Prabhakar Rao, D.V.S.R, Contract Labour Abolition and Absorption, Law Publishing House, Allahabad.

434: PERFORMANCE MANAGEMENT AND EMPLOYEE COUNSELLING

Course Objective: This course is designed to assist Human Resources professionals and operational managers in giving effective performance appraisals that help motivate employees to achieve higher productivity.

Unit – I

Performance Management: Concept and Objectives; Goal setting and Expectancy Theory; Performance Management Models; Designing Performance Management System; Pfm Process: Performance Appraisal - A Conceptual Frame work, Tools of Performance Appraisal, Performance Management in MNC and Outcome, Designing of PMS in MNC – Aims and Role of PMS, Characteristics of an Ideal PMS, Linking of Performance Management and Strategic Planning in a MNC

Unit – II

Performance Management Process; Goal Setting Levels; Corporate, Department and Individual; Monitoring Performance; Performance Feedback Performance Review; Coaching; counseling and Mentoring: 360 degree Appraisal and its Application in US, Europe and Asia, Performance Management Reward Systems in MNC.

Unit – III

High performance Teams: Elements of Team Building, Team Characteristics and Behaviors , Team Concepts and Norms, Selection of Team Members, Cross Functional Teams.

Unit – IV

Features of Effective Performance Appraisal System: Feedback; Building Team Performance; Learning organizations; Counseling: Meaning, Need for counseling; Functions of Counseling; Forms of Counseling; Counseling Process; Counseling Variables; Pre-requisites for Effective Counseling; Skills of an Effective Counseling.

Unit – V

Performance Management and Motivation from Global Scenario – Application of Expectancy Model, Reward and Recognition from Global Perspective, Challenges of Implementing PMS in MNC .

Reference Books

1.Prem Chand, Performance Management, Macmillin, New Delhi
2.T.V.Rao, Performance Management and Appraisal System Response
3.Dave, Indu, The Basic Essentials of Counseling, Sterling Pub. Pvt., Ltd., New Delhi
4.Carroll, Michal and Watso, Michael, Hand Book of Counseling in Organizations, Sage Pub., New Delhi
5.Mabey, Chirstopher and Salamanm Graeme, Stgrategic HRM, Beacon Books, New Delhi
6.Rao T.V., and PAreek, Udai(ed)., Redesigning Performance Appraisal System, Tata McGrew Hill Pub., New Delhi
7.Neale, Frances, Handbook of Performance Management, Jaico Pub., House, New Delhi
8.Benson, Gray, Stepping Up Performance, Jaico Pu., House, New Delhi

9.Walters, Mike, The Performance Management Handbook, Jaico Pub., House, New Delhi
10.Murphy, Kerin R., and Cleveland, Jeanette N., Understanding Performance Appraisal, Sage, London
11.David Wade and Ronald Recardo, Corporate Performance Management, Butterworth Heinemann, New Delhi
12.Kur Verweire etal, Integrated Performance Management, Sage, New Delhi.
Text Book : Perforamance Management Herm……..nnis Pearson Education ,2007
13. Performance Management Systems , UK Sahu,Excel Books
14.The Tale …..Management Hand Book A Berger & Dorothy R.Berger, Tata Mc-Graw Hill

435- Human Resource Management in Service Sector

Course Objective: The objective is to understand the maintaining and improving the service quality and performance in service sectors.

UNIT I :

Concept of Service: Types of Service, Service Management, Evolving Environment of Services, Myths about Service, Service as a System, Attitudes towards Service Sector, Reasons for growth of the Service sector.

UNIT II :

Nature of Service sector: Characteristics of Services, Elements of Customer Service, Components of Service, Identifying customer Groups, Service Process, Classification of Servicing operating systems, Balancing Supply and Demand, Challenges for service managers, People and service, Maintaining and Improving Service Quality and performance.

UNIT III :

Human Resource Management in Service Organizations: Concept, Functions, Utilization, Development, Environment, Organising HRM Functions in Service Sector, Competencies and service organizations, Performance Measurement, Empowerment in service organizations, Managing services across Boundries.

UNIT IV :

Application in HRM in service sector: HRM in Hospitals, Hotels, Insurance and Banking, other Financial Institutions, Ports and Docks, Managing Salary Levels, Working Conditions, Legal provisions, Unionism, Problems and Chalenges.

UNIT V :

HRM in IT Sector: Software Industry and BPO Sector, Wage Salary Levels, Working Conditions, Legal Provisions, Unionization, Distribution of Male and Female Workers, Gender Bias, Problems and Challenges.

Suggested Books

1. Balaji. B., Services Marketing and Management, S. Chand & Co. Ltd., New Delhi.
2. Haksever, Cengiz, Barry Pender, Roberta S.Russel and Robert G.Murdik, Service Management and Operations, Pearson Education (pte)ltd., New York.
3. Van Dierdonck van woy, Service Management An Integrated Approach, Financial Times/ Prentice hall of India, New Delhi.
4. Goyal.R.C., Human Resource Management in Hospitals. Prentice hall of India, New Delhi.

MBA (HRM)

MBA(HRM) Course Syllabus

I Semester

101: PRINCIPLES OF MANAGEMENT

Course Objective: On successful completion of the course the students should have :

a. To familiarize the students with management theory, functions, principles and practices of management.
b. Learnt the scientific decision making process and problems and solving techniques and also learn the modern trends in management.

Unit-I : INTRODUCTION

Management-Concept, Significance, Principles and Functions-Management and Administration – Managerial Skills- social responsibility of business, Management by Objectives(MBO) Management Thought.

Unit-II: PLANNING AND ORGANIZATION

Planning-Nature and Process of Planning- Flexibility of planning- Characteristics of sound plan-Decision Making-Nature of Decision Making-Process and Techniques-Organization-Levels -Organization Structures-Staffing Policies-Line and Staff Relations–Delegation, Centralisation and Decentralisation.

Unit-III : STAFFING

Nature and Importance of Staffing – Factors in Selecting Lower, Middle and Upper Level Managers – Skill and Personal Characteristics needed by Managers

Unit –IV: DIRECTING

Directing–Leadership-Leadership styles-Communication-Types of Communication-Motivation-Need Theories–Controlling–Types of Control-

Unit-V: CONTROL

Controlling-System of controlling- Methods, Tools and Techniques of control-Making Controlling Effective-Organising process-Departmentation Types-Making Organising Effective.

Reference Books

1. Agarwal R D Organisation and management – Tata McGrawhill.
2. Koontz and Weichrich Essentials of management – Tata McGrawhill
3. Aswathappa K. Human Resource and personnel Management, Text and cases-Tata McGrahills.

4. Sherlekar- S.A Management – Himalaya publishing house.
5. Robbins Stephen.p and Mary coulter – management – PH1 publisher.

102 - ORGANISATIONAL BEHAVIOUR

Course Objective: This course is designed to enable the students to understand the concepts, theories, processes and dynamics of human behavior in Organizations.

UNIT – I Organisational Behaviour: Meaning – Importance – Nature and Scope – Approaches – Key elements – Challenges and opportunities for O.B. – Contributing disciplines to O.B. – O.B. Models.

UNIT – II Individual: Individual Behaviour - Perception – Process, factors influencing perception – barriers in perceptual Accuracy – enhancing perceptual skills – Attribution - Learning – characteristics, theories and principles of Learning. Motivation – Theories of Motivation – Maslow, Herzberg, David Mcclelland and Porter and Lawler - Personality – Stages of Development, determinants of Personality.

UNIT – III Group Dynamics: Meaning, Determinants of group behaviour and types of groups – Group Dynamics – frame work of group behaviour. Developing inter – personal relations, Transactional Analysis – Johari Window.

UNIT – IV Organisational Culture: Organization Design, culture and climate. Creating an ethical organizational culture – Conflicts – Meaning, conflicts at individual, group and organisational level – sources of conflicts – functional and dysfunctional aspects – Strategies for conflict resolution.

UNIT – V Organisational Change: Organisational Change – change management and its dimensions, process. Pressures for change – resistance to change – overcoming resistance to change. Approaches to manage Organizational Change – Lewin's and Kotter's Plan for Implementing Change. – Organisational Development.

Suggested Books:

1. Fred Luthans, ***Organisational Behaviour,*** Tata McGraw Hill.
2. Stephen P.Robbins, ***Organisational Behaviour,*** Pearson Education, New Delhi, 2006.
3. Aswathappa.K., ***Organisational Behaviour*** , Himalaya Publishing House, New Delhi.
4. Donald R.Brown& Don Harwey, ***An Experimental Approach to Organisational Development,*** Pearson Education.
5. Sarma V. s. Veluri, Organisational Behavour, Jaico Publishing House.
6. Paton McCalman, ***"Change Management"***, Sage Publications.
7. VenkataRatnam, ***"Negotiaed Change",*** Sage Publications.
8. Jai, B.P.Sinha, ***"Culture and Organisational Behaviour"***, Sage Publications.
9. Arun Kumar N Meenakshi., Organisational Behavour, Vikas Publishing House.
10. Keith Davis & John Newstrom, *Human Behaviour at work*, Mc-Graw Hill.

103 – MANAGERIAL COMMUNICATION

Course Objective: To equip the student with the necessary techniques and skills of communication to inform others, inspire them enlist their activity and willing cooperation in the performance of their jobs.

Unit I Role of communication in Business – Objective of Communication – The process of Human communication, Communication barriers – Types of Communication; Written Communication – Oral Communication – Visual Communication, Audio Visual Communication – Silence – Developing Listening Skills – Improving Non- verbal Communication skills – Understanding Cultural Effects of Communication.

Unit II Managing Organization Communication – Formal and Informal Communication – Intra and Personal Communication – Models for Inter personal Communication – Exchange theory – Johari window and Transactional Analysis.

Unit III Managing motivation to influence interpersonal communication – Inter-personal perception – role of emotion in inter personal communication – communication styles – gateways to effective interpersonal communication.

Unit IV Business writing skills – Significance of Business Correspondence, Essentials of Effective Business Correspondence – Business Letter and Forms – Oral Presentations – Meetings, Telephone Communication - Use of Technology in Business Communication – E-Mail Messages.

Unit V Effective presentation and Interview Skills: Art of giving interviews in relation to placement appraisal interviews in selection and placement – Appraisal interviews – Exit Interviews – Web/ video conferencing and Tele-Conferencing.

Suggested Books:

1. K. Bhardwaj, Professional Communication, IK Int. Pub. House, New Delhi.
2. Krizan, Merrier, Logan and Williams, Effective Business Communication, Cengage, New Delhi.
3. HC Gupta, SG Telang, Business Communication, Wisdom, Delhi
4. Penrose, Business Communication for Managers, Cengage , New Delhi
5. McGrath, Basic Managerial Skills for All 5thEdtion, Prentice Hall of India.
6. Urmila Rai & S.M. Rai, Business Communication, Himalaya Publishers
7. Meenalshi Raman – Business Communication Oxford University Press
8. Lesikar I Flatley, Basic Business Communication, Tata McGrw Hill.

104: MANAGERIAL ECONOMICS

Course objective: To enable the students to understand the principles of micro economics relevant to managing an organization; to describe principles of macro economics to have the understanding of economic environment of business. This will enable the students to study functional areas of management.

Unit- I

Introduction: Nature, scope, uses, relation with traditional economics, operations research, Mathematics, Statistics, Accounting-responsibilities of a managerial economist, objectives of a firm, Basic tools in Managerial Economics-Opportunity cost principle, Incremental principle, principle of time perspective, discounting principle, Equi marginal principle.

Unit-II

Demand and Supply: Demand determinants, demand function, law of demand, assumptions, exceptions-demand distinctions/nature, elasticity of demand: price, income, cross, promotional,methods of foresting, Law of supply, determinants of supply, kinds of supply elasticity, methods of measuring elasticity of supply, cost concepts

Unit- III

Market Structure and Pricing Practices: Market structure: perfect, monopoly, monopolistic, oligopoly,nature of profit, theories, functions of profit, break even analysis-pricing methods, international price discrimination- dumping

Unit- IV

Production and Cost analysis: Production function with one variable input, two variable inputs, all variable inputs, managerial uses of production functions, ISO quant,internal,external,diseconomies of scale, concept of learning curve

Unit- V

Performance of an economy-Macro Economics: Business Cycles: features, phases, importance, Inflation: types, causes, effects, National income: measures, significance, capital budgeting, multiplier, accelerator. Fiscal and monetary policies

Reference Books

1. Managerial Economics Theory and Applications. Dr D.M.Mithani Himalaya publishers
2. Managerial Economics R.L Varshny, K.L Maheshwari sultan chand publishers
3. Managerial Economics analysis, problems P.L Mehatha sultan chand publishers
4. Managerial Economics D.N Dwivedi,Vikas Publishers
5. Managerial Economics and Financial Analysis P.Prem Chand Babu,M.MadanMohan,Himalaya
6.Managerial Economics H.L Ahuja S.Chand publisher

105: RESEARCH METHODOLOGY AND BUSINESS ANALYTICS

Course Objective: On successful completion of the course the students should familiarize with doing research work and analyzing big data which helps management in taking decisions.

Unit-I

Meaning and Definition of Research, Nature and importance of research the role of business research, aims of social research, research process, Quantitative and Qualitative Research, Types of Research, Research design, Importance of Research Planning, Meaning of research design, Functions and goals of research design, Pilot study and case study, Concepts of a Research plan, Induction and Deduction metho, Snapshot studies, cross sectional and longitudinal studies.

Unit-II

Meaning and definition of Data and importance, sources of primary and secondary data, tools for collection of primary data, report writing : Technical report, planning report writing , research report format, main body and appendices including bibliography, oral presentation.

Sampling techniques: Advantages and limitations of sampling, essentials of a good sample , probability sampling techniques: simple random sampling, stratified random sampling, systematic random sampling, cluster sampling, area sampling, non probability sampling techniques: convenience, judgment, quota, snowball sampling.

Unit – III

Business Analytics : Computer Uses In Daily Activities, - Emergence of Digital Firm – Evolution of Business Analytics – Differences of Business Intelligence and Analytics – Business Analytics Life Cycle, Process – Business Analytics as Solution for Business Challenges – Master Data Management: Data Warehousing – Data Mining – Meta Data – Data Marts – Data Integration – Concept of OLTP and OLAP.

Unit- IV

Measures of Central Tendency and Dispersion, Skewness and Kurtosis-Correlation Analysis: scatter diagram, positive and Negative correlation, limits for coefficient of correlation, Karl pearson's coefficient of correlation, Spearman's rank correlation, Properties of Correlation, Regression analysis: concept, least square fit of a linear regression, two lines of regression, Multiple Regresssion, Properties of regression coefficients, Curve fitting analysis.

Unit- V

Statistical Inference: Introduction to null hypothesis Vs alternative hypothesis. Tests of hypothesis, procedure for testing of hypothesis, tests of significance for small samples, application, T-test, F-Test, Chi-square test, ANOVA one way and two way classifications.

Reference Books

1. N.D. vohra, 2001, Quantitative Techniques in management, Tata McGraw Hill, 2ndnedition.
2. Barry Render, Ralph M. Stair, Jr. and Michael E. Hanna, 2007, Quantitative analysisfor management, 9th Edition, Pearson publication
3. Gupta S.P. Statistical Methods. Sultan chand and sons, New Delhi.2005
4. C.R. Kothari, Research Methodoloty: Methods and Techniques, 2/e, Vishwa Prakashan, 2006.
5. Willam G. Zikmund, Business Research Methods, Thomson, 2006.
6. Carver & Nash, Data Analysis with SPSS, Cengage, New Delhi
7. James R.Evans, Business Analytics Methods, Models and Decision, Pearson, 2015
8. Shashi K.Gupta & Praneet Rangi Kalyani Pub. Business Analytics

106 – ACCOUNTING FOR MANAGERS

Course Objective: To develop an insight of concepts, principles and techniques of accounting, costing and utilization of financial and accounting information for planning, and decision-making

UNIT-I Introduction to Accounting: Book-Keeping – Branches of Accounting - Financial Accounting – Cost Accounting – Management Accounting – Need of Accounting - Objectives of Accounting – Systems of Accounting – Users of Accounting Information - Principles of Accounting - Accounting Concepts and Conventions – Accounting Standards (Fundamental Level) – Classification of Accounts – Journal – Ledger - Trial Balance – Errors in Trial balance (Theory and Problems).

UNIT-II Presentation of Financial Statements: Capital and Revenue items – Construction and Analysis of Trading, Profit & loss account and Balance Sheet – Bank Reconciliation Statement – Inventory Valuation and Depreciation – Accounting for Intangible Assets (Theory and Problems).

UNIT-III Financial Statement Analysis: Meaning – Tools of Financial Statement Analysis – Comparative Statement Analysis – Common-size Statement Analysis - Trend Analysis – Ratio Analysis – Funds Flow Statement Analysis – Cash Flow Statement Analysis (Theory and Simple Problems).

UNIT-IV Cost & Management Accounting: Costing – Elements of Costing – Classification of Costs – Cost Sheet - Marginal Costing – CVP analysis – Break Even Analysis – Standard Costing and Variance Analysis (Theory and Simple Problems).

UNIT-V Budgeting: Budget and Budgetary Control – Principles and methods – Types of budgets – Preparation of Fixed, Flexible, Cash, Master and Zero Based Budgets (Theory and Problems).

Contemporary Developments: Inflation accounting – Human Resource Accounting – Responsibility Accounting (Theory).

REFERENCES:

1. G .Prasad & V. Chandra Sekhara Rao, Accounting for Managers, Jai Bharat publications, Guntur.
2. Jelsy Joseph Kuppapally – Accounting for Managers – PHI (2008).
3. Ramachandran and Kakani, "Financial Accounting for Management", TMH, New Delhi.Jawaharlal, Accounting for Management, Himalaya, Mumbai
4. Khan and Jain, Management Accounting, Tata Mc Graw Hill, Delhi.
5. Maheswari S.N: Advanced Accountancy, Vikas Publishing House. ND
6. Grewal T.S. Introduction to Accounting, 2009, S Chand Publishers
7. RajniSofat, Preeti Hiro – Basic Accounting – Prentice Hall of India, 2008.
8. Dr. Maheswari, S.N., Accounting for Management, Sultan Chand Publishing House Pvt. Ltd., New Delhi.
9. Jain S.P, Narang K.L and Simmi Agarwal, "Accounting for Managers", Kalyani Publishers, New Delhi.
10. Wild. J.J., Subramanyam, K.R. Halsey, R.F., Financial Statement analysis, Tata McGraw Hill.

107: INFORMATION TECHNOLOGY FOR MANAGEMENT

Course Objective: The primary objective of this course is to familiarize the student with basic concepts of information technology and their applications to business processes. To elevate students' awareness of information technology and develop an in depth and systematic understanding of key aspects of IT Management.

UNIT I

Introduction and definition of computer – History – Major components of a computer system – Interfacing with a computer – organisation structure - types – Introduction to computer languages – Translators : Compiler – Interpreter and Assembler. Operating Systems: Definition, Functions, Types and Classification – Elements of GUI based operating system – Windows – Use of menus – tools and commands of windows operating system – Linux and free and open software; Computer Networks: Overview and Types (LAN, WAN and MAN) – Network topologies – Internet; Data representation and computer security.

UNIT II

MS OFFICE : Applications and Features. MS Word – editing a document – Formatting – Spell Checking – Page setup – Using tabs, Tables and other features Mail Merge

UNIT III

MS-PowerPoint : Features – Slide Preparation – Home – Insert – Design – Animation – Slide Show – Review – View menu Options – Applications of MS-PowerPoint.

UNIT IV

DBMS – Concept – Advantages and Applications; MS-Excel : Basics - Home – Insert – Page Layout – Formulas – Data – Review – View Menu Options – Advantages of MS- Excel.

UNIT V

Information Technology for Management : Concept – Multimedia - Image processing systems and Document Management Systems – Trends in IT – Information Technology Systems – Contemporary Approaches to Information Systems – Relationship between Information Systems – Role of IT in Transaction Processing – Computer Aided Software Engineering (CASE) – Decision of IT for proper Management of the Organisation.

REFERENCE BOOKS

1. Rohit Khurana, Introduction to Information Technology, Pearson Education.
2. ITL education: Introduction to Computer Sciences, Pearson Publishers
3. Hunt and Shelly: Computers and commonsense, PHI publishers.
4. Dhiraj Sharma, Information Technology for Business, Himalaya Publishing House.

II Semester

201: MARKETING MANAGEMENT

Course Objective: The course is designed to obtain knowledge and understanding of the key concepts of marketing and enables to apply to the practical situations in workplace.

Unit-I

Introduction to Marketing: Definition, Nature, Scope and importance of Marketing – Marketing Concepts – Marketing Vs Selling –Marketing Mix- Marketing Environment: Meaning, Significance of Scanning Marketing Environment, Components of Micro environment, Macro environment.

Unit-II

Analyzing Marketing opportunities: Consumer behavior-Meaning- factors influencing buying behavior-consumer decision making process, Segmentation: Need- Benefits - Bases of segmentation – Target market – Product differentiation- Product Positioning, Marketing Research - Concept - Objectives - types - Process – Merits and Demerits.

Unit-III

Developing Marketing Strategies: Concept of Product- Product Classifications- Product Mix- New Product development - Product Life Cycle and Marketing Strategies, Designing Marketing Strategies for: Market leaders – Challengers - Followers and Nichers. Branding: Essentials of a good brand - types of brands - Packaging and labeling.

Unit-IV

Planning Marketing programs: Objectives - factors affecting pricing decisions- pricing methods- Pricing Strategies for existing products and New products. Channels of Distribution: Definition, Need and Types of Channels, Channel Management Decision – Retailing – Types of Retailers – Retailer Marketing Decisions – Trends in Retailing, Wholesaling.-The growth and types of wholesaling – Wholesaler Marketing Decisions – Trends in Wholesaling.

Unit-V:

Marketing Communication: Concept – importance – Promotional Mix: Advertising - Sales promotion - Personal Selling - Public Relations – Recent trends in Marketing: Social Marketing – Ambush Marketing – Green Marketing – Emotional Marketing – Online Marketing.

Reference Books

1. Marketing Management, R.S.N Pillai, Bagavathi, S.Chand
2. Business Marketing Management: B2B, Hutt & Speh, Cengage Publisher
3. Marketing Management Text & Cases, Indian Context Tapan K Panda, Excel Publisher
4. Principles of Marketing Kotler Armstrong PHI Publisher
5. Marketing Management, Rajan Saxena .TMH Publisher

202: HUMAN RESOURCE MANAGEMENT

Course Objective: To equip the students with basic concepts, methods, techniques and issues of Human Resource Management and the various functions of HRM including Quality of Work Life in the liberalized environment**.**

Unit-I : **HUMAN RESOURCE MANAGEMENT**

Human Resource Management- Concept, Scope, Philosophy, Significance, Objectives, Functions-Organizing HRM function-HR Planning-Job analysis, Job description, Job specification.

Unit-II: **RECRUITMENT**

Recruitment : Sources of recruitment, methods of recruitment, Selection procedure, selection tests, Placement and follow up-performance appraisal system, importance, objectives, techniques.

Unit-III: **TRAINNING AND DEVELOPMENT**

Training: Objectives, determining training needs and developing an efficient training mechanism, evaluation, career planning and developing methods.

Unit-IV: **JOB EVALUTION**

Job Evalulation techniques, Employee welfare and social security measures, grievance management, importance process and practices.

Unit – V**: QUALITY OF WORK LIFE**

Meaning, Conditions, Specific issues in QWL – Strategies for Improvement of QWL . Changing Role of HR –HRM Accounting – HRIS and HR Audit – HR in Knowledge Era.

Reference Books

1.Personnel Manaement Text and Cases C.B. Mamoria, S.V. Gankar, Himalaya publications
2.Human Resource Management text and cases V.S.P. Rao, Excel Books.
3.Human Resource Management Text and cases K. Aswathappa, McGraw-Hill
4.Human Resource Management Garry Dessler, Pearson Education.

203 – FINANCIAL MANAGEMENT

Course Objective: The Course aims at familiarizing the participants with the skills related to basic principles, tools and techniques of Financial Management.

UNIT – I Foundations of Finance: Introduction to Finance – Financial Management – Nature and scope of Financial Management – Functions of Financial Management – Objectives of Financial Management – Profit Maximization v/s Wealth Maximization – Role of Financial Manager – Time Value of Money – Agency Conflict.

UNIT – II Investment Decision: Nature and significance of Investment Decision – Estimation of Cash Flows – Steps in Capital Budgeting Process – Evaluation techniques – Traditional techniques – Payback period – ARR - Discounted Cash Flow techniques – NPV – Profitability Index – IRR – Discounted Payback Period (Theory & Problems).

UNIT – III Financing Decision: Sources of Finance – Short-term sources – Long-term sources - Concept of Leverage – Operating Leverage - Financial Leverage – Combined Leverage - Measurement of Leverages.

Capital Structure: Concept - Assumptions and Definitions – Factors determining Capital Structure – Tools for designing optimum capital structure – EBIT-EPS analysis – Financial BEP and Indifference Curve analysis – CAPM - Capital Structure theories – Net Income Approach – Net Operating Income Approach – M-M Hypothesis – Traditional Approach (Theory only).

Cost of Capital: Concept – Elements of Cost of Capital – Cost of Equity – Cost of retained earnings – Cost of Preference Shares - Cost of Debt – Weighted Average Cost of Capital (Problems).

UNIT – IV Liquidity Decision: Concept of Working Capital – Components of Working Capital - Approaches for Working Capital financing - Determinants of Working Capital – Operating Cycle - Estimation of Working Capital requirements. Management of Cash – Facets of cash management – Motives for holding cash. Receivables Management – Credit policy – Credit standards and analysis. Inventory Management – Nature of inventories – Need to hold inventories – Inventory management techniques – EOQ – ABC analysis.

UNIT – V Dividend Decision: Meaning – Forms of dividends - Concept of relevance and irrelevance theories – Walter's Model – Gordon's Model – MM Hypothesis – Factors determining Dividend Policy (Theory).

REFERENCES

1. Sheeba Kapil. Financial Management, Pearson, 2011.
2. Jonthan Berk Financial Management, Pearson, 2010.
3. Van Home. James C. "Financial Management", Prentice Hall of India (P) Ltd, New Delhi.
4. Salmon,Ezra and Pringle, John.J. "An Introduction to Financial Management ", Prentice Hall of India (P) Ltd, New Delhi.
6. Khan, M.Y. & Jain P.K "Financial Management", Tata McGraw Hill Pub. Co. Ltd New Delhi.
7. Panday, I.M. "Financial Management", Vikas Publishing House (P) Ltd.
8. Chandra, Prasanna "Financial Management", Tata McGraw Hill pub.Co.Ltd, New Delhi.
9. Tulsian, P.C. "Financial Management", S. Chand.
10. Alice C Lee, J C Lee, C F Lee "Financial Analysis, Planning and Forecasting", Cambridge University Press.

204: PRODUCTION MANAGEMENT

Course Objective: The Objective of the course is to enable students to understand the production Planning and Controlling aspects of a typical production and operations organization.

Unit-I

Production Planning: Production system, objectives, classification: job shop, batch, continuous, cellular,production planning: tactical, operational, strategic, maintenance management: functions, objectives, types, productivity, ergonomics in product design, concurrent engineering

Unit-II

Design of Work systems: Work study: method study and Work Measurement, objectives of work study, work study procedure, time study, comparison of various techniques, pre determined motion time

Unit-III

Flow shop scheduling: Shop floor planning: Johnson's rule, extension of Johnson's rule, CDS Heuristics, LOB, line balancing,Inventory management: objectives, techniques, Facility location: errors in selection, steps in location selection, relative importance of location factors, facility layout , factors influencing, types of layout

Unit-IV

Quality Management: Quality relevance and role, factors controlling quality, impact of poor quality, statistical process control: process, types of variations, implementation of statistical process control, Control charts- types, acceptance sampling, quality circles: structure, vendor analysis

Unit V

Modern production management Tools: Just in time manufacturing-overview, basic principles, benefits, push/pull production, kanban system, Total quality management-scope, benefits, fundamental factors affecting quality, ISO 9000 series-benefits, steps in ISO 9000 registration, Business process reengineering-characterstics,need,advantages,Lean manufacturing: steps,components,Quality function deployment.

Reference Books

1.Production Management, Martand T. Telsang S.Chand Publishers
2.Production and Operations Management K.Aswathappa,K.Shridhara Bhat Himalaya Publishing House
3.Production and Operations Management R.Pannerselvam PHI publishers
4.Production and Operations Management S.N Chary Mcgraw Hill
5.Production and Operations Management -Text and cases Upendra kachru,Excel Books

205: OPERATIONS RESEARCH

Course Objectives: This module aims to introduce students to use quantitive methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems.

Unit-I

Definition, Importance of Operations Research for Management, Nature of Operations Research, Scientific method in operation research, Characteristics and phases of Operations Research, Classification of models, Principles of modeling, Problem models of Operations Research, scope and limitations. Linear programming: formulation, terminology, applications of LPP, advantages and limitations of LPP Graphical solutions, Simplex method, Big-M method and two phase method.

Unit-II

Transportation problem, formulation, optimal solution, unbalanced transportation problem, Degeneracy, definition of Assignment problem, mathematical formulation of the assignment problem, differences of transportation and assignment , Hungarian method, unbalanced assignment problem , traveling salesman problem, solutions.

Unit-III

Network Analysis, Activity, merge event, burst event, looping, dangling, Redundancy, project Management by PERT/CPM, project crashing, PERT analysis and Computations, differences of PERT/CPM.

Unit-IV

Game theory; concepts, Characteristics, pay off matrix, maximin-minimax principle, saddle point, Dominance, Zero-sum game, two, three and more persons games, analytical method of solving two person zero sum games, mixed strategies of S_A ,S_B and value of the game, graphical solutions for (m×2) and (2× n) games, linear programming method of simplex method in game theory, Iterative method.

Unit – V

Simulation: Meaning – Definition of Simulation – Types of Simulation – Advantages and Disadvantages of Simulation – Event Type of Simulation – Monte – Carlo Simulation – Generation of Random Numbers – Simulation of Queueing System – Simulation of an Inventory System – Simulation Languages.

Reference Books

1, Shenoy, G.V. Srivastava, V. K. and Sharma S.C., "Operations Research for Management".
2. Kantiswaroop, Man Mohan and Gupta, Operations Research.
3. Goel and Mittal, Operations Research.
4. Sharma S.K. k.,Operations Research.
5. Hamdy, A. Taha:Operations Research: An introduction, prentice Hall of India New Delhi, 2007.
6. R.Panneerselvanm PHI 2nd Ed. Operations Research

206: INFORMATION SYSTEMS FOR MANAGEMENT

Course Objective : The primary objective of this course is to familiarize the student with basic concepts of management information system and its applications to business processes. To elevate students' awareness of Information Systems and develop an in depth and systematic understanding of key aspects of IS for Management.

UNIT I

Introduction: System : Definition - Types of System - Information System : Types – Management Information System (MIS) : Meaning – Importance – Need - Characteristics – Organizational Structure of MIS – Role of the Management Information System - Impact of the Management Information System – Applications of MIS – The logic of MIS – Major MIS Elements – Technology of MIS.

UNIT II

System Development Life Cycle (SDLC) : Stages in developing SDLC – Information System Development Life Cycle – System Design – Flow Chart - Prototyping: Steps in Prototyping – Development and Implementation of the MIS - Software Development : Importance and Steps, Outsourcing: Types and Importance.

UNIT III

Structured System Analysis and Design (SSAD) – The Major Business Systems – Five Basic Elements of a Business organisation – Business Systems – objectives of a business organisation – Synergism – Tools and Techniques for System Development – System Implementation.

UNIT IV

Concept of Decision Support System (DSS) – Meaning – Architecture – Characteristics – components – structure of DSS – conceptual model of DSS – DSS Tools – DSS software - MIS and the role of DSS – Concept of Group Decision Support System (GDSS) – Components – GDSS model - Concept of Executive Support System (ESS) – Components – Architecture - Knowledge Management : Concept - Importance - Approaches – Issues – Types of knowledge Management - HR Contribution to Knowledge Management – Artificial Intelligence System – Benefits of Expert system – limitations – Domains of Artificial Intelligence.

UNIT V

Functional Information Systems: Marketing Information System – Concept – Components – Architecture - Financial Information System – Concept – Components – Architecture - Human Resource Information System – Concept – Components – Architecture - Manufacturing Information System – Concept – Components – Architecture - Strategic Information System – Concept – Components – Architecture.

REFERENCE BOOKS

7. Kenneth C. Laudon and Jane P. Laudon: Management Information System, Eighth edition Prentice Hall of India.
8. Jawadekar W.S., Management Information System, TaTa McGraw Hill Publishing Company Limited, New Delhi.
9. James A.O Brien: Management Information Systems, TaTa McGraw Hill Publishing Company Limited, New Delhi.
10. Effy OZ, Management Information System, Vikas Publishing House.

11. Gordon B. Davis and Margrethe H. Oison, Management Information System, TaTa McGraw Hill Publishing Company Limited, New Delhi.
12. C.S.V. Murthy: Management Information System, Himalaya publishing House

207 – BUSINESS ENVIRONMENT

Course Objective: The present course aims at familiarizing the students with various aspects of economic, social, political and cultural environment of India. This will help them in gaining a deeper understanding of the environmental factors influencing Indian business organizations and also the students understand the legal and regulatory framework for doing business in India.

UNIT – I Business Environment: Meaning – Importance – Nature – Environmental Factors – Changing the dimensions of Business environment – monitoring techniques of environmental scanning

UNIT – II Socio – Cultural and Technological Environment: Elements of Socio – Cultural Environment: Impact on Business – Culture and Sub culture pattern – Social responsibility of business – Technology upgradation – technology transfer – Technological Policy.

UNIT – III Economic and Political Environment: Significance and elements of economic environment – economic system – economic planning in India – Industrial Policy – New foreign trade policy – liberalization – privatization and globalization – Demonetization – Monetary and Fiscal policy – EXIM policy – critical elements of political environment.

UNIT –IV Legal Environment of Business: Political Institutions – Legislature, Executive and Judiciary – Changes of Legal Environment in India – Intellectual Property Rights – Major regulations pertaining to business.

UNIT – V Business Legislations: Consumer Protection Act 1986 – SICA Act – 1985 – FEMA Act 1999 – IT Act 2000 – Competition Act 2002 – MSME Act 2006.

Suggested Books:

1. Francis Cherunilam, ***Business Environment***, Himalaya Publishing House, Mumbai.

2. Fernando, A.C., ***Business Environment***, Pearson.

3. Suresh Bedi, ***Business Environment,*** Excel Books, New Delhi,

4. Adhikary.M. ***Economic Environment of Business***, Sultan Chand & Sons, New Delhi.

5. Aswathappa.K., ***Essentials of Business Environment***, Himalaya Publishing House, Delhi.

6. Justin Paul, ***Business Environment***, Text and Cases, Tata McGraw Hill.

7. Krishna Rao,P, ***WTO-Text & Cases***, PSG Excel Series.

8. R.S.N. Pillai and Bagavathi, "***Legal Aspects of Business***", S.Chand, New Delhi.

9. H.L.Ahuja, "***Economic Environment of Business"*** S.Chand, New Delhi.

10. G.Prasad, ***Business and Corporate Laws***, Jai Bharathi Publishers.

NON CORE PAPER (for other Departments)

209: FUNDAMENTALS OF BUSINESS MANAGEMENT

Course Objective: To familiarize with basic fundamentals of management and to induce knowledge in various functional areas of management.

UNIT – I:

Fundamentals of Management: Concept – Significance – Functions – Principles - Role and Responsibilities of a Manager – Management is an Arts Or Science – Concept of MBO – Management vs Administration – Advantages - Limitations.

UNIT-II

Introduction to Business: Concept - Nature – Features – Types of Business – Business Vs Trade – Business Communication and its importance – Goal setting – Types of Strategies.

UNIT – III:

Marketing Management: Concept of Marketing –Nature – Scope – Distinction between Marketing and selling – Marketing Mix – Steps in New Product Development – Product life Cycle – Process of Marketing Research – Marketing Strategies – e-Marketing – Social Marketing.

UNIT-IV:

HRM: Concept – Nature – Objectives – Significance - functions – Role of HR Manager – HR Planning – Recruitment Process – Sources of Recruitment – Methods of Recruitment – Job Induction – Job Description - Job Specification – Job Analysis – Job Evacuation Process – Training and Development – Career Planning and Development Methods – Leadership – Motivation – Stress Management.

UNIT- V:

Financial Management: Concept – definitions – Nature – Scope – Objectives – Significance – Financial Decisions – Sources of Finance – concept of Cost of Capital Importance – classifications of costs – Computation of Specific Source of fund cost – WACC Concept of working capital Management – Objectives – Sources of W.C – Kinds of W.C – Components of W.C – Importance – Operating cycle – Cash Conversion cycle – Estimation of working capital – Dividend Policy – Issue of Dividend and Bonus Shares.

Reference Books:

1.Philip Kotler, Marketing Management, Pearson Education.
2.Heinz Weirich and Harold Koontz, Management, TMH.
3.I.M.Pandey, Financial Management, Vikas Publishers.
4.Garry Dessler, Human Resource Management, Pearson Edition.

III Semester (MBA)

301: BUSINESS LAW

Objective: The course aims to acquaint students with various laws governing business operations in India.

Unit – I

The Indian Contract Act – 1872 : Nature of a Contract - Classification of Contracts - Essentials elements of valid Contract — Capacity of parties – Free Consent - Contingent Contracts – Performance of Contract - Discharge of Contracts – Breach of Contract and its Remedies.

Unit – II

Negotiable Instruments Act – 1881: Meaning - Characteristics– Promissory Note – Definition- Characteristics, Bills of Exchange: Definition – Characteristics – difference between promissory note and Bill of exchange, Cheque: Definition – Characteristics – differences between Cheque and Bill of exchange – Crossing of Cheque - Types of Endorsements, Electronic funds transfer terminology– NEFT, MICR, RTGS, CTS.

Unit- III

Sale of goods Act – 1930: Meaning of Contract of Sale of Goods- Essential Elements of Contract of Sale, Conditions and Warrantees; Performance of Contract of Sale, Unpaid Seller- Concept - Rights of Unpaid Seller. **Indian Partnership Act – 1932**: Elements of partnership - Constitution of Partnership - Forms of partnership - Types of partners– Rights, Duties and Liabilities of Partners.

Unit-IV

The Companies Act – 2013 : Meaning of a company - Characteristics - Types of Companies – Steps and Procedure for incorporation of the Company – Memorandum of Association - Articles of Association - Prospectus – Shares: Meaning- Types of Shares, Company Management: Company Meetings - types Resolutions- types , Prevention of Oppression and Mismanagement of Company.

Unit –V

Income Tax Act – 1961 (Theory only) :Meaning – Characteristics - Purpose of Income Tax, Terminology of Income Tax: Income- person– Assessee - Assessment Year- Previous year – Residential Status, Gross Total Income – Advance Payment of Tax: Concept- Procedure , Tax Deducted at Source – Assessment Procedure.

Reference Books

1. Bansal, C.L., Business and Corporate laws, 1st Edition, Excel Books, 2006.
2. Maheswari, S.N., Maheswari, Business Regulatory Framework, Himalaya Publishing House, 2006.
3. Lal, B.B., & Vashisht, N., Direct Taxes, Latest Edition, Pearson Education, 2009.

4. Kapoor, N.D., Mercantile law, Sultan Chand & Sons, 2006.

302: ENTREPRENEURSHIP & SMALL BUSINESS MANAGEMENT

Course Objective: The objective of this course is to create conceptual understanding of the topic among the students and comprehend the environment of making of an Entrepreneur and to develop perspective understanding of startups and MSMEs in the Indian context.

Unit – I Entrepreneur and Entrepreneurship: Evolution of the Concept of Entrepreneur – Characteristics of an Entrepreneur – Distinction between an Entrepreneur and Intrapreneur and a Manager – Functions of an Entrepreneur – Types of entrepreneurs, Concept of Entrepreneurship – Functions, Problems, Entrepreneurial process – Growth of Entrepreneurship in India – Recent Trends of Women Entrepreneurship – Meaning of and Need for Rural Entrepreneurship – Problems and Development of Rural Entrepreneurship.

Unit II Startup Ideas and Opportunity Assessment: Importance of Ideas – Sources of startup Ideas – Techniques for generating ideas – Steps in potential ideas – Opportunity Recognition- sources and process – Development of Programmes E – Business Ventures – Importance of Financial Management – Project Feasability Study.

Unit – III MSME Enterprises: Definitions, Characteristics – Relationships of MSME – Relationship with large units – Export Oriented Units - Rationale – Objectives – Scope of Small Enterprises – Opportunities for an Entrepreneurial career – Role of Small Enterprises in Economic Development – Causes and Symptoms of Sickness – Cure for Sickness.

Unit IV Project preparation and Financing Ventures: Meaning of and Preparation ofProject – Importance of Report – Content; Guidelines for Report preparation – Network Analysis – PERT and CPM – Sources of Finance – Concept of working Capital and Estimation – Seed Capital – Venture Capital.

Unit V Institutional support to Entrepreneurs: Commercial Banks – Other major financial institutions – Central LevelInstitutions – KVIC; SIDO; NSIC : National Productivity Council (NPC); EDII – State Level Institutions – DIC – SFC-state Small Industries Development Corporation (SSIDC) – IndustryAssociations – Confederation of Indian Industry(CII) ; Federation of Indian Chamber of Commerce Industry (FICCI); Associated Chambers of Commerce and Industry of India (ASSOCHAM)

Suggested Books:

1. Vijay Sathe, “Corporate Entrepreneurship” 1st edition, 2009, Cambridge
2. S.S. Khanka, “Entrepreneurial Development”, 2007, S. Chand & Co. Ltd.
3. Vasanth Desai, “Dynamics of Entrepreneurial Development and Management”, 2007, HPH,Millenium Edition.
4. Dr. Vasant Desai, “Small Scale Industries and Entrepreneurship”, 2006, HPH.
5. P. Narayana Reddy, “Entrepreneurship – Text and Cases”, 2010, 1st Ed. Cengage Lerning.
6. David H. Hott, “Entrepreneurship New Venture Creation”, 2004, PHI.
7. E – Book, MSME at a glance – English version, Ministry of MSME.
8. Jaynal Ud – Din Ahmed and Abdul Rashid, MSME in India, New Century Publications.

303: TOTAL QUALITY MANAGEMENT

Course Objectives: This course is designed to learn the fundamentals of Total Quality Management with emphasis on quality philosophies and tools in the managerial perspective.

UNIT- I: Total Quality Management: Definition of quality – Dimensions of quality – Quality planning – Basic concepts of total quality management – Historical review – Principles of TQM – Leadership – Customer Satisfaction –Service Quality – Gurus of TQM – TQM Framework.

UNIT- II: Management Tools: Forced Field Analysis – Affinity Diagram – Just in time –Quality Circles – Cost Benefit Analysis – Flow Charts – Run and Control Charts – Check Sheets – Histograms – Scatter Diagrams – Cause and Effect Analysis – Process Simulation.

UNIT- III: Tools for Quality: Benchmarking – Quality Function Deployment – Quality By Design – Failure Mode and Effect Analysis – Total Productive Maintenance – ISO 9000 – ISO 14000.

UNIT- IV: Six Sigma: Definition -–– Competitive Advantage -- Implementation of Six Sigma – Design for Six Sigma and Tools.

UNIT- V: Business Process Reengineering: Introduction – History and Development of Business Process Reengineering – Principles of Reengineering – The Reengineering Process – Quality and Reengineering.

Suggested Books:

1. Besterfiled, D.H. "Total Quality Management", Pearson Education, Inc. 2003.
2. Zeiri., "Total Quality Management for Engineers", Wood Head Publishers, 1991.
3. Evans, J. R., and Lidsay, W.M., "The Management and Control of Quality", 5th Edition, South-Western (Thomson Learning), 2002.
4. Oakland.J.S. "Total Quality Management", Butterworth – Hcinemann Ltd., Oxford, 1989.
5. Narayana V. and Sreenivasan, N.S., "Quality Management – Concepts and Tasks", New Age International, 1996.
5. Kanishka Bedi., "Quality Management", Oxford University Press, 2006.

331: HUMAN RESOURCE DEVELOPMENT

Course Objective: The course aims to equip students to develop themselves into a critically reflective and capable HRD practitioner, or a manager who can facilitate the learning of others. The major objective of the course is to explain and demonstrate the contribution of HRD in an organization and enable student to develop an ability to decide learning and training needs and have competence in the design and delivery of learning programmes.

Unit – I

Human Resource Development: concept, Origin and Need for HRD; Objectives of HRD,HRI System, Systems approach to HRD: Approach to Activity Areas of HRD; HRD Interventions ; Performance appraisal, Potential Appraisal, Feedback and Performance coaching, Career Planning , Employee Welfare and Quality of Work Life, HRD Climate;HRD Audit.

Unit – II

HRD –Trends: Organization Development: OD Concept, Definitions, Characteristics ,Features of OD, OD Interventions, Approaches to OD Change Lewins Three- Steps Model, ; Assessment Centre HRD Experience in Indian Organizations, Important Challenges to Organizations, Roles of HRD Professionals Future of HRD.

Unit – III

Human Resource Training : Concept and Importance: Assessing Training Needs: Process of Training; Designing and Evaluating, Training and Development Programmers, Organizational Culture, Types, Developing Right Culture, Work Place Jealousies and Policies, Work place Spirituality for Cooperation and Peace.

Unit – IV

Types and Methods of Training On the job Training, Off the job Training , Training Methods, Lecture, Role Play, Reverse Role Plays, Rotation Role plays, Managing Diversity for HRD, Behavior Modeling, Brain Storming Case Study.

Unit – V

HRD Applications and HRD in Practice: Quality Circles Management Development and OD : HRD & OD : HRD in Large, small, Manufacturing and Service Organizations, Global Developments and Implications for HRD in India, HRD outsourcing, BPO, ITES.

Reference Books

1. Rao, T.V., Human Resource Development, Sage publications, New Delhi.
2. T.V. and Pareek, Udai, designing and managing Human Resource Systems; Oxford and IBR Pub. Ltd., New Delhi.
3. Nadler, Leonard, Corporate Human Resource Development, Van Nostrand Reinhold/ASTD, New York.
4. ILo, Teaching and Training Methods for Management Development Hand Book McGraw Hill, New York.
5. Graig, Robert l. and bittel Lester R.(ed), Training and Development Development Hand Book McGraw Hill,New York.

6. Rao T.V.(et),HRD in the New Economic Environment, TMH ,New Delhi.
7. Dr. D.K.Bhattacharya, HRD, Himalaya Publishing New Delhi
8. T.D.Tiwari and Anjuthakker, Wisdom Publications,
9. A.M.Shakhi, HRD
10, Gupta & Gupta . HRD, Deep & Deep Publications

332. MANAGEMENT OF INDUSTRIAL RELATIONS

Course Objective: To enlighten the students with the Concepts and Practical applications of Industrial Laws and Employee relations.

Unit – I: Industrial Relations: Scope and Significance – Evolution of Industrial Relations in India and comparative analysis with USA and UK– Recent Trends in Industrial Relations – Approaches to Industrial Relations – Theories of Industrial Relations.

Unit – II: Promotion of Harmonious Relations – Machinery for Prevention and Settlement of Industrial Disputes – Conciliation – Arbitration and Adjudication – Code of Discipline and Code of Conduct; Industrial Disputes Act 1947.

Unit – III: Collective Bargaining (CB) – CB Practices in India – Participative Management Forms and Levels – Schemes of Workers' Participation in Management in India – ILO and its impact.

Unit - IV: Trade Unions: Concept, Growth, functions and Objectives of Trade Unions - Trade Union Movement in India, UK and USA - Changing Role in the Context of Liberalization - Trade Union Act 1926.

Unit-V: Trade Unionism in India: Problems of Trade Union; Recognition, Leadership, Political involvement, Union rivalry; National trade Union Federations; Emerging Trends in Trade Unions in India.

Suggested Books:

1. Venkat Ratnam, C.S. – Industrial Relations, Oxford University Press.

2. SC Srivathava, Industrial Relations and Labour Laws, Vikas, New Delhi.

3. M.Arora: Industrial Relations, Excel Publications.

4. P.R.N.Sinha, Indu Bala Sinha and Seema Priyadarshini Shekar, "Industrial Relations, Trade Unions and Labour Legislation", Pearson Education, New Delhi.

5. Ramaswamy E.A. – The Strategic Management of Industrial Relations, Oxford University Press.

6. Cowling and James, The Essence of Personnel Management and Industrial Relations, Prentice Hall of India.

7. Ratna Sen, "Industrial Relations in India", Macmillan India Ltd. New Delhi.

8. Michael Armstrong, Employee Reward, Universities Press (India) Ltd.

333 - Employee Compensation and Administration

Course Objective: Explain how perceptions of compensation differ among society, stockholders, managers and employees. Understand the concept of a compensation strategy, where it comes from, how it relates to the organization's situation**.**

UNIT I :

Employee compensation: Concept and Significance: Wage Concept: Wage , Salary , Minimum Wage, Living Wage, Need-Based Minimum Wage, Money Wage and Real wage; Wage policy in India ; Theories of wages.

UNIT II :

Wage Administration Principles: Factors influencing Wage Fixation and Methods, wage Differentials: Occupational , skill, Sex, Inter-Industry, Regional and Sectional.

UNIT III :

Wage Fixation Mechanisms: Statutory Wage fixation, Wage Boards, Collective Bargaining , Adjudication, Pay Commission; Wage Fixation in Public Sector.

UNIT IV :

Incentives : Principles and procedures for installing incentive system; Types of wage Incentive System, Wage incentive Schemes in India, working of incentive schemes, Linking wage with productivity; Fringe Benefits: Concepts and Types.

UNIT V :

Wage and salary policies in Organization: Role of HR Department in wage and salary Administration, Managerial compensation, Perquisites and special Features; Recent trends in managerial compensation in Indian Organizations and MNC's.

Suggested Books :

1. Subramanian, K.N., Wages in India, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
2. Sarma. A.M, Understanding Wages Systems, Himalaya Publishing House, Mumbai.
3. Varma, Promad, Wage Determination: concepts and cases, Oxford IBH publication. Ltd New Delhi.
4. Chatterjee, N.N., Management of Personnel of in Indian Enterprises. Allied Books agency, Culcutta.
5. Aswathappa. K., Human Resource and Personnel Management. Tata Mc Graw Hill Publishing Co.,

334: EMPLOYEE WELFARE AND LABOUR ADMINISTRATION

Course Objective: To enlighten the students with the Concepts and Practical applications of employee welfare and labour administration.

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Unit – I : LABOUR WELFARE

Labour Welfare : Concept, Scope and Philosophy of Lab our Welfare; principles of Lab our Welfare: Indian Constitution and Labour Welfare Historical Development of Lab our Welfare in India:

Unit – II: ILO

Impact of ILO on Lab our Welfare in India; Agencies of Lab our Welfare and Their roles: State, Management, Trade Unions and Voluntary Agencies.

Unit – III: WELFARE PROGRAMES

Labour Welfare Programmers ; Statutory and Non-Statuory, Extra Mural and Intra Mural: Canteen, Housing, Workers Education Scheme; Welfare Office: Role , Status and Functions.

Unit – IV: SOCIAL SECURITY

Social Security : Concept and Scope; Social Assistance and Social Insurance, Development of Social security in India; Social Security Measures for Industrial Employees.

Unit – V: **LABOUR ADMINISTRATION**

Labour Administration : Central Lab our Administrative Machinery in India; Chief Lab our Commissioner , Director general of Employment and Training, director general of factory Advice Service, Provident Fund Organization, ESI Scheme : Lab our Administration in AP

Reference Books

1. Moorthy, M.V., Principals of Lab our welfare in India, Sree Ram Centre
2. Sharma, A.M., Aspects of Lab our Welfare and Social Security, Himalaya Pub. House, Mumbai.
3. Ram Chandra P.Singh, Lab our Welfare Administration in Indian, Deep & deep Pub., New Delhi.

NON CORE PAPER (for other Departments)
305. ENTERPRENEURSHIP DEVELOPMENT

Course Objective: To develop necessary knowledge and skills among the students to become entrepreneurs.

UNIT – I : Entrepreneur & Entrepreneurship Development: Characteristics of Entrepreneur – Attitude; Qualities and Functions of entrepreneur-distinction between entrepreneur and intrapreneur– Importance of Entrepreneur –types of entrepreneurs- Role Models.

UNIT-II

Entrepreneurship Development - Theories of Entrepreneurship- growth of entrepreneurship in india-problems and development of rural entrepreneurship-: Role of Government in Promotion of Entrepreneurship.

UNIT – III : Idea Generation and Feasibility Planning: Sources of New Ideas – Methods of idea generation – Creative problem solving – Opportunity Recognition – Fundamentals of Feasibility Planning – Four Stages Growth Model.

UNIT – IV : Managerial Aspects of Entrepreneurship : Sources of Finance – Working Capital; Venture Capital; Seed Capital – Financing Agencies – Government grants; Subsidies; Investors; Private Offerings – Product Development – Marketing Management, HRM in SMES.

UNIT – V : Entrepreneurial Strategy : Generation of New entry Opportunity – Entry Strategy - New Entry Exploitation – Decisions under uncertainty – Risk Reduction Strategies – Growth Strategies – Innovations Strategies and Managing Newness.

Suggested Books:

1.Nanda, H., Fundamentals of Entrepreneurship, PHI, First/e, New Delhi,2009.

2.Vasanth Desai, The Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, 2009.

3.Bholanath Dutta, Entrepreneurship Management – Text and Cases, Excel Books, 2009.

4.Morse & Mitchell, "Cases in Entrepreneurship" , SAGE Publishers, New Delhi.

5.Barringer & Ireland, Entrepreneurship – Successfully Lauching New Ventures, Pearson, 2006.

6.Poornima Charantimath, Entrepreneurship Development & Small Business Enterprises, Pearson Education.

IV SEMESTER

401: STRATEGIC MANAGEMENT

Course Objective: The objective of this course is to analyze the main structural features of an industry and develop strategies that position the firm most favorably in relation to competition and influence industry structure to enhance industry attractiveness, to recognize the different stages of industry evolution and recommend strategies appropriate to each stage and to appraise the resources and capabilities of the firm in terms of their ability to confer sustainable competitive advantage and formulate strategies that leverage a firm's core competencies.

Unit-I: Introduction: Concepts in Strategic Management, Strategic Management as a process – Developing a strategic vision, Mission, Objectives, Policies – Factors that shape a company's strategy – Crafting a strategy – Industry and Competitive Analysis, Porter's Five Forces Model.

Unit-II: Environmental Scanning and leadership: Methods. SWOT Analysis – Strategies and competitive advantages in diversified companies and its evaluation. Strategic Analysis and Choice: Tools and techniques- BCG Matrix, Space Matrix, GE Model, Grand Strategy Matrix -Strategic Leadership: Leadership and Style – Key Strategic Leadership Actions - Developing Human Capital and Social Capital – Balanced Scorecard.

Unit-III: Strategy Formulation : Strategy Framework For Analyzing Competition, Porter's Value Chain Analysis, Competitive Advantage of a Firm, Exit and Entry Barriers - Formulation of strategy at corporate, business and functional levels. Types of Strategies – Tailoring strategy to fit specific industry – restructuring and diversification strategies – different methods Turnaround strategy and diversification strategies.

Unit-IV: Strategy Implementation : Strategy and Structure, Leadership, culture connection - Strategies for competing in Globalizing markets and internet economy – Organizational Values and Their Impact on Strategy – Resource Allocation – Planning systems for implementation.

Unit-V: Strategy Evaluation and control – Establishing strategic controls - Measuring performance – appropriate measures- Role of the strategist – using qualitative and quantitative benchmarking to evaluate performance - strategic information systems – problems in measuring performance – Strategic surveillance -strategic audit.

REFERENCES:

1 .Vijaya Kumar P,.HittA : Strategic Management, Cengage learning, New Delhi,2010.
2. John A PearceII, AmitaMital: "Strategic Management", TMH, New Delhi, 2012.
3. Sanjay Mohapatra: "Cases Studies in Strategic Management", Pearson, New Delhi,2012.
4. Adrian Haberberg&Alison: Strategic Management, Oxford University Press, New Delhi, 2010.
5 .P.Subba Rao: "Business Policy and Strategic Management" Text and Cases, Himalaya Publishing House, New Delhi, 2011.
6. Appa Rao, Parvatheshwar Rao, Shiva Rama Krishna: "Strategic Management and Business Policy", Excel Books, New Delhi, 2012.

402: TALENT AND KNOWLEDGE MANAGEMENT

Course Objective: The main objective of this paper is to enable the students understanding the significance of Talent and Knowledge Management in today's business scenario.

Unit – I: Introduction : Meaning and importance of talent management; Designing and building a talent reservoir–Segmenting the Talent Reservoir; Talent Management Grid; Creating a talent management system; Institutional strategies for dealing with talent management.

Unit – II : Competency Management : Competency–meaning, characteristics, types–Steps in developing a valid competency model; Talent management information systems; Developing a talent management information strategy; Role of leaders in talent management.

UNIT-III: Introduction to KM & Role of IT: Meaning, Importance of Knowledge Management. —Data – information – Knowledge – Wisdom interrelationship; Organizational knowledge: Characteristics and components of organizational knowledge; Building knowledge societies Role of Information Technology in Knowledge Management System – Knowledge management tools

UNIT-IV: Future of Knowledge Management & Industry Perspective: Companies on the road into knowledge management – knowledge management in manufacturing and service industries – Knowledge management in finance – Knowledge management in marketing – customer relationship process;Business ethics and Knowledge Management – Challenges and future of knowledge management.

UNIT-V: Knowledge Management Process: Universal appeal ; Stages of Knowledge

Management process ; Knowledge Capital Vs. Physical Capital ;The promise of Internet and the imperatives of the New Age;Study of Road Blocks to the implementation of knowledge management;10 step KM Road Map of Amrit Tiwana. Business intelligence and internet platforms – Web portals - Information architecture – Net banking in India.

Suggested Books:

1. Ed by Lance A. Berger and Dorothy R Berger. "The Talent Management Handbook", 2004, Tata McGraw Hill edition.
2. Ed by Larry Israelite, "Talent Management", ASTD Press.
3. Sajjad M Jasmuddin, "Knowledge Management", 1st ed, 2009, Cambridge.
4. Stuart Barnes, "Knowledge Management Systems", Ed, Cengage Learning
5. Irma Becerra-Fernandez, Avelino Gonzalez and Rajiv Sabherwal "Knowledge Management", 2009, Pearson Education Inc.
6. Donald Hislop, "Knowledge management in Organizations", 2009, Oxford University Press, Second edition.
7. Sudhir Warier, "Knowledge Management", Vikas Publishing House Pvt. Ltd.
8. Thorne & Pellant, "The Essential Guide to Managing", Viva Books.
9. Stuart Barnes(Ed) "Knowledge Management Systems". Cengage Learning.

431: INTERNATIONAL HUMAN RESOURCE MANAGEMENT

Course Objective: The course is designed to enhance the potentials of the student to manage Human Resource in Multi National Organizations to achieve Business Standards.

Unit - I

Introduction to International Human Resource Management: Concept, Scope and Significance - Expatriate- Approaches to International Human Resource Management, Differences between Domestic and International HR Activities; Role of International HR Department - Issues and Challenges of IHRM, Organizational structure of multinational corporations,

Unit- II

Socio – Culture Contexts: Cultural Factors - Cultural Sensitivity - Culture affects Management approaches - Cross-cultural Communication - Cross Culture Differences in the Work Place – Hofstede Cross-Culture theory.

Unit – III

Recruitment and Selection: Concept – sources of Human Resources: Micro level, Macro level, Modern Sources, Techniques of Recruitment – Centralized Vs Decentralized recruitment – Selection: The Expatriate System, Reasons for Expatriate failure in foreign assignment - Selection Techniques for International Assignment: Adaptability to cultural change, Motivation for a foreign assignment and Leadership ability.

Unit – IV

Training and Development: Need for Global training - Areas of Global Training & Development, Compensation : Objectives of International Compensation Management - Complexities in International Compensation Management- - Factors Affecting International Compensation Management - Approaches to International Compensation Management, Performance Management: System of performance appraisal – Problems of Performance Appraisal – Measures for effective Performance Appraisal.

Unit -V

Introduction to International Industrial Relations: Key Issues in International Industrial Relations - Trade Unions and International Industrial Relations - Conflict Resolution in Multinational Corporations; Forms of Industrial Democracy to Multinational Corporations – Regional Integration – NAFTA, EU.

Reference Books

1. Dowling Welch, Schuler, International Human Resource Management Thomson, New Delhi.
2. Anne Wil Harzing et al., International Human Resource Management., sage, New Delhi
3. P.Subba Rao, International Human Resource Management, HPH, New Delhi
4. Briscoe, Dennis R., International HRM , Prentice Hall NJ.
5. Torrington, D., International HRM : Think Globally and Act Locally, Hemal Hempstead, Prentice Hall.

432: Strategic Human Resource Management

Course Objective: The Objective of this course is to appreciate how human resource is emerging as a key resource for competitive advantage and understanding the role of HRM in organizational performance.

UNIT I : Concept of Strategy; Types of strategies: Corporate strategy and Business strategy, Integrating Human Resource Strategy with Corporate and Business and Strategies.

UNIT II : Human Resource Environment: Technology and Organization Structure; Worker Values and Attitudinal Trends; Management Trends, Demographic Trends: Trend's in the utilization of human resources and international developments.

UNIT III : Strategic International Human Resource contributions: Strategic Human Resource Activity Typology; Classifying Human Resource Types : Integration of strategy and human resource planning: The Human Resource manager and Strategic Planning. Strategic, Human Resource Planning**.**

UNIT IV: Strategic Human Resource Processes: Workforce Utilization and Employment Practices; Efficient Utilization of Human Resources; Dealing with employee shortages: Selection of employees; Dealing with employee surpluses and special implementation challenges. Reward and development systems: Strategically Oriented Performance Management Systems: Strategically oriented compensation systems and employee development.

UNIT V: Impact of Human Resource Practices: Individual high performance practices; Systems of high –performance human resource practices: individual Best practices vs. Systems of Practices and Universal Practices vs. Contingency Perspectives. Human Resource Evaluation: Over view of the Evaluation: Approaches to Evaluation: Evaluation Strategic Contributions of Traditional Areas: and Evaluation Strategic Contributions in Emerging Areas.

Suggested Books :

1. Greer, Charles R. (2003) Strategic Human Resource Management – A General Managerial Approach New Delhi: Pearson Education (Singapore) Ple. Ltd.
2. Mabey, Chrisopher and Salaman, Graeme, Strategic Human Resource management, Beacon, New Delhi.
3. Salaman, Graeme, Human Resource Strategies, Sage Publications, New Delhi.
4. Porter, Michael S., Competitive Advantage: Creating and Sustainig Superior Performance, Free Press, New York.

433 : LABOUR LEGISLATIONS

Course Objective: To have a broad understanding of the legal principles governing the employment relationship at individual and collective level. To familiarize the students to the practical problems inherent in the implementation of labour statutes.

Unit – I: Industrial Jurisprudence; Definition, Industrial Jurisprudence in India, Principles of Industrial Jurisprudence: Social Justice, Natural Justice, Equity, National Economy, Dynamism, Constitutional Norms, Welfare, Res Judicata, Laches, Vicarious Liability. Writs and appeals under the Indian Constitution, Labour Legislation: Growth, Ojectives and Classification.

Unit – II: The Factories Act, 1948, The mines Act 1952 and its rules .

Unit – III: The Plantation Labour Act, 1951, The Contract Labour (Regulation and Abolition) Act 1970.

Unit – IV: The Apprentices Act 1961, The Child Labour (Prohibition and Regulation) Act 1986.

Unit – V: The A.P Shops and Establishments Act 1988. The Dock Workers (Regulation and Abolition) Act 1948.

Reference Books

1. Malik, P.L Industrial Law, Eastern Book Company, Lucknow

2. Goswami, V.G. Labour and Industrial Relations Law, Central Law Agency, Allahabad

3. Agarwal, S.L, Labour Relations Law in India, Mc Milan Company of India Ltd., New Delhi

4. Sharma A.M. Industrial Jurisprudence, Himalaya Publishing House, New Delhi

5. Mishra P.N., Labour and Industrial Laws, Central Law Publishing, Allahabad

6. Vaidyanathan, N, IOL Conventions and India, Minverva Associates, Calcutta

7. Sinha, P.R.N, Industrial Relations and Labour Legislations, Oxford and I.B.H Publishing Co., New Delhi

8. Prabhakar Rao, D.V.S.R, Contract Labour Abolition and Absorption, Law Publishing House, Allahabad.

434: PERFORMANCE MANAGEMENT AND EMPLOYEE COUNSELLING

Course Objective: To enlighten the students with the concepts of performance management and enables the student to understand employee counseling.

Unit – I

Performance Management: Concept and Objectives; Goal setting and Expectancy Theory; Performance Management Models; Designing Performance Management System; Pfm Process: Performance Appraisal - A Conceptual Frame work, Tools of Performance Appraisal, Performance Management in MNC and Outcome, Designing of PMS in MNC – Aims and Role of PMS, Characteristics of an Ideal PMS, Linking of Performance Management and Strategic Planning in a MNC

Unit – II

Performance Management Process; Goal Setting Levels; Corporate, Department and Individual; Monitoring Performance; Performance Feedback Performance Review; Coaching; counseling and Mentoring: 360 degree Appraisal and its Application in US, Europe and Asia, Performance Management Reward Systems in MNC.

Unit – III

High performance Teams: Elements of Team Building, Team Characteristics and Behaviors , Team Concepts and Norms, Selection of Team Members, Cross Functional Teams.

Unit – IV

Features of Effective Performance Appraisal System: Feedback; Building Team Performance; Learning organizations; Counseling: Meaning, Need for counseling; Functions of Counseling; Forms of Counseling; Counseling Process; Counseling Variables; Pre-requisites for Effective Counseling; Skills of an Effective Counseling.

Unit – V

Performance Management and Motivation from Global Scenario – Application of Expectancy Model, Reward and Recognition from Global Perspective, Challenges of Implementing PMS in MNC .

Reference Books

1.Prem Chand, Performance Management, Macmillin, New Delhi
2.T.V.Rao, Performance Management and Appraisal System Response
3.Dave, Indu, The Basic Essentials of Counseling, Sterling Pub. Pvt., Ltd., New Delhi
4.Carroll, Michal and Watso, Michael, Hand Book of Counseling in Organizations, Sage Pub., New Delhi
5.Mabey, Chirstopher and Salamanm Graeme, Stgrategic HRM, Beacon Books, New Delhi
6.Rao T.V., and PAreek, Udai(ed)., Redesigning Performance Appraisal System, Tata McGrew Hill Pub., New Delhi
7.Neale, Frances, Handbook of Performance Management, Jaico Pub., House, New Delhi
8.Benson, Gray, Stepping Up Performance, Jaico Pu., House, New Delhi
9.Walters, Mike, The Performance Management Handbook, Jaico Pub., House, New Delhi
10.Murphy, Kerin R., and Cleveland, Jeanette N., Understanding Performance Appraisal, Sage, London
11.David Wade and Ronald Recardo, Corporate Performance Management, Butterworth Heinemann, New Delhi
12.Kur Verweire etal, Integrated Performance Management, Sage, New Delhi.
Text Book : Perforamance Management Herm…….nnis Pearson Education ,2007
13. Performance Management Systems , UK Sahu,Excel Books

435- Human Resource Management in Service Sector

Course Objective: The objective is to understand the maintaining and improving the service quality and performance in service sectors.

UNIT I :

Concept of Service: Types of Service, Service Management, Evolving Environment of Services, Myths about Service, Service as a System, Attitudes towards Service Sector, Reasons for growth of the Service sector.

UNIT II :

Nature of Service sector: Characteristics of Services, Elements of Customer Service, Components of Service, Identifying customer Groups, Service Process, Classification of Servicing operating systems, Balancing Supply and Demand, Challenges for service managers, People and service, Maintaining and Improving Service Quality and performance.

UNIT III :

Human Resource Management in Service Organizations: Concept, Functions, Utilization, Development, Environment, Organising HRM Functions in Service Sector, Competencies and service organizations, Performance Measurement, Empowerment in service organizations, Managing services across Boundries.

UNIT IV :

Application in HRM in service sector: HRM in Hospitals, Hotels, Insurance and Banking, other Financial Institutions, Ports and Docks, Managing Salary Levels, Working Conditions, Legal provisions, Unionism, Problems and Challenges.

UNIT V :

HRM in IT Sector: Software Industry and BPO Sector, Wage Salary Levels, Working Conditions, Legal Provisions, Unionization, Distribution of Male and Female Workers, Gender Bias, Problems and Challenges.

Suggested Books

6. Balaji. B., Services Marketing and Management, S. Chand & Co. Ltd., New Delhi.
7. Haksever, Cengiz, Barry Pender, Roberta S.Russel and Robert G.Murdik, Service Management and Operations, Pearson Education (pte)ltd., New York.
8. Van Dierdonck van woy, Service Management An Integrated Approach, Financial Times/ Prentice hall of India, New Delhi.
9. Goyal.R.C., Human Resource Management in Hospitals. Prentice hall of India, New Delhi.

M.Com. Course Structure and Syllabus

(Choice Based Credit System)

With effect from the Academic Year 2018-19

DEPARTMENT OF COMMERCE

YOGI VEMANA UNIVERSITY

Vemanapuram, Pulivendula Road

Kadapa – 516005

DEPARTMENT OF COMMERCE
YOGI VEMANA UNIVERSITY::KADAPA

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6. **Sri. S.V. Rama Murthy** — **Industrialist**
   Managing Director
   Chaitanya Chemical Pvt. Ltd
   Kadapa - 516001

Yogi Vemana University, Kadapa :: M.Com - Course Structure (CBCS)

Paper code	Title of the Paper	Teaching Hours per Week	Credits	Exam Duration (Hours)	Marks		
					Internal Assessment	External Assessment	Total
M.Com. I Semester							
101	Organisational Behaviour	4	4	3	25	75	100
102	Managerial Economics	4	4	3	25	75	100
103	Business Environment and Policy	4	4	3	25	75	100
104	Corporate Financial Accounting	4	4	3	25	75	100
105	Computer Applications in Business (Theory and Practical)	4	4	2	25	50 Theory 25 Practical*	100
Total		20	20		125	375	500
M.Com. II Semester							
201	Human Resource Management	4	4	3	25	75	100
202	Marketing Management	4	4	3	25	75	100
203	Financial Management	4	4	3	25	75	100
204	Research Methodology for Business	4	4	3	25	75	100
205	E-Commerce (Theory and Practical)	4	4	2	25	50 Theory 25 Practical*	100
OEPT: 206	Offered by other Departments (CBCS)	4	4	3	25	75	100
Total		24	24		150	450	600
M.Com. III Semester							
301	Accounting for Managerial Decisions	4	4	3	25	75	100
302	Corporate Tax and GST	4	4	3	25	75	100
303	Accounting Package – Tally (Theory and Practical)	4	4	2	25	50 Theory 25 Practical*	100
Electives							
304(A)	Security Analysis and Portfolio Management	4	4	3	25	75	100
304(B)	Marketing Research	4	4	3	25	75	100
305(A)	Financial Markets and Services	4	4	3	25	75	100
305(B)	Service Marketing	4	4	3	25	75	100
OEPT: 306	Offered by other departments (CBCS)	4	4	3	25	75	100
Total		24	24		150	450	600
M.Com. IV Semester							
401	Soft Skills for Career Development	4	4	3	25	75	100
402	Entrepreneurship Development	4	4	3	25	75	100
Electives							
403 (A)	Financial Derivatives	4	4	3	25	75	100
403 (B)	Retail Marketing Management	4	4	3	25	75	100
404 (A)	International Financial Management	4	4	3	25	75	100
404 (B)	International Marketing Management	4	4	3	25	75	100
405	Project Report and Viva-Voce	**	4		25 (Viva-Voce)	75 (Project Report)	100
Total		20	20		100	400	500
Grand Total			80		525	1675	2200

OEPT: Open Elective Paper Theory

The Commerce Department offers the following TWO papers for the students of other Departments as Open Elective Paper (CBCS)

Paper code	Title of the Paper	Teaching Hours per Week	Credits	Exam Duration (Hours)	Marks		
					Internal Assessment	External Assessment	Total
OEPT - 206	Stock Markets	4	4	3	25	75	100
OEPT - 306	Banking and Insurance Services	4	4	3	25	75	100

* The Practical Examination shall be conducted by External Examiner and Internal Examiner based on Record, Demo and Viva-Voce.

** A faculty member can guide maximum of EIGHT students. Guidance of EIGHT students by a faculty member will be equivalent to the teaching workload of one paper per semester.

YOGI VEMANA UNIVERSITY, KADAPA
M.COM - COURSE STRUCTURE (CBCS)
Scheme of Syllabus and Evaluation Pattern

The following scheme and structure of syllabi for M.Com., course for each paper in each semester except Computer Application in Business in I Semester, E-Commerce in II Semester and Accounting Package – Tally in III Semester as under:

a. Internal Assessment (IA) 25 Marks
Semester End Examinations (SEE) 75 Marks

b. For Practical Papers : (Computer Application in Business in I Semester, E-Commerce in II Semester and Accounting Package – Tally in III Semester).
Internal Examination 25 Marks
Practical Examination 25 Marks
Semester End Examinations (SEE) (Theory) 50 Marks

Note: The practical Examinations shall be conducted by an Internal Examiner and External Examiner based on the record, demo and Viva-Voce

c. Project & Viva-Voce in IV Semester
Viva-Voce Examination 25 Marks
Project Report (Dissertation) 75 Marks

1. Resolved to recommend the model question papers of each paper as under:

Section – A for 15 Marks
Section – A shall consist of 8 short questions and student shall answer any 5 questions and each question carries 3 marks

Section – B for 60 Marks
Section – B shall consist of 4 questions and student shall answer all the questions with internal choice i.e. either or and question carries 15 marks. Model Question paper is enclosed here

2. Resolved to recommend the model question papers for Computer Applications in Business in I Semester, E-Commerce in II Semester and Accounting Package – Tally in III Semester as under

Section – A for 10 Marks
Section – A shall consist of 8 short questions and student shall answer any 5 questions and each question carries 2 marks

Section – B for 40 Marks
Section – B shall consist of 4 questions and student shall answer all the questions with internal choice i.e. either or and question carries 10 marks. Model Question paper is enclosed herewith.

DETAILED SYLLABUS

I SEMESTER

Paper code	Title of the Paper	Teaching Hours per Week	Credits	Exam Duration (Hours)	Marks		
					Internal Assessment	External Assessment	Total
101	Organisational Behaviour	4	4	3	25	75	100
102	Managerial Economics	4	4	3	25	75	100
103	Business Environment and Policy	4	4	3	25	75	100
104	Corporate Financial Accounting	4	4	3	25	75	100
105	Computer Applications in Business	4	4	2	25	50 Theory 25 Practical*	100
	Total	20	20		125	375	500

101: ORGANISATIONAL BEHAVIOUR

Objective: The objective of this paper is to help the students to understand the human behavior in business organizations and its influence on organizational change, development and effectiveness.

UNIT-I: Organisational Behaviour (OB): Nature - Significance of Organisational Behaviour – OB as an Interdisciplinary Subject - Approaches to Organizational Behaviour – Challenges of OB in the 21st Century.

UNIT-II: Individual Dynamics: Attitude; Personality; Perception - Factors Influencing Perception - Motivation – Concept – Types - Theories - Maslow's Need Hierarchy- Two factor theory; Vrooms Expectancy Theory – ERG Theory.

UNIT-III: Group Dynamics: Features - Types of Groups - Group Formation - Group Dynamics – Group Cohesiveness - Determinants of Group Cohesiveness; Leadership – Concept –Qualities of a leader - Leadership Theories – Trait Theory – Behavioural Theory – Contingency Theory – Fiedler Contingency Theory - Managerial Grid Theory – Leadership Life Cycle Theory – William.J.Reddins 3D Leadership Theory – Conflict Management - Causes and Consequences of Organisational Conflicts – Conflict Management Techniques

UNIT-IV: Organisational Dynamics: Organisational Culture – Effectiveness – Determinants of Oraganisational Effectiveness - Organisatonal Change - Concept – Planned Change - Why People Resist for Change – How Change can be Implemented; Organizational Development: Concept - Organizational Development Interventions.

Suggested Books

1. Prasad, L.M., Oganinational Behaviour, S.Chand Publications.
2. Aswathappa .K, Oganinational Behaviour, HPH, New Delhi.
3. Fred Luthans, Oganinational Behaviour,Tata McGraw Hill.
4. Stephen P.Robbins, Oganinational Behaviour , Pearson Education.
5. Arun Kumar N Meenakashi., Oganinational Behaviour, VPH.
6. Dale, Oganinational Behaviour, Sage Publications.
7. Hersey, Paul, Kenneth H. Blanchard and Dewey E. Johnson, Management of Organisational Behaviour, Utilising Human Resources, PHI.
8. Subbarao P, Organisational Behaviour, HPH.
9. K. Sridhara Bhat, Management and Behavioural Process, HPH.

102 : MANAGERIAL ECONOMICS

Objective: The objective of this paper is to enable the students to understand economic concepts, theories, fundamentals as aids to decision making under given environmental constraints.

UNIT-I: Introduction: Meaning and Definition of Managerial Economics - Nature and Scope - Principles - Objectives of the Firm - Theory of the Firm (or) Profit Maximization Model - Managerial and Behavioral Theories - Role and Responsibilities of a Managerial Economist.

UNIT-II: Demand and Supply Analysis: Meaning - Law of Demand - Demand Schedule- Demand Function - Determinants and Distinctions - Demand Estimation - Methods of forecasting for Existing and New Products - Criteria for a Good Forecasting Method; Meaning and Law of Supply - Determinants of Supply.

UNIT-III: Cost and Production Analysis: Cost Concepts - Cost Output Relationship in Short run and Long run - Cost Control and Reduction; Meaning of Production - Production Function - Laws of Production - Production Function with One, Two and All Variables Input Factors - Cobb Douglas Production Function

UNIT-IV: Profit and Price Analysis: Nature of Profit - Kinds of Profit - Theories of Profit - Managerial uses of Cost Volume Profit Analysis - Profit Planning and Forecasting; Competition - Types of Competition: Perfect Competition - Imperfect Competition; Pricing - Concept - Pricing Polices and Strategies - Pricing Methods - Product Line Pricing - Transfer Pricing - Pricing by Retailers - Export Pricing - Dual Pricing - Administered Pricing - Price Forecasting

Suggested Books

1. Craig Peterson and Lewis: Managerial Economics, Pearson Education Publication 2008
2. Mankiw, Principles of Macroeconomics, 4e, TL 2007.
3. Mehta, P.L., Managerial Economics, Text and Cases, S.Chand & Co., Publishers, New Delhi
4. Varshney, R.L., and Maheswari, K.L., Managerial Economics, S.Chand & Co., Publishers, New Delhi
5. Battacharya & Chakravarthy, Fundamentals of Business economics BS Publications 2002.
6. Ahuja, H.L., Managerial Economics, S. Chand, New Delhi
7. Trivedi, M.L. Managerial Economics, Tata Mc-Graw Hills, New Delhi.
8. Mithani, D.M, Managerial Economics – Theory and Applications , Himalayas Publishing House, New Delhi.

103 : BUSINESS ENVIRONMENT AND POLICY

Objective: The objective of this paper is to understand the students with a background of various environmental factors of business.

UNIT-I: Theoretical framework of Business Environment: Concept – Nature and Significance of Business Environment – Types of Environment – Internal and External Environment – Techniques of Environmental Scanning and Monitoring – Changing Dimensions of Business Environment

UNIT-II: Economic Environment of Business : Significance - Elements of Economic Environment - Economic Systems and Business Environment – Economic Planning in India – Government Policies - Industrial Policy- Fiscal Policy - Monetary Policy – EXIM Policy – Public Sector and Economic Development - Economic Reforms - Liberalization – Privatization – SEZs - Impact of New Economic Policy on Business.

UNIT-III: **Socio-Cultural, Political and Legal Environment:** Critical Elements of Socio-Cultural Environment - Impact of Socio-Cultural Environment on Business - Political Environment – Social Institutions and Systems – Social Values and Attitudes – Social Responsibilities of Business; Legal Environment – Changing Dimensions of Legal Environment in India – Competition Policy (MRTP Act) – FEMA and Licensing - Consumer Protection Act – Political Institutions - Reasons for State Intervention – Types and Extent of Intervention - Corporate Governance in India.

UNIT-IV: Technological and Global Environment: Technological Environment – Impact of Technology on Business – Management of Technology – Status of Technology in India; Global Environment: Definition and Importance – Nature and Scope – Rationale for Global Environment - Multi National Corporations (MNCs) - Problems and Benefits of MNCs –Global Environment Policy - Strategies for Going Global - EXIM Policy – Procedure for Exporting the Goods - Emerging Challenges of Global Business.

Suggested Books

1. Aswathappa. K, Essentials of Business Environment, Himalaya Publishing House, New Delhi.
2. Francis Cherunilam, Business Environment, Himalaya Publishing House, New Delhi.
3. Kohli.S.L. and Resutra N.K, Business Environment, Kalyani Publishers, New Delhi 2005.
4. Fernando A.C, Business Environment, Pearson Education, New Delhi.
5. Misra.S.K, and V.K.Puri, Indian Economy, Himalaya Publishing House, New Delhi, 2008.
6. Agrawal. A.N., Indian Economy: Problems of Development and Planning, New Age Publications, New Delhi, 2008.
7. Misra.S.K., and V.K.Puri, Economic Environment of Business, Himalaya Publishing House, New Delhi, 2008.
8. Raj Agrawal, Business Environment, Excel Books, New Delhi, 2008.

104: CORPORATE FINANCIAL ACCOUNTING

Objective: The objective of this paper is to expose the students to advanced corporate financial accounting issues and practices.

UNIT-I: Introduction to Accounting: Nature and Scope of Financial Accounting – Importance – Objectives - Generally Accepted Accounting Principles (GAAP) – Indian Accounting Standards and International Accounting Standards. (Theory only)

UNIT-II: Inflation Accounting: Definition - Limitations of Historical Accounting – Methods of Accounting for Price Level Changes - Current Purchasing Power (CPP) - Current Cost Accounting (CCA) - Gearing Adjustment. (Theory & Problems)

Unit-III: Human Resource Accounting: Concept - Suggested Methods for Valuation of Human Resources - Advantages and Disadvantages of HR Accounting; Corporate Social Accounting - Concept and Objectives of Social Accounting - Social Accounting Measures - Social Responsibility Accounting; Government Accounting - Structure of Government Accounting - Commercial Accounting Vs Government Accounting.

Unit-IV: Consolidated Financial Statements: Definition - Preparation of Consolidated Balance Sheet – Minority Interest – Pre Acquisition or Post Acquisition Profits – Cost Control or Goodwill – Inter Company Balances – Bonus Shares – Treatment of Dividends – More Than One Subsidiary - Inter Company Holdings – Preparation of Consolidated Financial Statements. (Theory & Problems)

Suggested Books

1. Gupta, R.L. and Radhaswami, M., Advanced Accountancy, S. Chand & Co., New Delhi.
2. Jain and Narang, Advanced Accountancy, Kalyani Publications, New Delhi
3. M.C. Shukla, T.S. Grewel, Advanced Accountancy, S. Chand & Co., New Delhi.
4. S.N. Maheswari and S.K. Maheswari, Corporate Accounting, Vikas Publishing House, New Delhi.
5. Arulanandam, Advanced Accountancy, Himalaya Publishing House, Delhi.
6. Ghosh, T.P., Accounting Standards and Corporate Accounting Practices, Taxmann.
7. Jawaharlal, Accounting Theory, Himalaya Publishing House.
8. I.M. Pandey, Management Accounting, Vikas Publication.
9. Bhatty J, Management Accounting, ELBS.
10. Khan and Jain, Management Accounting, Tata McGraw Hill.

105: COMPUTER APPLICATIONS IN BUSINESS

Objective: Computer Application is useful for acquisition, processing and organization of data. Main aim of the subject is to make students know and learn about computers through its applications.

UNIT-I: Introduction: Meaning and Definition of Computer – Generations – Concepts of Hardware and Software – Characteristics – Advantages and Disadvantages – Input Devices – Output Devices – Primary Memory - Secondary Storage – Types of Printers – Basic Components of Windows – Operating Systems – Networks – Viruses.

UNIT-II: Documentation: Features – Title Bar – Menu Bar – Standard Tool Bar – Formatting Tool Bar – Mail Merge – Macros.
Hands on Practice: Resume Preparation – Visiting Card – Letter Writing – Sending Letters through Mail Merge.

UNIT-III: Spreadsheet: Features – Worksheets and Workbooks – Creating formulas – Copying formulas – Functions in Spread Sheet.
Hands on Practice: Students Marks Statement – Employee Salary Details– Temperature Analysis – Payrolls - Creating Charts.

UNIT-IV: Slide Presentations: Features - Uses –Slide layout – Applying a Theme to a Presentation – Slide Animations; **Database:** Create Databases - Tables - Create Forms to Enter Data - Use of Queries in Data Manipulation – Generating Reports.
Hands on Practice: Departmental Profile and College Profile Using Animation - Audio and Video Presentation.

Suggested Books

1. Fundamentals of Computer: Dr. K. Kiran Kumar, Sri Vaibhava Publications, Hyderabad.
2. M.S. Office: Dr. K. Kiran Kumar – Sri Vaibhava Publications, Hyderabad.
3. Microsoft Office: Professional for Windows 95, Instant Reference, Diennes, Sheila , BPB Publications, New Delhi.
4. Saha RG and IL Narasimha Rao, Fundamentals of Information Technology, Himalaya Publications, New Delhi.
5. N.V.N.Chary & Lalitha S., Fundamentals of Informational Technology, Kalyani Publishers, Hyderabad.

II SEMESTER

Paper code	Title of the Paper	Teaching Hours per Week	Credits	Exam Duration (Hours)	Marks		
					Internal Assessment	External Assessment	Total
201	Human Resource Management	4	4	3	25	75	100
202	Marketing Management	4	4	3	25	75	100
203	Financial Management	4	4	3	25	75	100
204	Research Methodology for Business	4	4	3	25	75	100
205	E-Commerce	4	4	2	25	50 Theory 25 Practical *	100
OEPT : 206	Offered by other Departments (CBCS)	4	4	3	25	75	100
Total		24	24		150	450	600

201: HUMAN RESOURCE MANAGEMENT

Objective: The objective of this paper is to provide basic knowledge of various facets of selection, training and development of human resources in the organization.

UNIT-I: Introduction to Human Resource Management: Definition and Concept of Human Resource Management – Evolution and Historical Perspectives – Approaches – Functions – Contemporary Issues in HRM – Strategic Human Resource Management – Horizons and Challenges of Challenges in the 21st Century.

UNIT–II: Acquisition of Human Resources: Human Resource Planning – Definition – Objectives – Process – Growing Importance – Job Analysis – Recruitment – Factors Affecting Recruitment – Source of Recruitment – Employee Selection – The Process of Selection – Selection Tests – Placement and Induction.

UNIT–III: Employer and Employee Relations Management: Employer and Employee Relations – Need and Importance – Role of the State – Grievance Handling – Concept – Causes – Steps in Grievance Procedure in India – Industrial Conflicts – Causes – Preventive and Settlement – Machinery – Employee – Health and Safety Measures – Employee Welfare and Social Security – Workers Participation in Management – Forms – Factors Contributing for Limited Success.

UNIT–IV: Development of Human Resources: Performance Appraisal System – Objectives and Methods of Performance Appraisal – 360^0 Performance Appraisal – Employee Training and Development – Need and Importance – On the Job Training and Off – The Job Training Methods – Compensation Management – Definition and Objectives of Job Evaluation – Principles – Process – Techniques; International Human Resource Management (IHRM): Concept and meaning of IHRM – Approaches – Features – Emerging Need for Cross-Culture Management – Factor affecting IHRM.

Suggested Books

1. Aswathappa K. Human Resource and Personnel Management Text and Cases, Tata McGraw Hill, New Delhi.
2. Edwin B. Flippo, Principles of Personnel Management, Mc Graw Hill.
3. Venkata Ratnam C.S. Managing People, Global Business Press, New Delhi.
4. Tripati P.C. Personnel Management and Industrial Relations, Tata Mc Graw Hill, New Delhi
5. Bohlander , Human Resource Management, Thomson.
6. Jyothi, Human Resource Management, Oxford University Press.
7. N.K. Singh, Human Resource Management, Excel Publications.
8. P.Subbarao, Human Resource Management, Himalaya Publishing House, New.
9. David Ulrich, Human Resource Management Champions, Harvard Business Scholl Press.
10. Rao V.S.P, Human Resource Management, Excel Books. Delhi.

202: MARKETING MANAGEMENT

Objective: The objective of this paper is to facilitate and make the students understand about the conceptual framework of marketing and its applications in decision making.

UNIT-I: Introduction: Market - Types - Marketing Concepts- Marketing Myopia - Nature, Scope, Importance - Elements of Marketing - Functions of Marketing - Approaches to Study Marketing - Rural Marketing - Urban Marketing - Modern Marketing - Traditional Vs. Modern Marketing - Tele Marketing - Digital Marketing - Services Marketing - Social Marketing - Functions- Process.

UNIT-II: Market Targeting: Selecting Target Markets; Market Segmentation - Bases for Segmenting Consumer and Industrial Markets – Requirements for Effective Segmentation; Product Concept - Product Classification- Rationale for Product Mix - PLC Stages - New Product Development Process.

UNIT-III: **Consumer Behavior and Marketing Research:** Concept- Types of Buyer Behavior- Factors Influencing Consumer Behavior – Buying Decision Process - Buyer Behaviour Models; Marketing Research - Characteristics – Process – Problems Limitations – Ethical Issues in Marketing Research

UNIT-IV: Channel and Promotion Management: Types of Channel Members - Importance of Distribution Channels - Factors Involved in Creating Distribution Channels – Sales Promotion – Objectives – Importance – Sales Promotion Methods – Sales Promotion Vs Advertising - After Sales Management - Ecological Aspects of Marketing.

Suggested Books

1. Philip Kotler; Marketing Management, Pearson 2007 New D elhi.
2. S.A. Sherlekar, R.Krishna mooethi, Marketing management- 2015 HPH Hyderabad.
3. Biplab Bose, Marketing Management, Himalaya Publication, New Delhi.
4. William. J. Stanton, Charles Futrell, Fundamentals of Marketing, Tata McGraw Hill.
5. E. Jerome, McCarthy, Essentials of Marketing, PHI.
6. Cundiff EW, Richard RS, Norman, A.P, Govani, Fundamentals of Modern Marketing, TMH.
7. David .J L Hugh. G, Donald. A. Taylor, Ronald. S. Rubin, Marketing Research, Pearson Publication.
8. Ralph Wesfall, Stanley F. Starch, Marketing Research (Text and Cases), Prentice Hall.
9. Boyd and Westfall, Marketing Research-Text and Cases, Dreamtech Press.
10. S.A. Sherlekar, Marketing Management, Himalaya Publishing House.

203: FINANCIAL MANAGEMENT

Objective: The objective of this paper is to expose the students to the various issues, concepts and in-depth study of financial management to take the management decisions effectively.

UNIT-I: Financial Management: Meaning - Scope – Objectives – Finance Function – Functions of Financial Management - Role of Financial Manager – Time Value of Money; Investment Decision - Nature – Scope - Significance of Capital Budgeting – Capital Budgeting Process – Capital Budgeting Techniques: Traditional and Modern (Theory & Problems).

UNIT-II: Working Capital Management: Concept – Need - Operating Cycle – Kinds - Determinants – Approaches; Management of Current Assets - Cash Management – Receivables Management – Inventory Management (Theory & Problems).

UNIT-III: Financing Decisions: Capital Structure – Concept - Determinants of Capital Structure; Leverages: Meaning – Operating, Financial and Combined Leverages; Cost of Capital: Concepts – Specific Cost of Capital for Various Sources of Finance – Overall Cost of Capital (KO) (Theory & Problems).

UNIT-IV: Dividend Decision: Concept – Forms of Dividend - Factors of Dividend Decision – Dividend Theories - Walters Model – Gordons Model – MM Approach (Theory & Problems) Corporate Restructuring: Corporate Mergers and Acquisitions and Takeovers – Types of Mergers –Different Approaches for Valuation (Theory only).

Suggested Books

1. Van Horne, James C, Financial Management, Prentice Hall of India, New Delhi.
2. Khan M Y and Jain P K, Financial Management, Tata McGraw Hill Publishers. New Delhi.
3. Prasanna Chandra, Financial Management, Tata McGraw Hill Publishers. New Delhi.
4. Pandey, I.M., Financial Management, Vikas Publishing House, New Delhi.
5. Kulkarni P. V., Financial Management, Himalaya Publishing House, New Delhi.
6. Brealey & Myres, Principles of Corporate Finance, McGraw Hill, New York
7. Ross S.A., Westerfield, R.W. and Jordan, B.D., Fundamentals of Corporate Finance, TMH.
8. Ehrhadt, and Brigham, Corporate Finance–A Focussed Approach, Thomson South-Western.
9. Prasanna Chandra, Financial Management, Theory and Practice, Tata McGraw Hill.
10. Sudarsana Reddy G, Financial Management – Principles and Practice, HPH.

204: RESEARCH METHODOLOGY FOR BUSINESS

Objective: The objective of this paper is to make the students familiar with the Research and Statistical Techniques and their applications in business decision making.

UNIT-I: Introduction to Research: Features and Importance of Research in Business - Objectives - Types of Research: Basic, Applied, Descriptive, Analytical and Empirical Research; Formulation of Research Problem - Research Design - Significance of Review of Literature; Hypothesis: Formulation – Importance - Types; Sampling: Significance – Methods - Factors Determining Sample Size. (Theory only)

UNIT-II: Research Process: Stages in Research Process; Data Collection: Primary Data – Observation - Experimentation - Interview - Schedules - Questionnaire: Types - Steps in Questionnaire Designing - Essentials of a Good Questionnaire - Survey - Limitations of Primary data; Secondary data - Sources – Limitations - Factors Affecting the Data Collection Choice (Theory only)

UNIT-III: Data Processing and Statistical Analysis: Data Processing - Significance in Research – Editing – Coding - Classification - Tabulation - Graphical Presentation; Statistical Tools and Techniques for Analysis - Correlation Analysis; Parametric Test: t test - F test - z test; Non Parametric Test: Chi square test - ANOVA; Interpretation of Data - Significance - Precautions in Data Interpretation(Theory & Problems)

UNIT-IV: Research Reporting and Modern Practices in Research: Research Report Writing - Importance – Essentials - Structure / Layout – Report Writing Types; References and Citation Methods: APA (American Psychological Association) - CMS (Chicago Manual Style) - MLA (Modern Language Association) - Footnotes and Bibliography - Modern Practices: Ethical Norms in Research - Plagiarism - Role of Computers in Research (Theory).

Suggested Books

1. Krishna Swamy, O.R., Methodology of Research in Social Sciences, HPH, New Delhi.
2. Kothari,C. R., Research Methodology, New Age International Publications.
3. Shenoy, G.V., Quantitative Techniques for Managerial Decisions, New Age Publications
4. Gupta, S.C., Fundamentals of Statistics, Himalaya Publishing House, New Delhi
5. Anand Sharma, Quantitative Techniques for Decision Making, Himalaya Publishing House, New Delhi
6. Panner Selvam, R., Research Methodology, Prentice Hall of India, New Delhi.
7. Sachdeva, J.K., Business Research Methodology, Himalaya Publishing House, New Delhi.
8. Wilkinson,T.S.& Other, Methedology and Techniques of Social Research, Himalaya Publishing House, New Delhi.
9. Young Pauline,V, Scientific Social Serveys and Research - 4th Ed., Prentice Hall of India, New Delhi.

205: E-COMMERCE

Objective: The objective of this paper is to help the students to know about the contents of e-commerce and its practices in business.

UNIT-I: Introduction to E-Commerce: Concept – Features - Advantages and Disadvantages of E-Commerce - Global e-Commerce Environment - Adopting e-Commerce - Evolution of e-Commerce - Future of e-Commerce – Issues in e-Commerce: Privacy Issues –Social Issues - Security Issues.

UNIT-II Web Design: World Wide Web - Web designing - Web as market place - Role of Website in B2C e-Commerce - Push and Pull Approaches - Alternative Methods of Customer Communication such as e-mail – BBA - E-mail Etiquette and e-mail Security.

Hands on Practice: Web Page Designing – E mail Creation – E mail Security.

UNIT-III: Business Models of E-Commerce: B2B - B2C - B2G and Other Models of e-Commerce - Applications of e-Commerce to Supply Chain Management - Digital Market: Concept - Traditional Market Vs Digital Markets - Product and Service Digitization – Digital Marketing – Digital Advertising – Digital Branding – Retailing – Trading of Stocks – e Auctions - Digital Marketing Trends.

UNIT-IV: E-Payment System: Various types of e-Payment Systems – Debit Card System – Credit Card System – Digital Cash - Smart Cards – Digital Cheque - Digital Wallets; Threats: Types of Threats - Sources of Threats - Protecting e-Commerce Assets and Intellectual Property – Firewalls -– Client Server Network Security - Security Tools - Digital Identity - Digital Signature.

Hands on Practice: Creating Digital Signature – Usage of Digital Cash – Payment through Credit / Debit Card – Usage of Digital Wallet.

Suggested Books

1. Efraim Turban, Jae Lee, David King and H.Michael Chung, Electronic Commerce – A managerial perspective, Pearson Education, New Delhi.
2. Kenneth C.Laudon, and Carol Guercio Traver, E-Commerce – Business, technology and society, Pearson Education, New Delhi.
3. Joseph, E-Commerce, PHI,New Delhi.
4. Ravi kalakota, Whinston, Frontiers of Electronic Commerce, Pearson Education, New Delhi.
5. Daniel Minoli, Emma Minoli, Web Commerce Technology Handbook, Tata MC Graw Hill, New Delhi.
6. Ward Hanson, Internet Marketing, Thomson Learning Inc, Bangalore.

OPEN ELECTIVE PAPER THEORY

OEPT: 206 – Offered by Other Departments

III Semester

Paper code	Title of the Paper	Teaching Hours per Week	Credits	Exam Duration (Hours)	Marks		
					Internal Assessment	External Assessment	Total
301	Accounting for Managerial Decisions	4	4	3	25	75	100
302	Corporate Tax and GST	4	4	3	25	75	100
303	Accounting Package – Tally	4	4	2	25	50 Theory 25 Practical*	100
Electives							
304(A)	Security Analysis and Portfolio Management	4	4	3	25	75	100
304(B)	Marketing Research	4	4	3	25	75	100
305(A)	Financial Markets and Services	4	4	3	25	75	
305(B)	Service Marketing	4	4	3	25	75	100
OEPT: 306	Offered by Other Departments (CBCS)	4	4	3	25	75	100
Total		24	24		125	475	600

301: ACCOUNTING FOR MANAGERIAL DECISIONS

Objective: The objective of this paper is to help the students to know the accounting theory and practices while making the managerial decisions.

UNIT-I: Managerial Accounting: Concept – Nature and Scope – Functions – Uses and Limitations - Cost Analysis for Pricing Decisions: Full Cost Pricing - Mark Up Pricing - Break-Even Pricing - Target Pricing - Conversion Cost Pricing - Differential Cost Pricing.

UNIT-II: Business Decisions: Cost Behavior – Relevant Costs –Determination of Sales Mix – Exploring New Markets – Discontinuance of Product Line – Make or Buy Decisions – Equipment Replacement Decision – Change Vs Status Quo – Expand or Contract – Shut Down or Continue; Marginal Costing.

UNIT-III: **Divisional Performance and Transfer Pricing:** Decentralized Operations - Performance Measurement – Financial Performance– Non Financial Performance - Transfer Pricing – Meaning – Methods of Transfer Pricing – Issues in Transfer Pricing.

UNIT-IV: Responsibility Accounting (RA) : Concept of RA – Assumptions of RA – Types of Responsibility Centres – Responsibility Accounting Reports – Advantages of RA – Issues in RA; Management Reporting: Concept – Modes of Reporting – Types of Reports – Essentials of Good Report – Process of Preparing Report - Reporting Practices of Indian Companies.

Suggested Books

1. Atkinson, Banker, Kalpan and Young, Management Accounting, Prentice Hall of India, New Delhi.
2. Made Gowda, Accounting for Managers, Himalaya Publishing House, New Delhi.
3. Arora, M.N., Advanced Cost and Management Accounting, Himalaya Publishing House, New Delhi.
4. Manash Gupta, Cost Accounting Principles and Practices, Pearson Education, New Delhi.
5. Kulshrestha, N.K.., Management Accounting, Tata McGraw Hill New Delhi.
6. Maheswari, S.N., Principles of Management Accounting, S. Chand Publications, New Delhi.
7. Prashantha Atma, Cost and Management Accounting, HPH.
8. Sharma, R.K. and Guptha, S.K. Management Accounting, Kalyani Publishers, Ludhiana.

302: CORPORATE TAX AND GST

Objective: The objective of this paper is to describe the theoretical and practical knowledge of taxation to the students.

UNIT- I: Introduction: Meaning - Definition – Brief History of Tax – Types of Taxes – Basic Concepts – Objectives – Principles – Legal Framework – Advantages and Disadvantages of Taxation – Tax Planning – Tax Avoidance – Tax Evasion – Tax Management – Income – Types of Income –Penalties and Prosecutions – Tax Reforms (Theory only)

UNIT- II: Company Taxation: Introduction – Definition- Features – Types of Companies – Residential Status of a Company – Incidence of Tax – Income Sources – Agricultural and Non-agricultural – Income Computation of Gross Total Income of a Company – Tax Deductions U/S 80 – Carry Forward and Set Off - Accumulated Tax (Theory & Problems)

UNIT- III: Goods and Service Tax (GST): Concept – Types of GST – Features of GST - Advantages and Disadvantages – Comprehensive structure of GST Model in India – Registration under GST – GST Migration - GST Slabs in India – Transactions Covered under GST – Items Exempted from GST - Changes in GST since Beginning. (Theory only)

UNIT- IV: GST Execution: Input Tax Credit – Distribution of Tax – Tax Invoice in GST – GST Composition Scheme – GST Returns - Reverse Change Mechanism in GST - GST on Exports and Imports –Taxes on Outside the Purview of GST. (Theory only)

Suggested Books

1. Monica Singhania Vinod K Singhania, Students Guide to Income Tax, 57th Edition (2017-18), July 2017,
2. Vinod K. Singhania, Indirect Tax Laws, Taxmann Publications.
3. Gaur, V.P. Narang, D.B. Gaur, Puja Puri, Rajeev, Income tax Law and Practice, Kalyani Publishers
4. R.G. Saha, Taxation, Himalaya Publishing House Pvt. Ltd.
5. Joy Dhingra, Goods and Services Tax Fundamentals, 2017, Kalyani Publishers.
6. Dr. Thomas Joseph Thoomkuzhy, Dr. Jaya Jacob M., Ms. Chinnu Mariam Chacko, GST The Essentials of Goods and Services Tax: 2017, Himalaya Publishing House.
7. V S Datey, GST Ready Reckoner: Enforced with Effect from 1-7-2017**,** July 2017 4th edition, Taxmann publication
8. The Central Goods and Services Tax Act, 2017, NO. 12 OF 2017 Published by Authority, Ministry of Law and Justice, New Delhi, the 12thApril, 2017.

303: ACCOUNTING PACKAGE - TALLY

Objective: Computer Application is useful for acquisition, processing and organization of data. Main aim of the subject is to make students know and learn about computers through its applications.

UNIT– I: Computerized Accounting: Meaning - Concept – Manual Accounting Vs Computerized Accounting – Significance of Computerized Accounting – Advantages and Disadvantages - Different Software Available in the Market; Tally ERP 9: Features – Components of Gateway of Tally – Creation of Company - Creation of Group - Voucher – Ledger.
Hands on Practice: Creation of a Company – Ledger Creation – Voucher entries

UNIT– II: Vouchers: Voucher – Recording of Transactions - Types of Vouchers – Accounting Voucher – Inventory Voucher – Contra Voucher - Customizing the Existing Vouchers – Alteration of Voucher.
Hands on Practice : Voucher entries – Voucher alteration – Customizing Voucher

UNIT– III: Report Generation: Generating the Reports from Tally: Trial Balance – Account Books – Profit and Loss Account – Balance Sheet; Statement of Accounts: Funds Flow Statement – Cash Flow Statement – Bank Reconciliation Statement – Ratio Analysis.
Hands on Practice: Generation of Trial Balance – Profit and Loss Account – Balance Sheet - Funds Flow Statement – Cash Flow Statement – Bank Reconciliation Statement – Ratio's

UNIT– IV: Goods and Service Tax: Central Goods and Service Tax – Central Excise Service Tax – SAD – CVD – AED – Surcharge and Cess – State Goods and Service Tax – VAT/Sales Tax – Entry Tax – Tax on Lottery - Surcharge and Cess – Purchase Tax – Entertainment and Luxury Tax – Integrated Goods and Service Tax.
Hands on Practice: Creation of CGST – SGST – IGST - Entry Tax – Surcharges

Suggested Books

1. Sulochana, M., Kameswar Rao, K., and Kishore, R., Kumar, Accounting Systems, Kalyani Publishers, Hyderabad.
2. Dr. Kiran Kumar, K.Tally ERP 9, Sri Vaibhava Publications, Hyderabad.
3. Arora J.S, Tally ERP 9 A Financial Accounting Package, 3rd 2017, Kalyani Publishers, Hyderabad.
4. Dr. Prajnadipta Das, Mr. Rasananda Mohanty, Mr. Debiprasad Dash, Computer Applications in Business: 2017, Himalaya Publishing House Pvt. Ltd.
5. Saha R. G., Computer Applications in Business: 2016, Himalaya Publishing House Pvt. Ltd.
6. Kiran kumar K., Tally 9, Laasya Publishers, Hyderabad.
7. Firewall Media, Tally 9.
8. Vishnu Priya Sing, Tally 9, Computech Publications Ltd. New Delhi.

304 [A]: SECURITY ANALYSIS & PORTFOLIO MANAGEMENT

OBJECTIVES: The objective of this paper is to enable the students to learn various methods analyzing securities and building portfolios under various economic environmental situations.

UNIT-I: Investment: Concept - Nature and Scope of Investment - Investment Avenues - Investment Process – Investment categories – Investment Vs. Speculation – Risk and return – Factors Influencing Risk - Measuring Risk and Return (Theory and Problems)

UNIT-II: Fundamental Analysis: Economic analysis - Industry analysis - Company Analysis: Analysing the Financial Statements; Technical Analysis: Fundamental Analysis Vs Technical Analysis – Dow Theory- Trend Analysis – Moving Averages – Relative Strength Index - Efficient Market Hypothesis – Random Wall (Theory and Problems).

UNIT- III: Valuation of Securities: Preference shares – Features – Types – Valuation of Preference Shares; Equity Shares – Features of Equity Shares – Valuation of Equity shares; Debt Securities – Features of Debt Securities – Types of Debt Securities – Valuation of Debt Securities. (Theory and Problems)

UNIT-IV: Portfolio Management: Definition of Portfolio - Portfolio Management - Nature and Scope of Portfolio Management - Process of Portfolio Management- Portfolio Analysis - Markowitz's Model – Sharpe's Index Model; Capital Market Theory - CAPM – Performance Evaluation : Sharpe Index - Trainer and Jensen Models – Portfolio Revision. (Theory and Problems)

Suggested Books

1. Donald E.Fischer and Ronald J.Jordan, Security Analysis and Portfolio Management, 6th Ed., Prentice Hall of India, 2000.
2. Prasanna Chandra, Security Analysis and Portfolio Management, 2th Ed., Tata McGraw Hill.
3. Bhalla, V.K. Investment Management, S. Chand Publications
4. Rustagi, R.P., Investment Management -Theory and Practice, Sulthan Chand & Sons, New Delhi.
5. Punithavathy Pandian, Security Analysis and Portfolio Management,
6. Preeti Singh, Security Analysis and Portfolio Management, Himalaya Publishing House – New Delhi
7. V.A.Avadhani, Security Analysis and Portfolio Management, Himalaya Publishers – New Delhi

304 [B] : MARKETING RESEARCH

Objective: The objective of this paper is to familiarize the students about the conceptual frame work of marketing research and its various issues.

UNIT-I: **Marketing Research:** Meaning and Importance - Marketing Information System – Marketing Decision Support System. Research Design – Introduction to Design of Experiments – Exploratory, Causative, Conclusive and Experimental Designs - Marketing Research Process – Sources and Methods of Gathering Marketing Information

UNIT-II: **Decision Making Tools :** Decision Theory – Decision Making Under Certainty, Risk, Uncertainty, Criteria of Decision Making – Pessimism, Realism, Optimism, Regret, Equiprobable, EMV, EOL, Cost and Value of Information, Determinants of ECPI, Utility as a Criteria of Decision Making – Decision Tree Analysis.

UNIT-III: **Non-Parametric Statistics in Research:** McNemar, Sign test – One and Two Samples, Run Test, Wilcoxon Matched Pairs Test, Mann - Whitney, Kolmorov – Simronov, Kruskal – Wallis Tests. Markov Analysis – Brand Switching and Loyalty, Transition Probability Matrix, Steady State Probability

UNIT-IV: Multi-Variant Analysis: Multiple Regression – Cluster Analysis – Objectives – Concept - Factor Analysis Model – Conducting Factor Analysis – and Determinants of Factors, Applications. Research Report – Preparation and Presentation

Suggested Readings

1. Zikmund, Exploring MR, Thomson 9th Edition, New Delhi
2. Malhotra, K. Naresh, Marketing Research – An Applied Orientation, Pearson Education, New Delhi
3. Burns and Bust, Marketing Research, Pearson Education, New Delhi
4. Cooper R. Donald and Schendler, Business Research Methods, Mc. Graw Hill Publications, New Delhi.

305 [A]: FINANCIAL MARKETS AND SERVICES

Objective: The objective of this paper is to provide to students an understanding of financial markets and institutions involved in providing services to the organizations.

UNIT-I: Financial System: Concept – Components - Structure of Indian Financial System – Financial Sector Reforms - Indian Banking System – RBI and its Functions – Monetary Policy - Role of RBI in Banking System - Commercial and Public Sector Banks – Private Sector Banks – Foreign Banks – Co-operative Banks - Development of Commercial Banking in UK, USA and India.

UNIT-II: Financial Markets: Money Market - Concept – Instruments – Recent Trends in Indian Money Market. Capital Market - Concept – Primary and Secondary Markets – Capital Market Mechanism – Listing and Delisting – Trading and Settlement – Government Securities Market – Role of SEBI in Financial Markets.

UNIT-III: Financial Services: Concept – Classification - Lease Finance - Consumer Credit and Hire Purchase Finance - Factoring Service – Venture Capital Finance – Housing Finance –Stock Broking, Credit Rating - Insurance: Life Insurance – Non life insurance.

UNIT-IV: Mutual Funds and Merchant Banking: Concept – Structure - Types - Designing and Marketing of Mutual Funds Schemes – SEBI Guidelines; Merchant Banking: Concept - Functions and Growth – SEBI Guidelines – Merchant Banking in India.

Suggested Books

1. Guruswamy, Financial Services and Markets, Thomson , New Delhi
2. Pathak: Financial Markets and Services, Pearson Educations.
3. Gordon and Natarajan, Financial Markets and Services, Himalaya Publishing House, New Delhi
4. Avadhani, Marketing of Financial Services, Himalaya Publishing House.
5. Khan M.Y, Indian Financial Markets & Institutions, TMH.
6. Bhole L.M, Financial Markets & Institutions, THM.
7. Clifford G, Financial Markets, Institutions, and Financial Services, PHI.
8. Meir Kohn, Financial Institutions and Markets, Oxford University Press.
9. Fobozzi & Modigliani, Capital Markets, Institutions and Instruments, PHI.
10. Mandura Jeff, Financial Markets and Institutions, West Publishing Company.

305 [B] : SERVICES MARKETING

Objective: The objective of this paper is to provide a deeper insight into the marketing management of companies in offering services as a product.

UNIT-I: Services Marketing: Introduction – Characteristics - Importance of Services - Classification of Services; Marketing Vs Physical Services - Services in the Modern Indian Economy –Growth of Services Sector

UNIT-II: Service Products and Pricing of Services - Introduction to 8 Ps of Marketing Mix – Services Market Segmentation - Service Products – Product Life Cycle Services - Branding of Services – Pricing of Services - Objectives – Methods - Problems in Pricing – Putting Service Pricing Strategies into Practice

UNIT-III: Distribution and Promotion of Services: Distribution in a Services Context- Service Delivery in Cyberspace - Decisions about Time and Place of Delivery - Modes of Delivery - Role of Intermediaries - Distribution Channels – Designing Communication Mix for Services - Objectives of Communication. Challenges and Opportunities

UNIT-IV: Service Quality Management: Service Quality Audit - GAP Model of Service Quality – Total Quality Services Marketing - Services Excellence.

Suggested Books

1. Christopher Lovelock, Services Marketing People, Technology, Strategy, Pearson Education, New Delhi.
2. Ramamohan Rao, K., Service Marketing , Pearson Education, New Delhi
3. The S.M., Services Marketing – Himalaya Publishing House, New Delhi
4. Bhattacharya – Services Marketing – Excel Publishers, New Delhi

OPEN ELECTIVE PAPER THEORY

OEPT: 306 – Offered by Other Departments

IV Semester

Paper code	Title of the Paper	Teaching Hours per Week	Credits	Exam Duration (Hours)	Marks		
					Internal Assessment	External Assessment	Total
401	Soft Skills for Career Development	4	4	3	25	75	100
402	Entrepreneurship Development	4	4	3	25	75	100
Electives							
403 (A)	Financial Derivatives	4	4	3	25	75	100
403 (B)	Retail Marketing Management	4	4	3	25	75	100
404 (A)	International Financial Management	4	4	3	25	75	100
404 (B)	International Marketing Management	4	4	3	25	75	100
405	Project Report and Viva-Voce	**	4		25 (Viva-Voce)	75 (Project Report)	100
Total		20	20		125	375	500

401: SOFT SKILLS FOR CAREER DEVELOPMENT

Objective: to equip students with the most needed soft skills, positive attitude, personality development skills, communication skills, time management and interview skills.

Unit-I: Soft Skills: Meaning - Importance – Selling Your Soft Skills – Identifying and Exhibiting Soft Skills – Improving Soft Skills – Train Yourself – Practicing Soft Skills; Career Planning: Meaning and Importance – Guidelines for Choosing a Career – Myths About Choosing a Career – Tips for Successful Career Planning - Goal Setting.

Unit-II: Personality Development Skills: Self Esteem**:** Characteristics – Causes of Low Self-esteem – steps to build positive self-esteem; Know Yourself – Importance of Know Yourself – Process of Know Yourself – SWOT Analysis – Benefits of SWOT Analysis; Body Language – Body Talk – Voluntary and Involuntary Body Language – Types of Body Language – Improving Your Body Language Positive Attitude - Steps in Building Positive Attitude – Obstacles in Developing Positive Attitude

Unit-III: Communication Skills: Art of Listening – Meaning – Benefits of Active Listening – Kinds of Listening - Factors that Hamper Listening – Poor Listening Habits – Tips For Listening; Art of Public Speaking – Importance of Public Speaking – Benefits of Public Speaking – Tips for Public Speaking; Art of Writing – Meaning and Importance – Creative Writing – Writing Tips – Drawbacks of Written Communication; Art of Letter Writing and E-mail; Resume/CV Preparation

Unit-IV: Interview Skills : Concept - Types of Interviews - Art of Facing Interview – Common Mistakes Commits at the Time of Interview; Quick Tips - Written Test - Group Discussion – Role Play - Dress Code & Appearance - Final Interview – Time Management- Ideal Way of Spending a Day - Time Savers - Time Wasters; Stress Management – Meaning – Effects of Stress – Kinds of Stress – Sources of Stress – How to Overcome Stress.

Suggested Books

1. Alex, K., Soft Skills – Know Yourself and Know the World, S. Chand Publishers, New Delhi.
2. Scot Ober, Contemporary Business Communication, Wiley India, New Delhi.
3. Parag Diwan, Business Communication, Excel Publications, New Delhi.
4. Hind, D., Transferable Personal Skills: A Student's Guide, Sunderland.
5. Pandey Shasthri, Personality Development and Communicative English, Himalaya Publishing House, New Delhi.
6. C. S. Rayudu, Communication, Himalaya Publishing House, New Delhi.
7. Biswajit Das, Business Communication and Personality Development, Excel Books.
8. K. Srinivasa Krishna & B. Kuberudu: Business Communication and soft skills, excel, Hyderabad, 2008.
9. Seghal, M.K. Business Communication, Excel Books, New Delhi.

402: ENTREPRENEURSHIP DEVELOPMENT

Objective: The objective of this paper is to coin the students about the conceptual framework of entrepreneurship development along with financial institutions aiding to Entrepreneurship Development in India.

UNIT-I: Entrepreneurship: Concept – Characteristics of an Entrepreneur – Functions – Types of Entrepreneur – Entrepreneur Vs. Manager - Entrepreneur Vs. Intrapreneur - Myths about Entrepreneurship – Role of Entrepreneurship in Economic Development - Problems of Entrepreneurship; Rural Entrepreneurship; Women Entrepreneurship.

UNIT-II: Entrepreneurship Development: Economic and Non-Economic Factors affecting Entrepreneurship Development - Government Actions - Entrepreneurial Motivation – Competencies - Mobility – Entrepreneurship Development Programmes (EDPs) - Growth of Entrepreneurship in India.

UNIT-III: Small Enterprises: Meaning - Objectives – Opportunities for Entrepreneurial Career – Role of Small Enterprises in Economic Development – Problems of Small Enterprises - Small Enterprise Process - Project Identification and Selection – Project Formulation – Project Appraisal – Financing - Government Policy for SSIs- Need for Tax Benefits- Tax Holiday; Investment Allowance; Tax Concessions for SSIs in Rural and Backward Areas; Startups – Role of Startups in Industrialization.

UNIT-IV: Institutional and Policy Initiatives for Promotion of ED: Introduction - Need for Institutional Finance – Commercial Banks - Other Financial Institutional**:** Central Level Institutions- KVIC; SIDO; NSIC Ltd; MUDRA, SIDBI; State Level Institutions – DIC - SFC-SSIDC - Venture Capital Institutions - Industrial Estates.

Suggested Books

1. Thomas, W. Zimmerer, Norman, M. Scarborough, Essentials of Entrepreneurship and Small Business Management, Pearson Education, New Delhi
2. Nandan, H., Fundamentals of Entrepreneurship, Prentice Hall of India, New Delhi
3. Vasant Desai, Dynamics of Entrepreneurship Development and Management, Himalaya Publishing House, New Delhi
4. Madhurima Lall, Shiksha Sahai, Entrepreneurship, Excel Books, New Delhi.
5. S.S.Khanka, Entrepreneurship Development, S.Chand publications, New Delhi.
6. Developing Entrepreneurship-Issues and Problems, NISIET, Hyderabad.
7. Jain and Varshney, Entrepreneurship Development-An Indian Perspective, HPH.
8. Schumpeter J, The Theory of Economic Development, Harvard University Press.
9. Hadimani R.N, Dynamics of Industrial Entrepreneurship, Ashish Publishing House.

403 (A) : FINANCIAL DERIVATIVES

Objective: The objective of this paper is to acquaint the student with the risk management techniques of derivative trading in Forex markets.

UNIT-I: Financial Derivatives: Meaning - Characteristics of Derivatives - Types of Derivatives: Forwards – Futures – Options - Swaps – Benefits and Risks of Derivative Markets – Participants - Development of Derivative Markets in India - The Regulatory Framework of Derivatives Trading in India; Hedging - Meaning – Objectives – Risk Management Strategies - Heading Instruments - Heading Fund Strategies.

UNIT–II: Forward Contract: Futures Contract - Types of Futures Contracts - Uses of Forward and Futures Contracting – Mechanics of Future Markets - Forward Contract Vs Future Contract - Determination of Forward and Future Prices on Commodities – Stocks - Stock Indices - Strategies in Futures Market: Interest Rate Future - Currency Future - Financial Futures - Commodities Future Marketing.

UNIT-III: Options: Meaning - Features - Options Vs Futures - Types of Options Contracts – Mechanics of Option Markets - Advantages and Disadvantages of Options - Option Pricing Models: Black Scholes Model - The Binomial Model - Factors Affecting the Pricing of Options – Trading Strategies involving Options: Spreads - Combinations and other Pay-offs.

UNIT-IV: Swaps: Meaning - Structure of Swaps - Types of Swaps - Interest Rate Swap - Types of Interest Rate Swaps - Uses of Interest Rate Swaps - Currency Swaps - Credit Swaps - Commodity Swaps - Equity Swaps.

Suggested Books

1. Keith Redhead Financial Derivatives – An introduction to Futures Forward, Options, Prentice Hall of India.
2. John C. Hull, Sankarshan Basu, Options, Futures and Other Derivatives, Seventh Edition, Pearson Education, New Delhi.
3. SC Gupta, Financial Derivatives: Theory Concepts and Problems, Prentice Hall.
4. Sudhindrabhat – Security Analysis and Portfolio Management –Excel Books.
5. Somakethan, T.V., Derivatives, Tata McGraw Hill., New Delhi.

403 [B] : RETAIL MARKETING MANAGEMENT

Objective: The objective of this paper is to enable the students to have a deeper insight and motivate them towards retail sector.

UNIT-I: Retailing: Meaning – Functions - Types of Retailing – Retailing Process - Factors affecting Retailing - Retail Management Strategy –Strategic Retail Planning Process - Emerging Trends in Indian Retailing

UNIT–II: Merchandise Management: Merchandise Planning – Sources of Merchandise - Allocation of Merchandise; Retail Pricing Strategies Promoting the Merchandise – Implementing an Advertising Plan

UNIT-III: Store Management: Objectives of a Good Store Design - Store Layout - HRM in Retail Organizations - Designing the Organization Structure for Retail Firm.

UNIT-IV: CRM in Retail Management: Prompt Delivery - Customer Satisfaction after Sales Services – Factors affecting Retailing in India - Retailing Opportunities in India

Suggested Books

1. Bajaj, Retail Management, Oxford University Press.
2. Gilberto, Retail Marketing Management, Pearson Education
3. Retail Management, Suja Nair, Himalaya Publishing House, New Delhi.
4. Retail Management, Swapna Pradhan, Tata McGraw Hill, New Delhi.

404 [A] : INTERNATIONAL FINANCIAL MANAGEMENT

Objective: The objective of this paper is to acquaint the students to the conceptual framework of international monetary system and foreign exchange risk analysis.

UNIT–I: International Financial Management: Concept – Importance - Nature and Scope - International Financial Environment – International Financial Instruments - Role of International Financial Manager - Finance Function - Emerging Challenges - Global Financial Markets – Recent Changes in Global Financial Markets.

UNIT–II: International Monetary System: Objectives – Regimes - Role of International Monetary Fund(IMF) – Sources of IMF – IBRD (World Bank)– International Liquidity - Domestic Vs Offshore Markets – Euro Markets - Economic Integration and Regional Trade Blocks- Types: SAARC - ASEAN - SAFTA - NAFTA - European Union.

UNIT–III: **Foreign Exchange Market:** Components of Foreign Exchange Market – Functions - Structure of the Forex Markets, Major Participants – Foreign Exchange Rate Mechanism – Factors Influencing Exchange Rates – Exchange Rate Quotations and Arbitrage - Foreign Exchange Market in India – Exchange Controls in India

UNIT–IV: **Foreign Exchange Risk and Exposure:** Exchange Risk Management – Concept - Types of Risk - Tools and Techniques of Foreign Exchange Risk Management; Exposure - Types of Exposures – Economic Exposure – Operating Exposure – Transaction Exposure.

Suggested Books

1. P.G.Apte, International Financial Market, Tata McGraw Hill Publishing House, New Delhi
2. Eun Choel and Risnick Bruce, International Financial Management, Tata Mcgraw Hill.
3. Madhu Vij, International Financial Market, Excel Books, New Delhi
4. V.K.Bhalla, International Financial Management, Anmol Publications, New Delhi
5. V.A. Avadhani, International Financial Management, Himalaya Publishing House.
6. Srivastava, R.M., Multinational Financial Management, Excel Publishers.
7. Jeff Madura, International Financial Management, Cengage Publishers.
8. Machi Raju, International Financial Management, Himalaya Publishing House.

404 [B] : INTERNATIONAL MARKETING

Objective: The objective of this paper is to make the students with a perspective of International Marketing, its environment and complexities.

UNIT-I: International Marketing: Scope and Significance of international marketing, The Strategic Importance of International Marketing, Differences between International and Domestic Marketing – International Market Environment – International Political, Social and Culture Environment.

UNIT-II: International Market Entry Strategies: Indirect Exploring - Domestic Purchasing - Direct Exporting - Foreign Manufacturing Strategies without Direct investment - Foreign Manufacturing Strategies with Direct Investment – International market Segmentation - Entry Strategies of Indian Firms.

UNIT-III: International Product Management: International product Positioning – Product Saturation Levels in global market - International Product Life Cycle. Global Advertising and Brand – Selecting an Advertising Agency – Personal Selling – Sales promotion – Public Relations and Publicity – Sponsorship Promotion.

UNIT-IV: International Marketing Channels: Channels – Distribution Structures – Distribution Patterns – Factors Effecting Choice of Channels – The Challenges in Managing an International Distribution Strategy – The Management of Physical Distribution of Goods.

Suggested Books

1. Michael Czinketa; International Marketing, 8/e, Thomson, 2007.
2. Philip R. Cateora, John L. Graham, International Marketing, Tata Mc Graw Hill Co., New Delhi
3. Subhash, C. Jain, International Marketing, 6/e, South-Western, 2006.
4. Vern Terstra, Ravi Sarathy, International Marketing, 8/e, Harcourt ASIA PVT. LTD., 2007.

405: PROJECT REPORT AND VIVA VOCE

Soon after the completion of 2nd semester end examinations, students are required to visit the Industrial units of their choice, prepare and submit project report on the concerned units at the end of the 4th semester but before the commencement of semester end examinations. After the completion of 4th semester end examinations, the students are required to take Viva-Voce examination. The Viva-Voce shall be conducted by a Committee consisting of the Head of the Department of Commerce, Chairman BOS and external examiner in the case of regular course. In case of self-supporting course, the viva-voce shall be conducted by a Committee consisting of the Head of the Department of Commerce, the Chairman BOS or his nominee, Coordinator and external examiner. The Marks shall be awarded 25 for Viva-Voce and 75 for Project Report.

OPEN ELECTIVE PAPER THEORY

The Commerce Department offers the following TWO papers for the students of other Departments as Open Elective Paper (CBCS)

Paper code	Title of the Paper	Teaching Hours per Week	Credits	Exam Duration (Hours)	Marks		
					Internal Assessment	External Assessment	Total
OEPT – 206	Stock Markets	4	4	3	25	75	100
OEPT – 306	Banking and Insurance Services	4	4	3	25	75	100

OPEN ELECTIVE PAPER THEORY

OEPT-206: STOCK MARKETS

Objective: The objective of this paper is to create awareness and practical exposure about Stock Market Operations.

UNIT-I: Stock Market: Concept - Importance of Stock Markets - Functions of Stock Markets - Types of Stock Markets - Bombay Stock Exchange – National Stock Exchange Other Stock Exchanges - Primary and Secondary Markets – Functions of SEBI in Stock Market Operations.

UNIT-II: Primary Market: Concept – Features - Types of New Issues - Initial Public offer (IPO) – Placement of Issues – Recent trends in Primary Market – SEBI Guidelines.

UNIT-III: Secondary Market: Concept - Features – Listing of Securities – Registration of Stock Brokers – Trading methods - Settlement – Stock Indices – Speculation - SEBI Guidelines.

UNIT-IV: Stock Exchange: Concept – Nature – Functions – Growth of Stock Exchanges – Dealings in Stock Exchanges – Organisation of Stock Market – Securities Contracts (Regulation) Act - NSDL – CSDL – Irregularities in Stock Market.

Suggested Books

1. Guruswamy, Financial Services and Markets, Thomson , New Delhi
2. Pathak: Financial Markets and Services, Pearson Educations.
3. Gordon and Natarajan, Financial Markets and Services, Himalaya Publishing House, New Delhi
4. Avadhani, Marketing of Financial Services, Himalaya Publishing House.
5. Aswathappa, Essentials of Business Environment, Himalya Publishing House 2008
6. Punithavathy Pandian, Financial services and markets, Vikas Publishing House

OPEN ELECTIVE PAPER THEORY

OEPT-306: BANKING AND INSURANCE SERVICES

Objective: The objective of this paper is to create awareness about the Banking and Insurance services which are rendering service in India.

Unit -I : Introduction of Banks: Definition - Function of Bank - Types of Banks - Co-operative Banks - Commercial Banks – Nationalisation of Commercial Banks - Regional Rural Bank - Reserve Bank of India - Functions of RBI – Role of RBI in Indian Banking System.

Unit-II: Banking Services: Concept – Classification – E-Banking - Credit Cards - Debit Cards – Digital Wallets - Personal Identification Number – Online Enquiry and Update facility- Electronic Fund Transfer.

Unit-III: Insurance Services: Concept - Objectives – Classification - Life Insurance – Types of Life Insurance Products; Health Insurance - Individual and Group Insurance – Life Insurance in India.

UNIT-IV: General Insurance: Concept – Fire Insurance - Automobile Insurance – Marine Insurance - Agricultural Insurance – General Insurance in India - Insurance Regulatory and Development Authority (IRDA) Act.

Suggested Books

1. Guruswamy, Financial Services and Markets, Thomson , New Delhi
2. Pathak, Financial Markets and Services, Pearson Educations.
3. Gordon and Natarajan, Financial Markets and Services, Himalaya Publishing House, New Delhi
4. Avadhani, Marketing of Financial Services, Himalaya Publishing House.
5. Principles of Risk Management and Insurance (Seventh Edition), Pearson Education
6. Koteswar G, Risk Management - Insurance and Derivatives, Himalaya Publishing House, New Delhi
7. P.K. Gupta, Insurance and Risk Management, Himalaya Publishing House, New Delhi.
8. T.T.Seth, Insurance Principles and Practices, S. Chand, New Delhi

YOGI VEMANA UNIVERSITY

I/II/III Semester M.Com Degree Examination, Month, Year

(Semester Scheme -CBCS)

COMMERCE

MODEL QUESTION PAPER (FOR PRACTICAL PAPERS 105, 205 & 303)

Paper no: Title of the Paper

Time: 2 Hrs Max. Marks: 50

SECTION – A

Answer any FIVE of the following questions.
Each question carries 2 marks (5 X 2 = 10)
Each answer should not exceed 1 page.

1.
2.
3.
4.
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6.
7.
8.

SECTION – B

Answer any ALL questions. Each question carries 10 marks (4 X 10 =40)
Each answer should not exceed 4 pages.

9.

(OR)

10.

11.

(OR)

12

13

(OR)

14

15

(OR)

16

YOGI VEMANA UNIVERSITY

I/II/III/IV Semester M.Com Degree Examination, Month, Year

(Semester Scheme -CBCS)

COMMERCE

MODEL QUESTION PAPER

(FOR OTHER THAN PRACTICAL PAPERS)

Paper No: Title of the Paper

Time: 3Hrs Max. Marks: 75

SECTION – A

Answer any FIVE of the following questions.
Each question carries 3 marks (5 X 3 = 15)
Each answer should not exceed 1 page.

1.
2.
3.
4.
5.
6.
7.
8.

SECTION – B

Answer any ALL questions. Each question carries 15 marks (4 X 15 =60)
Each answer should not exceed 6 pages.

9.

(OR)

10.

11.

(OR)

12

13

(OR)

14

15

(OR)

16

Panel of Subject Experts in Commerce

1. Prof. A.V. Ramana, Department of Commerce, S.K. University, Anantapur
2. Prof. B. Amarnath, School of Business Management, SV University, Tirupati
3. Prof. Shobha Rani, Department of Commerce, S.K. University, Anantapur
4. Prof. Anjaneyulu, Department of Commerce, S.K. University, Anantapur
5. Prof. B. Krishna Reddy, Department of Management, S.K. University, Anantapur
6. Prof. K. Ramakrishnaiah, Department of Commerce, S.V. University, Tirupati
7. Prof. P.R. Sivasankar, Department of Commerce, PG Centre, V.S. University, Kavali
8. Prof. M. Chandraiah, Department of Commerce, PG Centre, V.S. University, Kavali
9. Prof. K. Venkata Rao, Department of Commerce, V.S. University, Kavali
10. Prof. M. Rajasekhar, Department of Commerce, S.V. University, Tirupati.
11. Prof. P. Mohan Reddy, Department of Commerce, S.V. University, Tirupati
12. Prof. B. Ramachandra Reddy, Department of Commerce, S.V. University, Tirupati.
13. Prof. P.V. Narasaiah, Department of Commerce, S.V. University, Tirupati.
14. Prof. M. Venkateswarlu, Department of Commerce, S.V. University, Tirupati.
15. Prof. K. Jayachandra Reddy, Department of Commerce, S.V. University, Tirupati.
16. Prof. G. L. Narayanappa, Department of Commerce, Dravidian University, Kuppam.
17. Prof. M. Sudeer Reddy, Department of Management, JNTU, Hyderabad.
18. Prof. B. Vijaya Lakshmi, Department of Business Management, Mahila University, Tirupati.
19. Prof. Shankaraiah, Department of Commerce, Osmania University, Hyderabad.
20. Prof. K. Sambasiva Rao, Department of Commerce, Andhra University, Vizag.
21. Prof. R. Satya Raju, Department of Commerce, Andhra University, Vizag.
22. Prof. G. Satyanarayana, Department f Commerce, Andhra University, Vizag.
23. Prof. P. Paramasivaiah, Department of Commerce, Tumkur University, Tumkur.
24. Prof. G. Sudarsana Reddy, Department of Commerce, Tumkur University, Tumkur.
25. Prof. B.Sekhar, Professor, Department of Commerce, Tumkur University, Tumkur.
26. Prof. P. Murali Krishna, Department of Management, S.K. University, Anantapur.
27. Prof. C. Viswanatha Reddy, Department of Management, Rayalaseema University, Kurnool.
28. Prof. H. Lajipathi Rai, Department of Commerce, S.K. University, Anantapur
29. Prof. C.N.Krishna Naik, Department of Management Studies, S.K. University, Anantapur – 515 003.
30. Prof. P.Prem Chand Babu, Department of Management Studies, S.K. University, Anantapur – 515 003.
31. Prof. K.Venugopala Rao, Department of Management Studies, S.K. University, Anantapur – 515 003.
32. Prof. P.Murali Krishna, Department of Management Studies, S.K. University, Anantapur – 515 003.
33. Prof. B.Anitha, Department of Management Studies, S.K. University, Anantapur – 515 003.
34. Prof. B.R.Megharaj, Department of Management Studies, S.K. University, Anantapur – 515 003.

35. Dr.D.Prabhakar, Assistant Professor, Department of Management Studies, S.K. University, Anantapur – 515 003.
36. Dr.Ch.Krishnudu, Assistant Professor, Department of Management Studies, S.K. University, Anantapur – 515 003.
37. Dr.V.Sailaja, Assistant Professor, Department of Management Studies, S.K. University, Anantapur – 515 003.
38. Prof. V. Chandrasekar Rao, Department of Commerce & Management Studies, A.N. University, Guntur.
39. Prof. Noor Basha Abdul, Department of Commerce & Management Studies, A.N. University, Guntur.
40. Prof. G.V. Chalam, Department of Commerce & Management Studies, A.N. University, Guntur.
41. Prof. D. Suryachandra Rao, Department of Commerce, Krishna University, Krishna University, Machilipatnam.
42. Prof. S. Guruswamy, Professor & HOD, Department of Commerce, University of Madras, 94442 15777
43. Prof. S. Kamaleswar Rao, Department of Commerce & Business Management, Kakatiya University, Warangal.
44. Prof. N. Kusuma, Department of Commerce & Business Management, Kakatiya University, Warangal.
45. Prof. S. Teki, Department of Management Studies, Adikavi Nannaya University, Rajahmundhry.
46. Dr. N Udaya Bhaskar, Head & Assistant Professor, Department of Management Studies, Adikavi Nannaya University, Rajahmundhry.
47. Dr. P Uma Maheswari Devi, Assistant Professor, Department of Management Studies, Adikavi Nannaya University, Rajahmundhry.
48. Prof. K. Shankaraiah, Dean Faculty of Commerce & Management, Mahtama Gandhi University
49. Prof. M.Yadagiri, Professor, Department of Commerce, Telangana University, Nizamabad.
50. Ms .G Alice Joy, Assistant Professor, Department of Commerce, Adikavi Nannaya University, Rajahmundhry.
51. Dr. M Ramesh, Assistant Professor, Department of Commerce, Adikavi Nannaya University, Rajahmundhry.
52. Mr. A Srinivasa Rao, Assistant Professor, Department of Commerce, Adikavi Nannaya University, Rajahmundhry.
53. Dr. G. Rambabu, Asst. Professor, Department of Commerce, Telangana University, Nizamabad.
54. Prof M. Subramanya Sharma, Department of Commerce & Business Management, Kakatiya University, Warangal – 506009
55. Prof V.V.Subrahmanya Sharma, Department of Commerce & Business Management, Kakatiya University, Warangal – 506009
56. Prof S. Kamaleswar Rao, Department of Commerce & Business Management, Kakatiya University, Warangal – 506009

57. Prof .D. Sakriya, Department of Commerce & Business Management, Kakatiya University, Warangal – 506009
58. Prof .N. Kusuma, Department of Commerce & Business Management, Kakatiya University, Warangal – 506009.
59. Prof. Dr.M.Ramachandra Gowda, Department of Commerce, Bangalore University, Bangalore.
60. Prof. M. Muniraju, Department of Commerce, Bangalore University, Bangalore.
61. Prof. M.Muninarayanappa, Department of Commerce, Bangalore University, Bangalore.
62. Dr. C. Srinivas Rao, Associate Professor, Department of Commerce, PG Centre, V.S. University, Kavali
63. Dr. KVSN Jawahar Babu, Asso. Professor, Dept. of Tourism Management, Vikramasimhapuri University, Nellore.
64. Dr. K. Neelamanikanta, Asst. Professor, Dept. of Tourism Management, Vikramasimhapuri University, Nellore.
65. Dr. M. Tyagaraju, Asst. Professor, Dept. of Tourism Management, Vikramasimhapuri University, Nellore.
66. Dr. P. Sujatha, Asst. Professor, Dept. of Tourism Management, Vikramasimhapuri University, Nellore.
67. Dr. S. Suja Nair, Asso. Professor, Dept. of Management, Vikramasimhapuri University, Nellore.
68. Dr. P. Chenchu Reddy, Asst. Professor, Dept. of Management, Vikramasimhapuri University, Nellore.
69. Ms. J. Vijetha, Asst. Professor, Dept. of Management, Vikramasimhapuri University, Nellore.
70. Ms. G. Sai Sravanthi, Asst. Professor, Dept. of Management, Vikramasimhapuri University, Nellore.

SYLLABUS OF M. Sc., (PSYCHOLOGY)COURSE

Department of Psychology

YOGI VEMANA UNIVERSITY

Vemanapuram, Kadapa-516 005

15141-Core

GENERAL PSYCHOLOGY

Unit – I: Psychology as science

Definition, nature, scope and aims of Psychology- The rise of experimental psychology,- The schools of psychology (Structuralism, Functionalism, Behaviorism, Psychoanalytic)-Methods of Psychology – Introspection method, observation method, Survey method, case study method, experimental method and Correlational method

Unit-II: Physiological basis of behaviour -

The structure of neuron- Varieties of neuro transmitters- Central and Peripheral nervous system- Autonomic Nervous system. Structure and functions of brain- Limbic System- Endocrine glands – Effects of over and under secretion of glands.

Unit III :Sensation, Perception & Learning

Sensation & Perception: Meaning of Sensation- Types of Sensation - Definition of Perception – Factors influencing Perception (Physiological and Psychological)- Perception and Illusion.

Learning: Definition and Nature - Learning theories, Pavlov, Thorndike, Skinner, Types of Learning – Conditioning , Habitual , Insight- Transfer of Training .

Unit – IV: Motivation and Emotion

Motivation:- definition and Nature - Instinct , drive, needs, incentive, motive, Classification of motives- Theories of Motivation:- Instinct theories – Freud & Mc Dougal; Need hierarchy theory – Maslow,

Emotion: Nature, kinds of emotions- physiological basis of emotion. Theories of emotion: The James – Lange theory – The Cannon – Bard theory.

Reference:

A. Baron – Robert . A(2005) Psychology. Printice hall of India Pvt. Ltd., New Delhi.
B. Feldman, Robert. S(2004). Understanding Psychology, Tata Mcgraw Hill company Ltd., New Delhi.
C. Ghorpade, M.B. – Essentials of Psychology, Publishing house, Bombay 1977
D. Goleman. D. (1995) Emotional Intelligence, Bantam, New York.
E. Singh. Y.Bharava .M (1990) Manual for Emotional Mturity Scale, Naional Psychological conformation., Agra.

15142-Core

SOCIAL PSYCHOLOGY

Unit – I : Introduction to Social Psychology

Definition, Historical origins; Relationship with other social sciences-(Sociology, Economics, Political Science and Anthropology); Research methods in Social Psychology (Field Research, survey research, Archival Research, Correlational Research, observational research).

Unit – II: Social Perception and Social Cognition

Person perception; Attribution: Understanding the causes of others beahviour, Kelly's theory; Bem's theory; Regulatory focus theory. Impression formation and impression management. Schemas; Mental frame works. Interpersonal attraction. Communication system in humanbeings Nonverbal communication; The language of expression

Unit – III: Socialization

Definition, Motive and behaviour, Agencies of socialization (Parents, Peergroup, school and media) Sexual motives, Sex role identity , Psychological Androgyny, Dependency, Moral development, Self-Esteem, Self concept.

Unit – IV: Attitudes

Nature and formation of Attitudes, Functions of Attitudes; Theories of attitudes; Reinforcement theory; Balance theory; Cognitive dissonance theory; Measurement of attitudes; Self measures; Likert, Thurston Osgood and Bogardus scales: Physiological measures.

References:-

1. Baron, R.A., & Byrne, D. Socail Psychology Understanding human Interaction, Prentice- hall of Indian Pvt. Ltd, New Delhi, 1998.
2. Ray & Baumeister. Social Psychology. Censage.
3. Lipp, R.A. Introduction to social Psychology. Words worth publishing company, Balmont, California.
4. Lambeerth, Social Psychology: The theoretical approach.
5. Seidenberg, B., & Sandowsku, A. Social Psychology. An introduction.The free press, Macmillan publishing Co., Inc., 1976.

15143-Core

ABNORMAL PSYCHOLOGY

Unit I: Meaning and definition of abnormality

Definition and Criteria of abnormality-Historical background- Brief overview of classification- DSM IV and ICD – 10, Advantages and disadvantages of classification, Problem of Diagnosis.

Unit II: Different Perspectives of abnormal behaviour

Psychoanalytical Perspectives- Freud's Psychoanalytical theory- Jung's analytical theory- Adler's Individual psychology- Behavioristic perspective- Skinner's operant theory- Bandura social learning theory- Humanistic Existential perspective- Maslow need Hierarchy theory- Cognitive perspective – Beck and Ellis

Unit III: Nature of causation of Abnormalities

Causes of Abnormal Behavior: Biological causes: Constitutional, neurophysiologic and Biochemical Psychological Causes: Pathogenic causes, Pathogenic Interpersonal relationships. Socio – culture causes: Social class, Social roles, and Cultural factors. Predisposing, Precipitating reinforcing, Feedback and circularity of Causes

Unit IV: Classification of Mental Disorders

Psycho -Neurosis- Causes and Aetiology-Psychoses- Causes and Aetiology Anxiety disorders- Somatoform disorders: Functional disorders- Mood disorders, Personality disorders, psychosomatic disorders.

Readings:

a) Sarason I.G. and Sarason B.R. (2002) Abnoraml Psychology, 11 Edition. PHI Ltd.,
b) Sarason W. Gray & Marilym R. Zide. Psychopathology : Competency based assessment model for social workers. Cenage.
c) Comar J.R (1998) Abnormal Psychology.
d) Seligman N.H. (2001) Abnormal Psychology
e) Sultz D. (1976) Theories of Personality.

15144-Core

PSYCHOLOGICAL MEASUREMENT-I

Unit-I **Nature of Psychological Measurement**

Definition and Advantages of Measurement -History of Measurement -Scales of Measurement-The Nominal Scale-The ordinal scale-The interval scale-The ratio scale-Nature of Psychological Variable- Mental test tradition-Psycho Physical tradation

Unit-II **The Psycho- Physical Methods**

Method of Average Error-Constant and Variable Errors- Evaluation of the Method-The Methods of Minimal Changes-the Difference Limen -Evaluation-The Method of Constant Stimuli-Determining the Absolute Limen -Determining the Difference Limen -Evaluation

Unit-III **Psychological Scaling Methods**

Psychological Scaling methods-Principles of Scaling of Paired Comparisons-Method of Rank Order-Method of Successive Categorizes- Method, Evaluation advantages.

Unit-IV **Rating Scales**

Rating Scales-Types of rating scales-Problems in the constructions of Rating scales and uses; Errors and their control-some special features of rating scales- Evaluation of rating scales

References:

a) Psychological Testing – 7th Edition- Anaesthesia. PHI
b) F.S. Freeman: Psychological Testing, 3 rd edition , Oxford and IBH pubilications, Co.Pvt. Ltd., New Delhi.
c) J.P. Guillford: Psychometric methods, Tata- McGraw- Hill publishing Co. Ltd. New Delhi.
d) Ramamurti, P.V. 2014. An Introduction to Psychological measurements. Delhi: PHI Learning Private Limited.

25141-Core

COGNITIVE PSYCHOLOGY

Unit – I : The Study of Cognition

Definition of Cognitive Psychology- Historical origins of Cognitive Psychology: The Philosophical Background: Early Greek Philosopher – Descartes; Locke; British Associationism; Kant. Associationism in Psychology: Contributions of Ebbinghaus. The twentieth century Associationism. The Gestalt view, Bartlett's outlook.

Unit – II Attention and Memory

Attention: Selective attention – Kinds of Attention- Barriers of Attention- Memory: Definition, Types of Memory- Working memory, Semantic memory, Picture memory and Verbal memory, Remote Memory, Procedural memory etc.Theories of forgetting.

Unit – III: Concept Formation and Problem Solving

Concept formation- Process in concept formation – Analytical and non analytical strategies- Determinants of concept formation.Problem Solving: Functional fixedness, Organization and insight Syllogistic reasoning; Strategies for problem solving- Role of reasoning.

Unit – IV: Creativity and Intelligence

Creativity; Creative process, creativity and functional fixity, Investment theory and creativity – Judging creativity' Intelligence: Definition and nature – Factors influencing intelligence: Spearman, Thurston and Guilford's Gardner's Theory of multiple intelligences – Stenberg's Triarchic theory – Measurement of Intelligence.

References:

A. Michael G. Wessel Cognitive Psychology Harper and Row Publishers, New York, 1982.
B. Robert l. Solso. Cognitive Psychology, Sixth Edition , Pearson Education, Delhi 2004.

25142-Core

APPLIED SOCIAL PSYCHOLOGY

Unit. I: Social Influence and Social Exchange

Conformity, Asch's conformity studies; Explaining conformity; Compliance; why people comply; Obedience; Milgram's Studies. modeling; cooperation, competition, bargaining, conflict resolution.

Unit. II: Prejudice and Discrimination

Definition and Nature of Prejudice and Discrimination – Origin of Prejudice (Cognitive and Social) – Challenging Prejudice – Prejudice based on Gender – Forms of Discriminatory behavior

Unit. III: Aggression,

Definition and Nature-Theoretical perspectives on Aggression; The role of biological factors Drive theories and modern theories of aggression-Determinants of human aggression; social, personal and situational determinants- Prevention and Control of aggression.

Unit. IV: Environment and Behavior

Urban environment and social behavior, Effect of noise, Temperature, Weather, Light and Air pollution. Crowding-Long term effects of crowding. Theories of crowding.

References :-

1. Baron, R.A., & Byrne, D. Social Psychology: Understanding human Interaction, Prentice – hall of Indian Pvt. Ltd. Ew Delhi, 1988.
2. Lipp, R.A. Introduction to social psychology wordsworth publishing company , Balmont, California.
3. Lambeerth, social psychology: the theoretical approach.
4. Seidenberg, B., Sandowsku, A. social psychology. An Introduction. The Free Press, Macmillan publishing Co. Inc., 1976.

25143-Core

CLINICAL PSYCHOLOGY

Unit I: Foundations of Clinical Psychology

Definition and scope of Clinical Psychology - History of Clinical Psychology, Current status and Professional issues- Methods of Clinical Psychology.

Unit II: Models of Clinical psychology

Models of Clinical psychology- five models of clinical psychology (Psycho-dynamic/ cognitive/behaviorist/ humanist/ gestalt-based and systematic

Unit III: Major clinical disorders

Clinical child Psychology: Clinical issues, Behavioural Disorders, Emotional Disorder, Developmental and Learning Disorder – Clinical Neuro-psychology:- Symptômes and Syndromes; Delirium, Dementia, Amnesic syndrome, Neuro-psychological Delusional syndrome, Neuro-psychological syndrome, Neuro-psychological disorder with HIV – 1 infections.

Unit IV: Clinical Assessment and Psycho diagnostics

Signs and symptoms of Mental disorders; Intellectual Assessment; Personality Assessment; Neuropsychological Assessment; Clinical interviewing and testing. Psycho-diagnostics- intake/ an amnesis - developing hypotheses - selecting criteria and materials (tests, questionnaires, observations etc.)

Readings:

- Diagnostic and Stastical Manual disorders: 4th editon (2000) Washington, D.C.: American Psychometric Association.

A. Heeker, J.E. & Thrope, G.L. (2005) Introduction to clinical Psychology: Science, Practice and Ethics, Delhi; Pearson Edn.

B. Kendall, P.C. & Norton – Ford, J.D. (1982) Clinical Psychology Scientific and Professional Dimension: Chicester. John wiley.

C. Nietzel M.T., Bernstein, D.A., & Milich R. (1998) Introduction to clinical Psychology 5th edition, Trentice Hall, New Jersy.

D. Prabhu G.G. (1983) Then Now India Journal of Clinical Psychology.

E. The ICD -10 classification of Metal and Behaviouraldisorders. Clinical Descriptions and diagnostic guidelines (1992) W.H.O. Geneva.

25144-Core

PSYCHOLOGICAL MEASUREMENT-II

Unit-I Psychological Testing-History of Psychological testing-Characteristics of a Psychological Test-Uses of Psychological test.

Unit-II Test Construction-Item Content-Development of norms- Types of norms-percentile-Age norms-Grade Norms-Interpretation of Norms-Profile-Test administration-Test Selection-Role of Rapport.

Unit-III Psychological Testing –Reliability- types of Reliability-validity-Types of validity-Importance of item Analysis-Item difficulty- Item Validity-Item Discrimination.

Unit-IV Classification of Psychological Tests - Intelligence-Aptitude Tests-Tests of Interest -Personality Tests- Projective Techniques(TAT, Rorschach etc.)

1. Anaesthesia. Psychological Testing – 7th Edition- PHI
2. F.S. Freeman: Psychological Testing, 3 rd edition , Oxford and IBH publications, Co.Pvt. Ltd., New Delhi.
3. J.P. Guillford: Psychometric methods, Tata- McGraw- Hill publishing Co. Ltd. New Delhi.
4. Ramamurti, P.V. 2014. An Introduction to Psychological measurements. Delhi: PHI Learning Private Limited.

2514OE -Open Elective (for students of other departments)

PERSONALITY DEVELOPMENT

Unit-I: Definition of Personality –Nature of Personality - Determinants of Personality (Heredity/ Environment/ Situations)- Role of Emotions on Personality Development.

Unit-II: **C**oncept of self, self and Ideal self**,** Self confidence- Self acceptance and self growth - Motivation – sources of motivation – Performance appraisal – Types and application

Unit-III: Definition and Nature of Leadership – Leadership styles-skills – Communication-Intra personal communication and body language- Inter personal communication and relationships- Communication skills .

Unit-IV: Conflict: Meaning and Nature- levels of conflict; interpersonal and intra personal; Conflict Management; Concept of stress, causes and management

References:

- Guilford J.P. .Personality. Mc Graw Hill Book company Inc 1959.
- Hariharan et al., . Soft skills. MJP Publishers: Chennai, 2010.
- Hurlock E.B . Personality Development. Tata Mc Graw Hill Publishing company New Delhi – 1976.
- Janis, Irving and others . Personality Dynamics, Development and Assessment. New York. 1969

35141-Core

PERSONALITY-I

Unit – I: Definition and Nature

Definitions of Personality- Nature of Personality-Characteristics of Personality - Role of Endocrine system-Pituitary-Thyroid-Parathyroid-Adrenal-Gonads- Importance of Socialization.

Unit – II: Determinants of Personality(Physical/Intellectual/Emotional)

Physical Determinants(Body build attractiveness and physical changes etc.,) Intellectual(Intellectual development/ intellectual capacities etc.) Emotions and personality.

Unit – III: Determinants of Personality (Social/ Educational/Family)

Social determinants (Social experiences /social deprivation / social acceptance etc.,) Sex determinants (Effects of sexuality/ interest in sexuality/ attitudes etc.,); Educational determinants (attitude towards education/ readiness for school/ academic success etc.,)

Unit – IV: Assessment of Personality

Observation,Situational Performance Tests, Interview,Questionnaire Method-Personality Inventory, Rating Scales- Case History.

References:

a. Guilford J.P. “Personality” Mc Graw Hill Book company Inc 1959.
b. Hurlock E.B ”Personality Development” Tata Mc Graw Hill Publishing company New Delhi – 1976.
c. Janis, Irving and others “Personality Dynamcs, Development and assessment New York 1969 ”
d. Lazarus R.S. “Personality” prentice – hall INC Second edition 1971.
e. Stranger R. Psychology of Personality McGraw Hill Book company 1974, Fourth edition.

35142-Core

DEVELOPMENTAL PSYCHOLOGY-I

Unit-I: Foundations of Developmental Psychology
Concept of growth-Development and Maturation-Principles of Development-Role of Heredity and Environment-Prenatal Development.

Unit-II: Infancy and Babyhood
Characteristics of Infancy- Developmental Tasks- Physical and Cognitive Development , Socio- emotional Development- Hazards of infancy- Characteristics of early childhood – Developmental Tasks – Speech development - Emotional behavior- Developments in socialization - Hazards in babyhood.

Unit-III: Childhood
Characteristics of Early childhood- Developmental tasks –Physical development- skills – Emotional behavior -Moral development in early childhood- Personality development- Hazards of early childhood- Characteristics of Late Childhood – Developmental Tasks – Physiological Habits – Skills – Emotions Socialization – Play understanding – Sex-role Tying – Family Relationships – Personality – Hazards and Happiness in late Childhood.

Unit- IV: Puberty
Characteristics of Puberty – Criteria - Causes - Growth Spurt – Body changes at Puberty – Effects of Puberty changes and psychological consequences – Sources of Concern – Hazard and unhappiness at Puberty.

REFERENCES:

1. Hurlock. E.B (1980) Development Psychology: A Life Span Approach (Fifth Ed) New Delhi: Tata Mc Graw Hill Pub. co. Ltd.
2. Santrock, J.W (1997) Life – Span Development (sixth Ed) Chicago: Brown Mark.

35143-Core

COUNSELLING PSYCHOLOGY-I

Unit I : Introduction to Counseling

Concept and Definition of Counselling – Counselling as helping profession and related fields – Guidance , Psychotherapy, Clinical Psychology and Social work - Factors contributing to the emergence of Counselling- History of counselling movement- Present status of Counselling in India

Unit II : Goals , Characteristics and Types

Goals and expectations of Counselling – Roles and functions of counselor - The characteristics of an effective counselor- counselor skills- Characteristics of a Counselee – Developmental determinants, tools of counseling – Types of Counselling – Individual / Group counselling.

Unit III: Counseling process and Counselling Techniques

Phases of Counseling-Client- Counselee Relationship- Counseling setup (Influence of external conditions) Individual skills-Group Counseling-Dealing with Specific situations.

Unit IV: Legal and Ethical Considerations in Counselling

Conflicting responsibility – Confidentiality- Competence and representation and ethics in research – legal considerations- the legal recognition of counselors – Privileged communications – Expert Testimony and liability for negligence or malpractice.

Reference:

- Bhatnagar, A & Gupta, N .(1999). ***Guidance and Counselling. A Theoretical perspective.*** Vikas Publishing House: New Delhi.
- Gibson, R.L & Mitchell, M.H. (2006). ***Introduction to Counselling and Guidance.*** Prentice Hall of India Ltd., : New Delhi.
- Nelson, Richard Jones. (2011). ***Theories and Practice of counseling Therapy.*** 5th Edition. Sage Publications: New Delhi.
- Richard nelson jones (2008) ***Basic counseling skill's a Helpers manual.*** 2nd edition. New Delhi:Sage Publications India limited.
- S. Naryana Rao (1997) ***Counselling and Guidance***. Tata Mc. Graw-Hill.

35144- Core

HEALTH PSYCHOLOGY

Unit I :Introduction to Health Psychology

Definition - Scope– Health psychology as a new field –- Health Psychology and other fields- Emergence of Health Psychology- Research methods in Health psychology – Correlational studies – Cross sectional and longitudinal studies – Experimental designs.

Unit II: Models of Health and Health Behaviour

Illness and Personality –Allport, Roger, Maslow; Bio-Psychosocial perspectives- Eastern Approaches: Concept of Sthitha Prajna (Bhagvadgeeta), Concept of Anasakti. Health Behavior and Primary preventions-Changing health habits – Behavioral approaches. Transtheoretical model, and Social engineering – Health enhancing behaviors.

Unit III: Health Promotion and Disease Prevention

Behavioral Risk factors (Food and eating/ alcohol and drinking/ unsafe sexual behavior, Tobacco and smoking /sedentary life style). Development of Health habits - Approaches to Health Promotion – Behavioral change approach, Self–empowerment approach, Collective action approach.

Unit. IV: Health Services

Concept of Health Service – Perceiving and Interpreting systems – Uses and misuses of health services – The Patient-Practitioner relationship – Medical advices – Psychological problems of hospitalized patients. Role of Government and NGOs

References:

- Hans Selye (Ed.) (1980). ***Selyes Guide to Stress Research***. Van Nostrand Reinhold Company: NY.
- Baron, R.A ., and Byrne, D. (1999).***Social psychology***. Prentice Hall of India Private Ltd.
- Taylor, S.E. (2006). ***Health Psychology.*** 6th edition: Tata McGraw Hill, New Delhi.
- Jame Ogden. (2010).***Health Psychology.*** 6th Edition. Tata McGraw Hills.

3514OE -Open Elective (for students of other departments)

CAREER GUIDANCE

Unit I: Definition of Guidance **–** Principles of Guidance Need and scope of guidance- Areas of guidance-educational , vocational ,personal, Social, Moral and Health- Agencies of Guidance(International/ national/ State /Local)

Unit II: Types of Guidance-Individual Guidance-Group Guidance-Guidance for Special need Groups (Mentally Challenged and Slow Learners)

Unit III: Guidance and counseling **-** Definition and goals of counseling- characteristics of a good Counselor- Stages and functions of Counseling.

Unit IV: Career Guidance and Goals-Career planning-Career Development-Career Management-Factors Influencing career and life (Personality, Interest, and Aptitude)

References:-

- Shertzer.N., and Stone S.C. (1971) Fundamentals of counseling. Houghton and Mifin company: New York.
- Narayana Rao.S. (1975). Principals of Guidance and Counselling

45141- Core

PERSONALITY-II

Unit I: Nature of Personality theories

Personality theory and history of Psychology- What is a Personality theory – Personality theories and other psychological theories – Comparison.

Unit – III: Theories of Personality - Type and Trait

Type Theories (Hippocrats/Kretschmer's classification /Sheldon's classification) and Trait Theories - Allport / Cattell/ Guilford /Eysenck's classification.

Unit – III: Theories of Personality

Freud's Psycho Analytical Theory Structure and dynamics- Psycho-sexual development – Jung's theory –Adler theory-Erikson's theory.

Unit – IV: Assessment of Personality

Projective Techniques-Word association test- Sentence completion test – Rorschach Ink blot test- TAT(Thematic Apperception Test)-CAT(Children Apperception Test)- Psycho-drama- Socio- drama –Draw a Man Test-Doll play.

References:

a. Guilford J.P. "Personality" Mc Graw Hill Book company Inc 1959.
b. Hurlock E.B "Personality Development" Tata Mc Graw Hill
    a. Publishing company New Delhi – 1976.
c. Janis, Irving and others "Personality Dynamcs, Development and
    a. assessment New York 1969 "
d. Lazarus R.S. "Personality" prentice – hall INC Second edition 1971.
e. Stranger R. Psychology of Personality McGraw Hill Book company 1974, Fourth edition.

45142- Core

DEVELOPMENTAL PSYCHOLOGY-II

Unit-I: Adolescence

Adolescence – Characteristics of Adolescence – Developmental Tasks – Emotionality – Social Interests and Morality changes during adolescence – Sex Interests – Sex behaviour and Approved Sex Roles – Family Relationships- Personality changes and Hazards of Adolescence-Happiness in adolescence.

Unit-II: Adulthood

Early Adulthood: Personal and Social Adjustments: Characteristics of early Adulthood – Developmental Tasks - changes in Interests – Social Mobility – Sex-role adjustment. Personal and Social Hazards of Early Adulthood- Early Adulthood: Vocational and Family Adjustments: Vocational, Marital, Parenthood, Single hood and Hazards of Adjustments.

Unit –III: Middle Age

Characteristics and Developmental Tasks – Personal and social Adjustment – Adjustments to Physical Changes - Assessment of Adjustments to Physical Changes - Vocational and Family adjustments-Single hood, Loss of a spouse, Approaching Retirement and Old Age – Vocational and Marital Hazards of Middle Age.

Unit- IV: Old age

Characteristics and Developmental Tasks -Adjustment to Physical Changes – Changes in Motor Abilities – Changes in Mental abilities- Hazards to Personal and Social Adjustments in old age- Adjustment to retirement- Adjustment to singlehood in old age.

REFERENCES:

- Hurlock. E.B (1980) Development Psychology: A Life Span Approach (Fifth Ed) New Delhi: Tata Mc Graw Hill Pub. Co. Ltd.
- Santrock. J.W (1997) Life – Span Development (sixth Ed) Chicago: Brown Mark.

45143- Core

COUNSELLING PSYCHOLOGY-II

Unit. I : Theoretical Perspective - Psycho-Analytical Theory

Psycho-analytic theory – Introduction- Structure of Personality- Conscious and Unconscious – Psychosexual stages- Eros and Thanatos - Defense Mechanisms. therapeutic goals – therapeutic techniques - Free association, resistance, transference, interpretation of dreams.

Unit II: Behavioral Theory

Classical Conditioning- Operant Conditioning –Social learning approach– Cognitive Behavior therapy - Therapeutic Process -Therapeutic techniques -Systematic desensitization-Aversive reinforcement-Extinction.

Unit III: Other Theories of Counseling

Cognitive behavioral theory-Rational Emotive Theory-Humanistic Theories-Roger's Client centered Theory

Unit IV: Special Areas of Counseling

Counseling for various groups -Children, Adolescents, Youth, Adulthood-Middle age and aged. Family and Marital counseling/ counseling for special concern groups like counseling the physically and socially handicapped - Counseling the elderly – Counseling the women - Counseling the drug addicts.

REFERENCES:

- Hall C.S. & Lindzey. G. (1998). ***Theories of Personality.*** 3rd Ed. NY: J. Wiley & Sons
- Elizabeth B. Hurlock. (1976). ***Personality Development.*** Tata Mc. Graw Hill.
- Deurzen, E.V., & Martin , (2011). ***Skills Essential counseling Psychotherapy.*** Sage Publications: New Delhi.
- Nelson, Richard Jones. (2011). ***Theories and Practice of counseling Therapy***. 5th Edition. Sage Publications: New Delhi.

45144- Core

REHABILATION PSYCHOLOGY

UNIT-I: Introduction

Rehabilitation Psychology: Definition, historical perspective, scope and methods- Functions of Rehabilitation Psychology - Role of rehabilitation psychologist - Recent trends in rehabilitation psychology.

UNIT – II : Disability and Rehabilitation

Definition of disability- Types of disability - Psychological Approach to Rehabilitation: Assessment, diagnosis, treatment and certification. Understanding psychological needs of caregivers and working with families of persons with disabilities.

UNIT - III: Psychological Interventions

Management of problems of the disabled- Role of psychological interventions- Psycho-analytic /Cognitive Behaviour /Rational-emotive therapy; Augmentative (psycho-drama/role play/yoga and meditation)- Behaviour therapies (relaxation techniques/ systematic desensitization / bio-feedback).

UNIT – IV: Organization as Services

Work settings of rehabilitation psychologists Designing training programmes for rehabilitation psychologists Training need analysis, implementation of training programmes designs- Role of Government and NGO's .

References:

- Alexis Waitman & Suzanne Conboy-Hill, 1992. Psychotherapy and mental handicap. Sage Publications, New Delhi.
- Franks and Wilson. Annual review of behavior therapy theory and practices.Vol5. 1997.
- Rosenberg, M.S., Wilson, R. Maheady, L. (2004). Educating children with behavior disorder. London: Sage Publications.
- Golden C.J., 1984. Current Topics in Rehabilitation Psychology: Grune & Straton, London. •
- Nirbhay N.Singh, 1998. Comprehensive Clinical Psychology: Application in Diverse Populations, Volume 9, Elsevier Science, Pergamon.
- Zigler, E, Gates, D.B (1999). Personality development in individuals with Mental Retardation, New York: Cambridge University Press.

Scheme of Practicals M.Sc., Psychology course			
Code	**Semester-I**		**Max. Marks**
15141P	Practical –I	Communication and Soft skills	100
15141 P	Practical -II	Experimental Psychology-I	100
Semester-II			
15142P	Practical-I:	Basic Computer skills +Statistics	100
15142P	Practical- II	Experimental Psychology-II	100
Semester-III			
15143P	Practical-I:	Psychological Assessment-I	
15143P	Practical- II	Computer Assisted Psychological Testing+ SPSS	100
Semester-IV			
15144P	Practical-I:	Psychological Assessment-II	100
15144P	Practical- II	Project work	

M.Sc. Geology Revised Syllabus June 2018-19 on wards

I Semester

Code	Paper	Title
15041	Paper I	Geomorphology & Atmospheric Sciences
15042	Paper II	Crystallography, Mineralogy & Optical Mineralogy
15043	Paper III	Paleontology & Stratigraphy
15044	Paper IV	Indian Geology & Field Geology
15041P	Practical I	Crystallography, Mineralogy and Optical mineralogy
15042P	Practical II	Stratigraphy, Paleontology, Field Reports

II Semester

25041	Paper I	Statistics & Computer Applications
25042	Paper II	Structural Geology & Geotectonics
25043	Paper III	Igneous & Metamorphic Petrology
25044	Paper IV	Sedimentology and Marine Geology
25045	Non-Core	Introduction to Earth Resources
25041P	Practical I	Petrology
25042P	Practical II	Statistics, Computer Applications and Structural Geology

III Semester

35041	Paper I	Economic Geology , Mineral Economics & Gemology
35042	Paper II	Energy Resources
35043	Paper III	Remote Sensing & GIS
35044	Paper IV	Geochemistry
35045	Non-Core	Essentials of Remote Sensing and GIS Fundamentals
35041P	Practical I	Economic Minerals and Geochemistry
35042P	Practical II	Remote Sensing & GIS

IV Semester

45041	Paper I	Mineral Exploration, Mining and Ore beneficiation
45042	Paper II	Hydrogeology & Watershed management
45043	Paper III	Engineering Geology & Natural Hazards
45044	Paper IV	Environmental Geology
45041P	Practical I	Geoinformatic Applications in Mineral exploration, Hydrogeology and Engineering Geology
45042P	Practical II	Project Work

- Week end Field Trips for both Previous and Final year Students
- Study Tour for 10 to 14 days for both Previous and Final Year Students

I SEMESTER

15041 Paper I – Geomorphology & Atmospheric Sciences

Unit I

Scope of Geomorphology, Fundamental concepts of Geomorphology. Volcanoes & Volcanism – Nature and Origin of Volcanoes – Products of Volcanism, eruptive styles and associated landforms. Earthquakes and Earth's Interior. Causes, occurrence and effects of Earthquakes. Earth's Interior according to seismic theory. Nature and origin of Oceans and shaping of continents **15 hours**

Unit II

Geological action and resulting land forms of Oceans, Lakes, Glaciers and Wind. 1**5 hours**

Unit III

Geological action and resulting land forms of River. Drainage patterns and systems, Morphometric analysis – Morphometric characteristics, stream orders, stream length, stream frequency, elongation ratio, bifurcation ratio, drainage density, texture and interpretations. **15 hours**

Unit IV

Atmosphere – Circulation – Clouds, Precipitation, Acid rains – The Air – Masses - Cyclones and Anticyclones – Tropical cyclones – Tornadoes. Natural regions of the world – Tropical regions - Warm Temperate regions – Cold temperate regions – Polar regions. . Weather forecasting. Economic importance of weather – Agriculture and Industry. **15 hours**

Reference Books

1. Essentials of Geology by Stanley Chermicoff, Hayden A. Chip Fox. Ramesh Venkatakrishansn.
2. Physical Geology by A.Holmes.
3. Principles of Geomorphology by William D.Thornbury.
4. Principles of Geomorphology by Carls W.Montgomery.
5. Text book of Geomorphology by A.L.Bloom
6. Text book of Geomorphology by P.Dayal
7. Indian Geomorphology by H.S.Sarma.
8. An Introduction to Earth and Environment by A.K.Sinha

15042 Paper II – Crystallography, Mineralogy and Optical Mineralogy

Unit I

Elements of Crystallography – Derivation of 32 Crystal classes and Herman-Maughn Symbols, twin laws and twin crystals, X-ray crystallography and irregularities in crystals, Etch figures.

15 hours

Unit II

Structures of silicates, isomorphism and polymorphism. Physical, chemical and optical properties, mode of occurrence of the following mineral groups: Quartz, Feldspars , Feldspathoids and Zeolites. **15 hours**

Unit III

Physical, chemical and optical characters and mode of occurrence of the following mineral groups -- olivine, pyroxene, amphibole, mica, Garnet and Aluminum silicates. **15 hours**

Unit IV

General principles of optics, Polarizing microscope, Refringence-Birefringence , Double refraction – Snell's Law – Critical angle – Total Reflection, Pleochroism, Extinction, Determination of retardation with Berek compensator, optic axial angle, Uniaxial and biaxial minerals, Gypsum plate, Quartz wedge and mica plate **15 hours**

Reference Books

1. A Text Book of Mineralogy by E.S.Dana
2. Elements of Crystallography by F.A.Wade and R.B.Matrox.
3. Elements of Mineralogy by Rutleys
4. Optical mineralogy by Paul F.F. Kerr
5. Mineral Optics by Philips W.R.
6. Elements of Optical Mineralogy by Winchell A.N.

15043 Paper III - Paleontology and Stratigraphy

Unit I

Concept of Species – Nomenclature – Evolution of Life through Geological Time Scale – Taphonomy – Definition of fossil – Modes of preservation of Fossils – Index fossil – Zone fossil.

15 hours

Unit II

Scope of Micropaleontology – Detailed morphology of Foraminifera, Ostracoda – Utility of Microfossils in Hydrocarbon Exploration – Palaeoecology, Palaeobotony – Plant fossils **15 hours**

Unit III

Morphology, classification and evolutionary history of Mollusks (Lamellibranches, Gastropods and Cephalopods), Echinoderms. Morphology and Evolutionary history of Graptolites, Trilobites, Brachiopods and Corals. Evolution of Vertebrates – Horse, Elephant and Man **15 hours**

Unit IV

Stratigraphy: Definition, scope, history and evolution. Stratigraphic terminology, nomenclature and classification – Concept of Lithofacies and Biofacies - Historical evolution of Geological Time Scale. Principles of Palaeogeography and Palaeoclimate- Sequence Stratigraphy. **15 hours**

Reference Books

1. Fundamentals of Historical Geology and Stratigraphy of India – Ravindra Kumar
2. Geology of India and Burma by M.S.Krishnan.
3. Geology of India by D.N.Waldia
4. Geology of India by M.Ramakrishna & R.Vidyanadhan.
5. Field Geology by F.H.Lahee
6. Manual of Field Geology by Robert R.Compton
7. Guide to Field Geology by S.M.Mathur

15044 Paper IV- Indian Geology and Field Geology

Unit I

Major stratigraphic divisions and their equivalents in India. Brief account of classification, lithology, structure and economic importance of Archaeans, Cuddapahas and Vindhyan Supergroups and their equivalents with a special emphasis on Mineral wealth of Cuddapah Basin

15 hours

Unit II

Gondwana Supergroup, Fossil content of Triassic, Jurassic and Cretaceous formations of India. Short account of Siwaliks and Deccan Traps – Infra and Inter trapeans – Origin, composition, distribution. Tertiary and Quaternary rocks of India. Origin, composition and distribution of Deccan Traps. **15 hours**

Unit III

Age problems pertaining to Indian Stratigraphy a) Saline Series b) Deccan traps. Study of the following boundary problems with reference to India a) Precambrian – Cambrian, b) Permian – Triassic, and c) Cretaceous – Tertiary. **15 hours**

Unit IV

Toposheet and map. Toposheet and map reading. Various methods of locating a point on toposheet and map. Basic field procedure – Determination of slopes and gradient, measuring differences in elevation. Basic field observations at a point or out crop. Geological mapping – General considerations, reconnaissance, study of surface features and rocks. Transfer of field data collected on to a base map, finalization of map, preparation of geological cross section. Contouring – Definition, internal characteristics, direct and indirect methods of contouring and uses. Application of GIS in Mapping

15 hours

Reference Books

1. Invertebrate Paleontology – Henry Woods
2. Principles of Invertebrate Paleontology – Shorock & Twendhofel
3. Elements of Micropaleontology – Bignot. G.
4. Principles of Micropaleontology – F.H.Glessener
5. Principles of Stratigraphy – Lemon, R.R.
6. Principles of Sedimentology and Stratigraphy – Boggs, S.
7. Principles of Stratigraphy – Danbar, C.O., and Rodgers, J.

Practical I
15041P Crystallography, Mineralogy and Optical Mineralogy

Crystallography: Identification of crystal models of 32 crystal classes and their crystals.
Mineealogy: Megascopic identification of minerals
Microscopic identification of minerals in thin sections.

Practical II
15042P Stratigraphy, Palaeontology and Field Geology

Stratigraphy: Stratigrapy problems
Palaeontology: Megascopic identification of fossils
Microscopic identification of microfossils.
Submission of Field reports

II SEMESTER

25041 Paper I - Statistics and Computer Applications

Unit I

Data in Earth Sciences – Classification – Tabulation

Quantitative techniques – Central tendency and dispersion, Correlation and regression, Analysis of one way variance. **15 hours**

Unit II

Introductions to computers – History and generations – Definition and brief description of operating systems, languages and packages, Introduction to Internet **15 hours**

Unit III

MS Office – MS Word, MS Excell, MS Power Point - Description **15 hours**

Unit IV

Basic concepts of data and database management system – RDBMS, SQL. Oracle - Introduction to RDBMS, Data definition languages, data control languages, data control language, creating and managing objects like Tables and Views. RDBMS Query execution, transactions – Physical database design and performance tuning. **15 hours**

Reference Books

1. Computer and Commonsense – Hunt and Sheily
2. The Internet – Dauger and Comer
3. MS Office 2000 – Hand Book
4. Introduction to Data Base Management Systems – Ramakrishna
5. Oracle 8i complete reference – Kevin Loney, George Kochu
6. Fundamentals of Mathematical stastics – Gupta S.C. and Kapoor, V.K.
7. Statistical methods – Snedeca G.W. and Loncron, W.G.

25042 Paper II - Structural Geology and Geotectonics

Unit – I

Mechanical principles and properties of rocks and their controlling factors – Concept of stress and strain – two dimensional stress and strain analyses – Concept of Dip and Strike - Geometric classification of Folds - Mechanics of folding and buckling and recognition of folds.

15 hours

Unit – II

Joints Classification and their importance in Construction projects. Mechanics of faulting. Classification and recognition of faults. Strike slip faults, normal faults. Unconformities – types of unconformities, criteria for recognition and significance of unconformities.

15 hours

Unit – III

Tectonic aspects of Igneous rocks. Geometric classification of plutonic igneous rocks, tectonic setting of plutons.

Structures in metamorphic rocks, Foliation, Axial plane foliation, transported foliation, other metamorphic foliation.

Lineation – problem of lineation indicating extension parallel to fold axis, small scale folds.

Structural association, salt domes, diapers, nappe, tectonic melanges

15 hours

Unit – IV

Plate tectonics – Sea floor spreading, island arcs, orogeny and epiorogeny. Geo-dynamics of Indian plate, evolution of Himalayas, Isostasy and Neotectonics.

15 hours

Reference Books

1. Structural and Tectonic principles - Badgley, P.C.
2. Mechanics in Structural geology, Bayly, B.
3. Structural geology – Billings M.P.
4. Structural geology of rocks and region – Davis G.R.
5. Understanding the Earth – Gass I.B., Peter J.Smith and Smith PGL
6. An outline of Structural geology
7. Global tectonics – Keary. P., and Vine F.J.
8. Modres. E., and Twiss., R.J.
9. Folding and fracturing of rocks : Ramsy, J.G.

25043 Paper III - Igneous and Metamorphic Petrology

Unit I

Introduction to Igneous Petrology – Formation of igneous rocks – Crystallization of unicomponent, Bicomponent and ternary magmas. Origin, composition and constitution of magmas – Bowen's reaction principle – Magmatic Differentiation – Fractional crystallization and assimilation.

15 hours

Unit II

Forms, structures and textures of igneous rocks. Classification of Igneous rocks. Petrography and petrogenesis of the following rock types: Lamprophyres, Carbonatites, Anorthosites, Granites, Granodiorites, Pegmatites, Syenites and Nepheline syenites. Gabbro, Dolerite, Basalt, and Picrite basalts.

15 hours

Unit III

Metamorphism, metamorphic processes, Agents of metamorphism, kinds of metamorphism, classification and nomenclature of metamorphic rocks, structures and textures of metamorphic rocks. **15 hours**

Unit IV

Grades and zones of metamorphism – Concept and types of metamorphic facies. Classification and description of Schist, Gneiss, Amphibolite, Quartzite, Marble, Slate, Phyllite – Origin and types of granulites -Charnockites and Khondalites. **15 hours**

Reference Books

1. Igneous and Metamorphic Petrology – Turner and Verhoogen
2. Petrology of Igneous and Metamorphic rocks – Hyndman
3. The petrography of Igneous and Metamorphic rocks in India – S.C.Chatterjee.
4. Metamorphic petrology- B. Bhaskara Rao

25044 Paper IV – Sedimentology and Marine Geology

Unit I

Sedimentology – Origin of Sedimentary of rocks. Structures and textures of Sedimentary rocks. Provenance, lithification and digenesis of Sedimentary rocks. **15 hours**

Unit II

Classification of sedimentary environments – Non-marine environments – Glacial, Aeolian, Lacustrine and Fluvial environments – Marine environments – Shelf and Deep sea sediments..

15 hours

Unit III

Classification and origin of Clastic and Non-clastic rocks. Clastic – Rudaceous , Arenaceous and argillaceous rocks. Non-Clastic – Chemical and Organic deposits. Descriptive study of Sedimentary rocks (Breccia, Conglomerate, Lime Stone, Sand Stone, Shale, Silt, Shell Lime Stone,etc.,) . **15 hours**

Unit IV

Introduction and scope of Marine Geology, Morphologic and tectonic domain of the ocean floor. Oceanic profile, origin of oceanic crust, ocean sediments, classification, Near shore Geological Processes, Beach placers, Carbon Compensation Depth (CCD) , Shelf deposit, deep ocean Poly Metallic Nodules (PMN) , Hydrocarbon deposits. Concept and causes of Sea level changes and measurements. Physical and chemical properties of sea water. Residence times. Coastal Pollution , Mitigation and Management- Coastal Erosion and Protection measures

15 hours

Reference Books

1. Sedimentary Rocks – Pettijohn, F.J.
2. Origin of Sedimentary Rocks – Blottt, H., Middleton, G. and Murray, R.
3. Introduction to Sedimentology – Sengupta, S.M.
4. An Introduction to Sedimentology – Shelly, R.C.
5. Shepard, Submarine geology
6. Krunen, Marine geology
7. King, Introduction to marine geology and geomorphology
8. Keen, Introduction to marine geology
9. James Kennet, Marine geology, 1982, prentice hall
10. Riley and Chester, Introduction to marine chemistry
11. James Drever, The geochemistry of natural waters

M.Sc. Geology Choice Based Credit System

25045 – Introduction to Earth Resources

Unit I

Introduction to Earth – Dynamics of Earth, the interior of the Earth – Rocks –Genesis and Types Igneous , Sedimentary and Metamorphic Rocks.

Unit II

Minerals – Definition – Mineralogy and description of Common Rock forming minerals – Industrial minerals – Cement industry, Glass industry, Ceramic industry, Fertilizer industry, Steel Industry.

Unit III

Fuel Minerals – Mineralogy, origin, distribution of Coal – Petroleum and Natural gas – Origin – Inorganic and organic theories – Reservoir rocks – Atomic minerals – Association, occurrence and distribution of Atomic minerals.

Unit IV

Water resources – Hydrological cycle – precipitation, runoff, infiltration and evapotranspiration, Subsurface and vertical distribution of groundwater – Occurrence of groundwater, classification of aquifers, springs and wells.

Reference Books

1. Introduction to Sedimentology – Sengupta, S.M.
2. The petrography of Igneous and Metamorphic rocks in India – S.C.Chatterjee.
3. Metamorphic Petrology- B. Bhaskara Rao
4 Economic Mineral Deposits – Bateman, A.M. and Jenson, M.C.
5 Indian Mineral Resources- Krishna Swamy

Practical I-
25041P- Petrology

Petrology: Megascopic identification of Igneous, Metamorphic and Sedimentary Rocks.
Microscopic examination of Rock thin sections.
Norm Calculations.

Practical II
25042P - Statistics, Computer Applications and Structural Geology

Creating of MS Word file, Creating worksheets and execution of formulae, creating Bar graphs, pie graphs in MS Excel, Creating Power Point presentations with animations.
Creating database and simple queries in Oracle
Calculation of standard deviation, mean, median, mode, correlation, regression, theoretical distribution, and analysis of one way variance.
Structural geology problems: Dip & Strike, 3 point problems, thickness problem and fault problems, Geological maps, Section drawing, contour mapping, suitability of structural area for engineering projects.

III SEMESTER

35041 Paper I – Economic Geology ,Mineral Economics & Gemology

Unit I

Process of formation of mineral deposits – magmatic, metasomatism, hydrothermal process, sedimentation, residual and mechanical concentration, oxidation supergene enrichment, sublimation, evaporation. Ore deposition – Physical and chemical controls of ore fluids and their migration.

Origin, occurrence and distribution of the Gold, Iron, Manganese, Chromite, Copper, Lead and Zinc, Aluminium and Magnesium deposits of India. **15 hours**

Unit II

Metallogenic epochs and provinces with special reference to India. Origin, occurrence and distribution of refractory, abrasive, glass, ceramic, cement and fertilizer minerals. Mineral wealth of Andhra Pradesh. **15 hours**

Unit III

Classification of Mineral deposits – Strategic, critical and essential minerals. National Mineral Policy. Mineral Concession Rules, Mineral conservation and substitution. Status of mineral production in India. Marine Mineral Resources, Law of Sea. **15 hours**

Unit.1V.

Introduction to Gems -Basic properties of Gems-Formation of Gems. Description of Gem species with respect to their varieties [color wise],chemical composition ,crystal system ,physical and optical properties, characteristic inclusions and occurrence, Corundum, Beryl,, Garnet, Feldspar, Tourmaline ,Topaz and Silica, Treatment of Gemstones and their detection, Gem synthesis and distinction between Synthetic and Natural Gemstones.

15 hours

Reference Books

1. Mining Geology – Arogya Swamy
2. Principles of Mineral dressing - Gaudin A.M.
3. Selected topics in Mineral dressing – Pradeep and Rakesh Kumar.
4. Hand Book on Mineral Dressing – H.G.Vijayendra.

35042 Paper II - Energy Resources

Unit I

Petroleum – Origin- inorganic and organic theories – migration and accumulation of oil and gas – Geological age of reservoir rocks – Classification of traps. Petroliferous basins of India. Geology of the productive oil fields of India. Status of Oil and Natural Gas in India- Gas Hydrates

15 hours

Unit II

Coal – Origin and classification – Chemical characterization – Proximate and ultimate analysis – Gelogical and Geographical distribution of coal deposits in India. Detailed Geology for important coal fields of India. **15 hours**

Unit III

Atomic minerals – Mode of occurrence and association with other radioactive minerals. Methods of prospecting and productive geological horizons in India. Detailed Geology and Distribution of Uranium deposits in India. Atomic fuels and environment.

15 hours

Unit IV

Renewable Energy resources – Wind, Solar, Hydral and Geothermal **15 hours**

Reference Books

1. All you wanted to know about Disasters – (Brig) H.K.Kanna
2. Petroleum formations and occurrences – Tissort, B.P. and Welte D.H.,
3. Text book of coal – Chandra, D.
4. Uranium ore deposits – Dahlkamp F.J.
5. Petroleum Geology – Laverson, P.
6. Renewable Energy Resources and Emerging Technologies – Kothari, D.P., Singal, K.C. and Rakesh Ranjan
7. Renewable Energy Resources – John Twidell and Tony Weir

35043 Paper III – Remote Sensing and GIS

Unit I

Aerial Photography – Basic information and specifications – Aerial cameras – Optical aspects of aerial cameras – Planning and execution of photographic flights – Factors affecting image quality – Technique of Aerial Photo/image interpretation

Satellite Remote Sensing – Basic concepts – Electro Magnetic Radiation, Electromagnetic spectrum – Interaction of electromagnetic radiation with atmosphere, Interaction of electromagnetic radiation with Earth surface – Atmospheric widows – Spectral regions useful for Remote Sensing. **15 hours**

Unit II

Satellite data acquisition systems – Platforms – Airborne and Space borne – Sensors – Passive sensors – Multispectral scanners – Thermal infrared scanner – Microwave, radiowave scanners - Active sensors – Laser scanner, Radar altimeter and image Radar

Multispectral Remote Sensing – Resolutions – Spectral, Spatial, Radiometric and temporal – Remote Sensing in Thermal Infra Red regions – Basic concepts and characteristics – Geological interpretations and Advantages of thermal imagery – Remote Sensing in Microwave region – Basic concepts, characteristics, advantages and disadvantages. **15 hours**

Unit III

Digital Image Processing – Introduction, Basic concepts – Image formats and its characteristics – Image pre processing – Introduction, radiometric errors, geometric errors – Map projections – Geometric rectification, georeferencing and image to image registration.

Image enhancement – Radiometric enhancement – Spatial enhancement – Spectral enhancement – Image classification – Supervised classification, Unsupervised classification – Pattern of recognition and feature extraction – Image mosaiking and change detection. **15 hours**

Unit IV

Geographical Information System (GIS) – Introduction – Components of GIS – Data structures in GIS – Raster and Vector Data Structures – Types of data – Points, lines and polygons – Data conversion – Raster to vector and vector to raster.

Data input, verification, storage and output – Data Input process and devises – Spatial and non-spatial data entering – Data verification – Storage – Data output processes and devices – Digital elevation modeling – Products and usefulness of DEM/DTM – Introduction to GPS **15 hours**

Reference Books

1. Remote Sensing Principles and interpretations – Sabins, F.F.Jr.
2. Remote Sensing and Image Interpretation - Lillisand, T.., and Kiefer, P.W.
3. Remote Sensing Geology – R.P. Gupta.
4. Principles of Geographical Information Systems for Land Resources – Borough, P.A.
5. Geographical Information Systems – Kang Tsung Chang.

35044 Paper IV – Geochemistry

Unit I

Introduction to geochemistry – its scope. The earth in relation to the solar system and the Universe. Cosmic abundance of elements, composition of planets and meteorites. Structure composition and distribution of elements in the Earth. Geochemical classification of elements. Geochemistry of hydrosphere, biosphere and atmosphere. **15 hours**

Unit II

Elementary crystal chemistry and thermodynamics. Lattice energy of crystals, principles of ionic substitution in minerals. Ionization potential, electro negativity, Pauling's rule, Periodic Table with special reference to Rare Earth Elements (REE). Geochemistry of Uranium & Lithium**.**

15 hours

Unit III

Introduction to isotope geochemistry, stable isotopes, geochemistry of carbon, oxygen, sulfur Isotopes, Radiogenic Isotopes, Decay scheme of K-Ar, U-Pb and Rb-Sr, Carbon dating and its applications to Geology. **15 hours**

Unit IV

Geochemical prospecting; Fundamental concepts, pathfinder elements. Threshold values, geochemical anomaly. Primary and secondary dispersion Halos sampling. Geochemical cycles and geochemical methods for prospecting of metallic minerals, petroleum and natural gas. Techniques in Geobotanical survey. **15 hours**

Reference books

1. Introduction to Geochemistry – Mason, B. and Mooro
2. Introduction to Geochemistry – Krankopf, K.B.
3. Principles of Isotope Geology – Faure, G.
4. Introduction to Crystal Chemistry - Evans, R.C.
5. Geochemistry- Arthur H. Brownlow.

M.Sc. Geology Choice Based Credit System

35045 – Essentials of Remote Sensing and GIS Fundamentals

Unit I

Introduction of Remote Sensing – Types of sensors and scanners – Satellite data acquisition systems – Platforms – Airborne an Space borne sensors – Passive and Active sensors – Digital Image Processing – Introduction and Basic concepts.

Unit II

Geographical Information System (GIS) – Introduction – Components of GIS – Data structures in GIS – Raster and Vector data structures – Types of data – Points, lines and Polygons – Data conversion – Raster to Vector and vector to raster.

Unit III

Stages of Mineral Exploration – Methods of choosing target area – Criteria for accepting or rejectin the target area – Guides to ore search – straigraphic, lithological, geomorphological, structural guides, Rock alteration and Geobotanical guides in mineral exploration.

Unit IV

Remote Sensing Applications in Environment Assessment– Visual interpretation of satellite image for forest cover mapping, Density assessment – Google maps.

Reference Books

1.Remote Sensing Principles and interpretations – Sabins, F.F.Jr.
2.Remote Sensing and Image Interpretation - Lillisand, T.., and Kiefer, P.W.
3.Remote Sensing Geology – R.P. Gupta.
4. Indian Mineral Resources- Krishna Swamy

Practical I
35041P Remote Sensing and GIS

Visual Interpretation of Satellite Image
Digital Image Processing
GIS: Spatial data creation and spatial data conversion, scanning and screen digitization.
Georeferencing, Projection systems, Projection and transformation

Practical II
35042P Geochemistry

Chemicals, Reagents and solutions, Expressing the concentration of solution, percent concentration.
Calculation of Equivalent Weight, Diluting Solutions, Standardization of common standard solutions, Common Laboratory Techniques for Environmental sampling analysis.
Distillation, Gravimetric, Titrimetric, Potentiometry & Ion selective electrode
Calculation of Oxidation Number, Balancing weathering equations, checking the accuracy of Analytical results, Diagrammatic representation of geochemical date.

IV SEMESTER

45041 Paper I –Mineral Exploration, Mining and Ore Beneficiation

Unit I

Stages of Mineral exploration – Methods of choosing target area – Criteria for accepting or rejecting the target area – Guides to ore search – Stratigraphic, Lithological, Geomorphological and Structural. Rock alteration and Geo-botanical .Sampling and Drilling Methods. Detailed study of Geophysical methods of Exploration and Geochemical prospecting.

15 hours

Unit II

Remote Sensing Applications in various stages of mineral exploration – Spectral characteristics of alteration minerals – Hydroxyl bearing minerals, Carbon and tectosilicates and colour ratio images using digital image processing. Application of Remote Sensing in exploration of Gold, Base metals (Copper, Lead, Zinc), Diamond, Bauxite, Iron ore and barite.

15 hours

Unit III

Mining methods – Alluvial, Opencast mining and Underground methods. Mine supports, Subsidence, Methods of breaking of rocks, Mine atmosphere, Ventilation, Drainage, Pumping, Haulage and Winding. Mining hazards and safety measures. Preparation of Mine plans.

15 hours

Unit IV

Ore dressing and its importance, properties of minerals and rocks and their consideration in ore dressing techniques. Basic ore dressing operations – Crushing, Grinding, Sizing, Screening and classifiers. Heavy fluid separation – Zigging and tabling. Concentration process – Magnetic and electro static separation, Gravity concentration, froth flotation, Amalgamation and Agglomeration. Dressing of the following ores – Sulphide ores – Tin, Lead, Zinc, Native metals – Gold, Non-sulphide ores – Uranium, Baryte and Coal.

15 hours

Reference Books

1. Mining Geology – Arogyaswamy
2. Mining Geology – McKinstry
3. Ore Deposits of India – G.K.Gokhale.
4. Introduction to Geophysical prospecting – Dobrin, M.B.
5. Introduction to Exploration Geochemistry – Levinson, A.S.
6. Image Interpretation in Geology – Drury, S.A.
7. Remote Sensing Principles and Interpretation – Sabins, F.F.

45042 Paper II – Hydrogeology and Watershed Management

Unit I

Origin of water – Mateoric Juvenile, magmatic and sea waters – Hydrologic cycle – Precipitation, Runoff, infiltration and evapotrapspiration, Subsurface movement and vertical distribution of groundwater, Springs, Classification of aquifers. Occurrence of groundwater, Rocks affecting groundwater occurrence ,Hydrological properties of rocks – Specific Yield, Specific Retention, Porosity, Hydraulic conductivity, transmissivity, Storage Coefficient, Hydrographs.

15 hours

Unit II

Ground water movement, Darcy's law and its applications, determination of permeability in laboratory and in field, Estimation of Groundwater Budget,,Groundwater Quality – Physical & Chemical properties of water, Quality criteria for different uses, graphical presentation of water quality data ,

15 hours

Unit.111

Surface geophysical methods – Seismic, Gravity, Geoelectrical and Magnetic, Subsurface geophysical methods – Artificial recharge of groundwater. Exploration of Ground water using Remote Sensing data. Application of Remote Sensing Data in selection of groundwater in hard rock terrain and unconsolidated sediments. Groundwater indicators

15 hours

Unit.1V

Watershed-Definition, Scope, Characteristics and classification ,Derivation of Aquifer parameters, Groundwater recharge and its estimation. Watershed management, Soil conservation sites for water harvesting structures- Socio-Economic impact of Watersheds

. **15 hours**

Reference Books

1. Groundwater Hydrology – Todd, D.K.
2. Applied Hydrogeology – Fetter C.W.
3. Groundwater Assessment and Development and Management – Karanth, K.R.
4. Remote Sensingg and Interpretation – Lives and Kaifer
5. Remote Sensing in Hydrology – Enggmann
6. Remote Sensing Geology – Gupta, R.P.,
7. Hydrology and watershed Management,J NTU by B.Venkateswara Rao,G.Jagan Mohan Das,C..Sarala and M.V.S.S.Giridhar

45043 Paper III – Engineering Geology and Natural Hazards

Unit I

Engineering properties of rocks, soils - specific gravity, porosity, permeability, compressive strength, hardness, toughness, percentage of wear, tensile strength, modules of elasticity, modules of compression and residual stress and their importance in construction of civil engineering structures, Quarrying.

15 hours

Unit II

Definition and parts of dam, types of dams, geotechnical consideration in selection of dam sites, case histories – Nagarjuna Sagar Dam and Srisailam Dam, Characters for investigating relative suitability, geological consideration for reservoir sites.

Types of tunnels, objects for geological investigations, methods of investigation, geological considerations in tunnels types of bridges, Geology for bridge sites, problems of constructing civil engineering structures in areas prone to landslides, faulting, earthquake and coastal erosion.

15 hours

Unit III

Fundamental concepts of disaster management – Hazard, Disaster, Risk, Vulnerability management, Disaster management policy, National Disaster Framework – Floods, Cyclones and Tsunamis, nature, prediction and mitigation of volcanic hazards, Classification, causes& controls of landslides, subsidence and its importance. **15hours**

Unit IV

Application of Remote Sensing and GIS in river valley projects – Dams and reservoirs, site suitability evaluation (lithological, structural, geomorphological considerations) – Application of Remote Sensing and GIS in seismic hazards, landslides, ghat roads, bridges, culverts, route locations (highway and railroads) canal and pipeline alignment, tunnels constructions. Site suitability evaluation (lithological, structural, geomorphological, slope, gradient, economic considerations. **15 hours**

Reference Books

1. Engineering materials – S.C. Rangwala
2. Text Book of Engineering Geology – N.Chennakesavulu.
3. Principles of Engineering Geology and Geotectonics – D.P.
4. Engineering Geology – B.S.Satyanarayana Swamy
5. Principles of Engineering Geology – K.V.G.K.Gokhale
6. Remote Sensing and Image Interpretation – Lillisand, T.M., Keifer, R.W.
7. Remote Sensing Principles and Interpretations – Sabins, F.F.

45044 Paper IV – Environmental Geology

Unit I

Scope and Development of environmental geology- Renewable and non-renewable resources- land desertification and land degradation and land management, Deforestation, Afforestation. Soil Profile, origin of soils, Classification of Soils, Soil types of India, Soil conservation.

15 hours

Unit II

Environmental degradation due to irrigation, use of fertilizers and pesticides - Urbanization and associated impact on environment. Consumption of fossil fuels and its effect on environment. Green house effect and Global warming and related problems.

15 hours

Unit III

Environmental management in mining – Impact of mining activities on the environment, erosion, causes and control. Man made hazards like multipurpose dams, power projects, heavy engineering constructions and its impacts. Water contamination- Waste disposal.

15 hours

Unit IV

Spectral characteristics of soil. Impact assessment of anthropogenic activities such as urbanization, open cast mining and quarrying, river-valley projects, disposal of industrial and radio-active waste, dumping of ores, mine waste and fly-ash. Environmental abatement - legislative measures in India .

15 hours

Reference Books

1. Environmental Geology – Indian context – K.S.Valdiya
2. Environmental Geology – Flawn, P.T.
3. Environmental Geology – Keller, E.A.
4. Application of Remote Sensing in Agriculture – Steven, M.D., and Clark, J.A.
5. Environmental Science and Technology – Stanley E. Manahan.

Practical I

45041P Geoinformatics Applications

Mineral Exploration using Remote Sensing and GIS

Watershed Management using Remote Sensing and GIS

Site selection for Dams & Reservoirs, Tunnel alignment and Transportation network suing Remote Sensing and GIS

Land use and Land cover mapping using Remote Sensing and GIS

Study of maps of seismic zones, earthquake-prone, and landslide-prone areas in India using Remote Sensing and GIS.

Practical II

Project Work and Viva

REGISTRAR
YOGI VEMANA UNIVERSITY
KADAPA-516 005.