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BIOCHEMISTRY -V

MONTH	SYALLABUS
JUNE	Carbohydrates- structure of glucose, chemical and physical properties of carbohydrates, Tests for carbohydrates ,monosaccharides,disaccharides,polysaccharides-starch, glycogen and importance of carbohydrates.
JULY	Aminoacids-structure and classification,reactions of aminoacids,proteins,classification of protein,structural organisation of proteins,denaturation etc.
AUGUST	Lipids-classification of lipids,test for lipids,prostaglandins, steroid hormones etc
SEPTEMBER	Bioenergectics-thermodyanmic laws I & II,entropy,enthalpy,coenzymes-NAD,FAD,FMNH2 Etc .
OCTOBER	Oxidative phosphorylation,p:o ratio chemiosmotic model etc.

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BIOCHEMISTRY -VII

MONTH	SYALLABUS
FEBRAUARY	Carbohydrate metabolism-glycolysis,energectics of glycolysis,gluconeogenesis,HMP shunt etc.
MARCH	Glycogen synthesis,cori cycle,glycogen storage disease etc. Amino acid metabolism-transamination, deamination&decarboxylation etc. Urea cycle.
RIL	Lipid metabolism-beta oxidation,cholesterol biosynthesis,disease s,oxidation of saturated and unsaturated fatty acids. Photosynthesis-dark & light reaction,cyclic & non-cyclic phosphorylation,c3 7c4 plants etc.

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B.Sc. Biochemistry – Third Semester
Biochemistry –III

JULY

1.Identification and separation techniques principle and applications of UV– Visible, IR, ESR and NMR spectroscopy. Separation techniques: principle, types and applications of centrifugation, chromatography and electrophoretic techniques.

2.Introduction to biochemistry

Aim and scope, historical account of development of biochemistry, biochemical composition of living organism elemental and chemical compositions; properties of water .

3.Bioinorganic and environmental chemistry

Role of iron in Myoglobin, Haemoglobin and cytochromes; Copper in Hemocyanin, Magnesiumin chlorophyll, Cobalt in vitamin B-12 and Molybdenum in nitrogenase; Metaloenzymes.

4.Environmental toxicology

Biochemical toxicology of Pb, Hg, Cd. LD and ED values of majortoxicants. Treatment of sewage and industrial effluent DDT, Malathion, lindane and 2, 4D. Bioremediation and Phytoremediations.

PRACTICAL:

1. systematic qualitative anaiysis of organic compound 1

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2. systematic qualitative analysis of organic compound 2

3. systematic qualitative analysis of organic compound 3

4. systematic qualitative analysis of organic compound 4

AUGUST

5. Carboxylic acids

preparation and properties of lactic acid; structures of tartaric, malic, citric and iso citric acids; dicarboxylic acids: saturated dicarboxylic acid, ketoacids: structures , properties and reactions of pyruvic acid, M-ketoglutaric acid and oxaloacetic acid.

6. Amines

Classification; isomerism; distinguishing reactions of 1°, 2° and 3° amines; some biologically important amines (DOPA, Histamine).

7. Alkaloids

Introduction and general characteristics; general method of extraction; structure and medicinal uses of nicotine, atropine and LSD.

8. Terpenes

Structure and Biological roles of the following: menthol, santonin, juvenilehormone I, abscisin II, gibberilic acid and lanosterol. Steroids, structures andbiological importance of N-carotene.

PRACTICAL:

5. systematic qualitative analysis of organic compound 5 & 6.

6. systematic qualitative analysis of organic compound 7 & 8

7. systematic qualitative analysis of organic compound 9 & 10

8. systematic qualitative analysis of organic compound 11 & 12

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SEPTEMBER

9. Heterocyclic compound

Structural and nomenclature of furan, pyran, thiophene, thizole, pyrrole, imidazole, pyridine, pyrimidine, purine, isoalloxazine and indole, Aromaticity of furan,
thiophene, pyrrole and pyridine.

10. Drugs

Classification of drugs; synthesis and uses of sulphanilamide and pentothal. Antibiotics.

11. Colloids

Types of colloidal systems, electrical properties of colloids. Emulsions and emulsifiers, gels.

PRACTICAL:

9. systematic qualitative analysis of organic compound 13 & 14
10. systematic qualitative analysis of organic compound 15 & 16
11. Determination of BOD
12. Determination of COD

OCTOBER

12. Photochemistry

Laws of Photochemistry; Chemiluminescence; Bioluminescence; Photocatalysis an
photochemical reactions.

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B.Sc. Biochemistry – Fourth Semester
Biochemistry – IV

JANUARY

1.Digestive system composition and functions of major digestive secretions. Digestion
and absorption of carbohydrates, lipids, proteins and nucleic acids.

2.Excretory system Structure and functions of nephron; glomorular filtration, tubular absorption and secretion;
Concentration of urine, GFR, kidney function tests, composition of urine, renal failure,
nephrites.

3.Respiratory system Anatomy of Respiratory tract, Mechanism of respiration, Transport of gases and artificial
respiration. Acid base balance by lungs and kidneys. Bohr' s effect, chloride shift.

4.Nervous system

Structure and classification of neurons, membrane potential, resting membrane potential and
action potential, EEG; Neurotransmitters.

PRACTICAL:

1.Preparation of m-dinitrobenzene from nitrobenzene

2.Preparation of p-nitroacetanilide from acetanilide

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3. Preparation of p-bromoacetanilide from acetanilide

FEBRUARY

5.Cardiovascular system Blood vessels- anatomy and physiology; ECG, Blood pressure. Regulation of heart rate, hemorrhages.

6.Muscular system Muscle types; ultra structure of skeletal and cardiac muscle fibers; Muscle proteins. Definition of sarcomeres and mechanism of contraction. Energetics of muscle contraction. Regulation of skeletal muscle contraction. Muscular dystrophies.

7.Blood and Body fluids Composition of body fluids; blood; Properties, composition and functions; Erythropoiesis, blood coagulation – outline of extrinsic and intrinsic pathway; Composition and functions of CSF and Lymph.

8.Tisssues Classification, epithelial, connective tissues, role of collagen and elastin in bone composition, growth and remodeling, factors affecting growth.

PRACTICAL:

4.Quantitative analysis of urine

5.Paper chromatography

6.Estimaton of hemoglobin

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MARCH

9.Endocrinology Introduction - Endocrine glands. Functions of the hormones of hypothalamus, pituitary glands, adrenal cortex, thyroid, parathyroid and
pancreas .Diabetes mellitus & Hyperinsulinoma.

10.Nutrition Energy content of foods, Balanced diet- Definition Bomb calorimeter ,BMR by direct and indirect method; BOD; SDA- definition; SDA. RDA for different physical activities; pregnant women, lactating woman, infants and children.

11.Macronutrients Carbohydrate, proteins, lipid and fiber; Essential aminoacids, semi essential and non essential
Aminoacid. Nitrogen balance-Fortification, Marasmus & Kwashiorkar- causative factors , treatment and prevention.

PRACTICAL:

7.Estimation of A/G ratio

8.Titrable acidity of urine

9.Preparation of buffer

APRIL

12.Micronutrients Nutritional importance of vitamin, classification, source, daily requirements and functions;
Deficiency symptoms- hypervitaminosis of fat soluble vitamins. Nutritional importance of Minerals.

13.Stereochemistry

Stereoisomerism: types, stereochemical terminology; optical isomerism: Molecular dissymmetry;chirality: glyceraldehyde, lactic acid, tartaric acid; diasterioism, epimers, mutarotation, racemization and resolution, Geometrical isomerism.

PRACTICAL:

13.Separation of compounds by TLC

14.Determination of lamda max

CT-103:Analytical Biochemistry – I

SEPTEMBER

1.Overview of biochemical investigation Introduction to biochemistry,
Model organisms; *E.coli* and its mutants,yeast, *Ceanorhabditis elegans, Arabidopsis thaliana* and *Drosophilamelanogaster.* Basic equipments and methods, and safety considerations in animal cell culture Plant cell culture, media for plant cell culture, potential of plant cell culture in biochemical investigations.

2.Microscopic techniques Review of light microscope, resolution of

microscopes,Optical contrast, phase contrast, and dark fieldmicroscopy, preparation of specimen for biochemical investigations. Electron microscopy; Working principle and applications, of scanning electron microscopy (SEM), Transmission electron microscopy (TEM), and cryo-electron microscopy. 3-D images, negative staining, single particle reconstruction

OCTOBER

3.Fluorescence microscopy Fluorophores, principle and applications of
fluorescence microscopy, design and uses of Epifluorescence microscoy, and immuno-

fluorescence microscopy. Measuring cellular dynamics; calcium imaging in live cells, Fluorescence resonance energy transfer (FRET). Use of ion-selective electrodes, light emitting indicators and optical tweezers in study of cellular dynamics.

4.Centrifugation Principle of centrifugation, the Swedberg equation, types of centrifuges and rotors. Density gradient centrifugation-, Sub-cellular fractionation. Design and working of analytical ultracentrifuges, *Ultra-filtration;* Principle,instrumentation and application. Dialysis. Precipitation.Flow Cytometry.

NOVEMBER

5.Biocalorimetry Arrhenius equation, determination of energy of activation from Arrhenius plots. Main thermodynamic parameters; enthalpy, and entropy. Isothermal titration calorimetry Differential scanning calorimetry; design of experiment, application of DSC, microcalorimetry.

6.Manometry Instrumentation, types of manometry; Warburg constant volume manometer, Gilson's differential respirometer, applications.

DECEMBER

7.Radioisotopic methods of analysis Atomic stability and radiation, types of decay, rate of radioactive decay, half life, units of radioactivity. Design and applications of Geiger-Muller Counter, and types of scintillation counters. Disadvantages of scintillation counters, quenching, Chemiluminescence and Cerenkov counting. Autoradiography; principle and applications. Radio tracer techniques.

8.Quantitative biomedical measurements Analytical considerations and experimental error. Identification of systemic errors, SOPs. student's t-test, standard error of mean, examples for calculation. Q-tests, examples and applications, Null hypothesis, use of t-test to validate analytical methods- unpaired, paired, one-sample, two-sample tests with examples. Calibration methods

BCT – 104: General Physiology

BANGLORE CITY COLLEGE

DEPARTMENT OF CHEMISTRY

Lesson plan

C-401 AC: SOLID STATE AND RADIOANALYTICAL CHEMISTRY

MONTH	SYLLABUS
January	**Geometric Crystallography:** Symmetry elements, Bravais lattices, Screw axes and glide planes, point groups, and space groups and nomenclature. Law of Interfacial angle (Euler's construction). **Experimental Methods:** Rotation, Oscillation, Weissenberg and Precession methods, Debye- Scherrer method (Powder method), Determination of lattice parameters from these methods. **Electron diffraction:** Experimental technique, Wierl equation, Radial-Distribution method. **Neutron diffraction:** Principle and theory; advantages and uses.
February	**Diffraction theory and Single crystal X-ray diffraction** X-rays, Bragg's law, assignment of lines, diffraction pattern of a primitive cubic lattice, space group extinctions, Scaterring factor and structure factor, intensities from atomic positions for BCC and FCC lattices; Ewald's sphere of reflection, Reciprocal Lattice concept, Electron density function, Fourier synthesis, Fourier transform of the structure factor, Phase problem and Patterson synthesis.
March	**Nuclear properties and models:** Subatomic particles: protons, neutrons, quarks, spin and magnetic properties of nucleons, electrical quadrupole moment of nuclides, nuclear parity, nuclear statistics, nuclear forces and interactions. Nuclear models: liquid drop, shell model, Fermi gas model, collective model and optical model. **Radiation Chemistry:** Interaction of matter with radiation, radiation dosimetry-units and measurements using chemical dosimeters, radiolysis of water, the hydrated electron-recipitation and properties, free radical generation, radiation damage to solids-effects of radiation on metals, alloys, semiconductors, insulators and catalysts
April	**Applications of Radioactivity:** Synthesis of various useful isotopes, use of isotopes in the elucidation of reaction mechanism, structure determination, kinetics of exchange reactions, measurement of physical constants including the diffusion constants, radio analysis-isotope dilution techniques, NAA, PGNAA, neutron absoptiometry and age determination, radio isotopesin field of medicine.

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C 403: CHEMISTRY OF MATERIALS

MONTH	SYLLABUS
January	**Preparative Techniques:** Principles of solid state synthesis- ceramic methods, solid solution and compound precursors (nitrates, carbonates, hydroxides, cyanides and organometallics), sol-gel, spray pyrolysis, combustion, hydrothermal, electrosynthetic **New Materials** Fullerenes and fullerides – structure, synthesis, functionalization approaches, conducting properties of fullerides.applications. NASICON and alumina – structure and conducting properties. High-T_c Oxides - structure, perovskite A & B, structure and synthesis of La,Sr and Ba cuprates, applications.. Conducting polymers - PA, PPP, PPS, PPY-mechanism of conduction and applications.
February	**Nanomaterials:** Classification types of carbon nano tubes synthesis, functionalization charecterization and applications. Principles of self-assembly: surfactant solutions, importance of non-covalent forces, the hydrophobic effect, co-operativity, statistical mechanics of one-dimensional self-assembly. Preparation of nanoscale materials: Precipitation, mechanical milling, colloidal routes, selfassembly: chemical vapour depostition, sputtering, evaporation. Synthesis, characterization and applications of nanoparticles, nano wires and nanotubes. Elemental nanoparticles: Pure, Gold, Silicon, Silver ,Cobalt, Oxide nanoparticles: Silica,Zinc oxide, Iron oxide, Alumina.
March	**Intercalation Compounds:** Intercalation reactions - layered structure-graphite interlayer compounds (GILC), staging of graphite, TaS_2, Microporous materials – zeolites and zeolitic materials, $AlPO_4$ $GaPO_4$. **Fibres and Composites** Synthetic inorganic polymers- zirconia and other fibre Classification, microscopic composites, dispersion strengthned, particle reinforced,Fibre-glass reinforced composites, metal-matrix, plastic-matrix composites, hybrid composites.
April	**Amorphous Materials:** Crystalline versus amorphous solids, glass formation, Prepariontechniques- meltspinning, sputtering, ion implantation, Structural models of amorphous materials, Properties of metglasses - mechanical, electronic and magnetic properties.

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C-404 SPECTROSCOPY – III

MONTH	SYLLABUS
January	**Vibrational spectroscopy** Vibrational spectra of diatomic, linear and bent triatomic, AB_3, AB_4, AB_5 and AB_6 molecules, spectra of metal complexes: Ammine, amido, Nitro, Nitrito, lattice water, aquo and hydroxo, carbonato, nitrato, sulphato and other acido complexes, cyano and nitrilecomplexes, cyanato and thiocyanato complexes, mono and multinuclear carbonyl complexes, nitrosyls, phosphines and arsines, ambidentate ligands, ethylenediamine and diketonato complexes **Raman spectroscopy** Resonance Raman Spectroscopy, Nonlinear Raman effects Stimulated, hyper and inverse types, Lasers and their use in Raman spectroscopy **Photoacoustic spectroscopy:** Basic description and applications
February	**Photoelectron spectroscopy** Basic principles- photoelectric effect, Koopman's theorem, XPS and UPS, spin-orbit coupling in core level spectra, applications of core level spectra-ESCA, chemical shift, Valence level spectra- n, σ and π bands, Auger electron spectroscopy and applications, Electron energy loss spectroscopy- basic principles and applications Applications to the study of solids **NMR spectroscopy of inorganic molecules** Proton NMR spectra of metal hydride complexesNMR spectra of nuclei other than hydrogen: ^{19}F, ^{31}P, ^{11}B NMR spectra of simple compounds, Proton/hydride interactions with ^{103}Rh, ^{183}W, ^{195}Pt and ^{207}Pb in metal complexes/organometallic compounds, Solid State NMR.
March	**Electron spin resonance spectroscopy** Basic principles, the position of ESR absorption, significance of 'g' factor, determination of 'g' factor. Electron-nucleus coupling (Hyperfine splitting). ESR spectrometer, electronelectron coupling, double resonance in ESR, ENDOR, ELDOR. Interpretation of ESR spectra and structure elucidation of organic radicals using ESR spectroscopy. Spin density and Mc Connell relationship. Spin polarization for atoms and transition metal ions, spin-orbit coupling and significance of g-tensors, zero/non-zero field splitting, Kramer's degeneracy, application to transition metal complexes (having one to five unpaired electrons) including

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April		biological molecules and inorganic free radicals such as PH_4, F_2 and BH_3.
		Mossbauer spectroscopy Basic principles, isomer shift, quadrupole splitting and magnetic hyperfine interactions, application to the study of bonding and structures of Fe_{2+} and Fe_{3+} compounds, Sn_{2+} and Sn_{4+} compounds
		NQR spectroscopy NQR isotopes, electric field gradients, Nuclear Quadrupole coupling constants, Experimental techniques and applications **X-ray absorption spectroscopy** Near edge measurements and EXAFS

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C - 301 AC PRINCIPLES OF CHEMICAL ANALYSIS

MONTH	SYLLABUS
August	**Acid – Base Titrations:** Basic principles, Titration curves for mono functional acids and bases, pH calculations, theory of Indicators, fractions of phosphoric acid species as a function of pH. Titration curves for polyfunctional acids [H_3PO_4], polyamines and amino acid systems. **Redox Titrations:** Nernst equation, Standard & formal potentials. Titration curves, end point signals, Indicators, criteria for the selection of indicators. Feasibility of redox titration. Titration of multicomponent system. Adjustment of analyte's oxidation state. Applications: Oxidants such as Permanganate, dichromate, Ce (IV), bromate, Iodates.
September	**Precipitation titrations:** Solubility product. Theoretical principles: Titration curves, end point signals, Mohr, Volhard and adsorption indicators. **Complexometric titrations:** Complexometric titrations with particular reference to EDTA titrations, suitability of polydentateligands as titrants, expressions for the different forms of EDTA in solution as a function of pH, conditional stability constants, derivation of titration curve, effect of pH and second complexingagent on the conditional stability constant and titration curve. Selectivity by pH control, masking and demasking, metal ion indicators, types of EDTA titrations, titrations involving monodentate
October	**Karl-Fischer titrations** Stoichiometry of the reaction, preparation of the reagent, titration method, standardization of the reagent using water-in-methanol, determination of water in samples, interference and their elimination, application to quantitative analysis of some organic compounds-alcohols, carboxylic acids, acid anhydrides and carbonyl compounds. **Non-Aqueous titrations:** Acid –base titrations in non-aqueous solvents- classification of solvents, leveling and differentiating solvents, acidic and basic titrants, methods of titration. Titrations in glacial acetic acid and ethylene diamine, applications of non-aqueous titrations. **Gravimetric analysis:** Formation and treatment of precipitates, co-precipitation, homogeneous precipitation, important precipitating agents and their significance in inorganic analysis.

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November	**Kinetic methods of analysis:** Rate laws, psuedo first order kinetics, types of kinetic methods, fixed time methods. Applications of catalytic and non-catalytic kinetic methods. **Electroanalytical techniques** Membrane indicator electrodes- Classification of membranes, properties of ion-selective membranes, the glass electrode for P_H measurements, glass electrodes for other cations, crystalline membrane electrodes, liquid membrane electrodes. Ion-selective field-defect transistors (ISFETs): Mechanisam of ISFET ion-selective behavior, application of ISFETs. Molecular selective electrode systems: Gas-sensing probes, biocatalytic membrane electrodes, disposable multiplayer p-ion systems.

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C - 302 ADVANCED ANALYTICAL TECHNIQUES

MONTH	SYLLABUS
August	**Absorption Spectroscopy:** absorption, emission, fluorescence phenomenon, principles and differences, Flame AAS, Instrumentation, different types of nebulizers, Nonflametechniques, GAAS, electrothermalvapourisers, graphite furnace, cold vapour AAS, radiation sources, HCL, EDL, TGL etc. detectors, photoemmissive cells, PMT, photodiodes,Interferences, spectral, chemical, matrix, background absorption, correction methods, deuterium arc, zeeman effect, Smith-Hiefljemethos, single beam and double beam instruments, evaluation procedures, applications of AAS,
September	**Atomic Emission Spectroscopy:**Emission-priciple, Inductively coupled plasma optical emission spectrometry, theory, ICP characteristics, sample introduction methods, tourch configuration and view modes, analytical performance.merits and limitations of AES over AAS, Detection limit, application to elemental analysis, Microwave induced plasma systems in atomic spectrometry, principal processes, applications. Mass spectrometry in the analysis of inorganic compounds different techniques, applications
October	**Electroanalytical Techniques:** Electrode Potential, Currents in Electrochemical cells, Potentiometric titrations. Electrogravimetry-faraday's laws of electrolysis, Coulometry, Coulometric titrations. Voltammetry- principle, DME-advantages,limitations, HydrodynamicVoltammetry, Cyclic voltammetry-priciple, conditions for reversible, quasi reversible and irreversible reactions Anodic stripping voltammetry-priciple and applications, Polarography, Pulse polarography, Amperometry-titrations, different titration curves,applications, numerical problems on all these techniques .
November	**Thermal Methods of Analysis:** Principle, methodology and applications: thermogravimetric and differential thermal analysis, differential scanning calorimetry; Thermo-mechanical and dynamic mechanical analysis ; thermometric titrations. Thermal stability of polymers, applications, decomposition patterns, decomposition reactions-examples. **Biomolecules-Analysis:** Introduction, single biomolecule detection and characterization,Fluorescence, principle, factors influencing fluorescence, fluorescence based biosensors,fluoro immune sensors, Mass spectrometry-principle, sample preparation, probe tip, types of ion separation, instrumentation-types, applications in structural biology

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C-404 OC MEDICINAL ORGANIC CHEMISTRY

MONTH	SYLLABUS
January	***Pharmacokinetics, Pharmacodynamics, Theories of drug activity& Drug design*** Basics of drug receptor interactions. Theories of drug activity. Hansch equation. Computer-aided drug design and molecular modeling. ***Sterolds*** Occurrence. Nomenclature, basic skeleton, Diels hydrocarbon and stereochemistry. Isolation, structure and structural elucidation of sterols and bile acids (determination of ring size, nature of side chain, position of angular methyl and stereochemistry of ring junctions). Sex hormones and corticosteroids. Synthesis of cholesterol, estrone, progesterone, androsterone, testosterone. Photo products of ergosterol-vitamins D. Barton reaction for the synthesis of aldosterone. Marker degradation. Brief discussion of homosteroids, norsteroids and oral contraceptives. Synthesis of (*dl*)-norgestrel and ethinyloestradiol.
February	***Antibiotics*** Structure elucidation and synthesis of streptomycin, penicillins, cephalosporin-C, chloromycetinand tetracyclins (terramycin and aureomycin).
March	***Mechanism of drug action and synthesis of the following classes of drugs, with recent developments:*** *Antipyretics, analgesics and non steroidal anti-inflammatory drugs:* Aspirin, paracetamol, phenacetin, novalgin, phenylbutazone and ibuprofen. *Antidiabetics:* Sequence of A- & B- chains of insulin, glibenclamide, metformin, ciglitazone. *Antihistamines:* Methapyrilene, chlorpheniramine. *Antivirals :*Acyclovir, amantidine, rimantidine and zidovudine. *Antineoplastic agents:* Introduction, cancer chemotherapy, special problems, role of alkylating agents and antimetabolites in treatment of cancer. Mention of carcinolytic antibiotics and mitotic inhibitors. Synthesis of mechlorethamine, cyclophosphamide, melaphan, uracil mustards and 6- mercaptopurine. Recent development in cancer chemotherapy. Hormone and natural products. *Cardiovascular drugs:* Introduction, cardiovascular diseases, drug inhibitors of peripheral sympathetic function, central intervention of cardiovascular output. Direct acting arteriolar dilators. Synthesis of amyl nitrite, sorbitrate, diltiazem, quinidine, verapamil, methyldopa, atenolol, oxyprenol.

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April	**Local anti-infective agents:** Introduction and general mode of action. Synthesis of sulphonamides, furazolidone, nalidixicacid, ciprofloxacin, dapsone, aminosalicyclic acid, isoniazide, ethionamide, ethambutal, fluconazole, econozole, griseofulvin, chloroquin and primaquin. **Psychoactive drugs- chemotherapy of the mind:** Introduction, neurotransmitters, CNS depressants, general anaesthetics, mode of action of hypnotics, sedatives, anti-anxiety drugs, benzodiazepines, buspirone, neurochemistry of mental diseases. Antipsychotic drugs- the neuroleptics, antidepressants, butyrophenones, serendipity and drug development, stereochemical aspects of psychotropic drugs. Synthesis of chlorpromazine, diazepam, oxazepam, chlorazepam, alprazolam, phenytoin, ethosuximide, trimethadione, barbiturates, thiopental sodium, glutethimide.

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4th SEMISTER

4.1 INDUSTRIAL RELATIONS AND LABOUR LEGISLATIONS

MONTH	SYLLABUS
MARCH	Industrial relations and employee welfare Meaning, concept, definition Labour welfare officer duties, functions Trade union
APRIL	Salient features of the labour legislation Meaning, objectives silent features a) The workmen compensation act-1923 b) Trade unions 1926 c) The industrial dispute act 1947 d) Payment of wages act 1965 e) Factories act-1948
MAY	Collective bargaining Meaning characteristics Levels of collective bargaining Negotiation process Administration of the agreement
JUNE	Employee relation in knowledge-based industry Current rules of taxation of salary Domestic enquiry

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4th SEMISTER

4.2 SOCIAL WELFARE AND DEVELOPMENT ADMINISTRATION

MONTH	SYLLABUS
MARCH	Introduction to social welfare and development administration Social welfare administration Nature, scope Principles and functions
APRIL	Establishment of services organization Need for welfare and development organization Indian societies registration act-1860 Indian trust act 1882
MAY	Polices, programmes and delivery of services Communication in organization Decision making levels and methods
JUNE	Resource mobilization and maintains of records Resources Funding Statutory obligations

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4th SEMISTER

4.3 Medical and psychiatric social work

MONTH	SYLLABUS
MARCH	Introduction to medical social work Definition, nature, scope
APRIL	Health work in the hospital setting and in community Work with patient Work with family Importance of team work
MAY	Introduction psychiatric social work Meaning, definition, nature, scope Concept of mental health and mental illness Clarification of mental disorders
JUNE	Legislations polices and programmes for mentally ill National health policy- 2002 Mental health act -1987 Organ transplantation act-1983

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4th SEMISTER

4.4 PROJECT FORMULATION AND MANAGEMENT

MONTH	SYLLABUS
MARCH	Project formulation and management and participatory analysis Importance of project planning PRA techniques
APRIL	Objective setting, Operational plan and cot benefits analysis Specification of general and measurable objectives Preparation of budget Detailed operational plan
MAY	Logical framework, resource mobilization and finance-management Drafting project proposal for fund raising techniques of fund raising Personnel management
JUNE	Project monitoring and evaluation Monitoring: meaning, concept, process Evaluation: meaning, methods of evaluation PERT and CPM

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SECOND SEMESTER
PAPER : CS 2.1 .COMMUNITY ORGANIZATION

MONTHS	ACTION PLANNED
MARCH	Meaning and types of community and community organization . concept of community.
APRIL	Historical development .community organization ,community development.
MAY	Principles and models of community organization .skills in community organization.
JUNE	Community organization and process and phases .resource mobilization and fund rising techniques and strategies.

PAPER 2.2 SOCIAL WORK REASEARCH AND STATISTICS

MONTHS	ACTION PLANNED
MARCH	Meaning of research social research and social work research Meaning of research scientific characteristics of research process of research deductive and inductive.
APRIL	Research design Research design by purpose of study exploratory descriptive and exploratory.
MAY	Sampling and data collection. Sampling meaning sampling design process methods and types of sampling.
JUNE	Tools of data collection use of existing scales . Observation questionnaire and interview schedule. Data analysis and interpretation techniques and types Research report writing organizing research report.

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PAPER 2.3 COUNESELING : THEORY AND PRACTICE

MONTHS	ACTION PLANNED
MARCH	Meaning and definition of counseling Definition elements characteristics and goals
APRIL	Portrait of counselor and counselee The counseling relationship Personal growth and effective of the counselor
MAY	Counseling process Problem exploration and clarification Integrative understanding dynamic self-understanding.
June	Therapeutic counseling intervention Psychodrama .RET family therapy reality therapy .behavior therapy. psychodynamic ,cognitive behavioral humanistic and feminist key concepts principles and techniques of various approaches.

PAPER 2.4 SOCIAL POLICY ,LAW, GOVERNANCE AND SOCIAL WORK.

MONTH	ACTION PLANNED
_MARCH	Indian social policy .concept and definition of social policy public v/s social policy, Emergence of social policy world and India .models of social policy. Social work and social policy in order to promote social

	change and social control. Nature of governance ,development and social work. Good governance elements of good governance.
APRIL	Values underlying social policy based on the constitutional provisions. Problem of Indian constitutional fundamental of state policy. Ideals of Indian constitutional Salient features of the right to information act 2005
MAY	Salient features of social legislations. The special marriage act 1954 The Hindu marriage act 1955 The Hindu adoption and maintenance act 1956 The dowry prohibition act 1956
JUNE	The prohibition of child marriage act 2006 The juvenile justice act 2000 The protection of children from sexual offences act 2012 Human rights Definition and classification civil and political rights social economic and cultural rights Universal declaration of human rights History of human rights Social work as human rights profession.

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PAPER 2.5 DEVELOPMENT PARADIGMS FOR THE   EMPOWERMENT OF MARGINALIZED.

MONTH	ACTION PLANNED

MARCH	The concept of marginality ,marginalization nature and types of marginally marginalized communities in India. Meaning of social exclusion and social exclusion of SCs STs and OBCs Socio economic indices of marginalization poverty ,relative isolation ,deprivation ,exploitation ,discrimination ,educational backwardness ,inequality.
APRIL	Caste system in India : origin and nature as described by Dr BR Ambedkar Human development index of Dalits and Dalit development index in India Constitutional safeguards and constitutional agencies working for their development. Need and significance of social work intervention in initiating the right based development for details.
MAY	Contemporary issues of tribal Adivasis. Constitutional and legislative provisions for tribes. Critical analysis of various tribal development programs in India.
JUNE	Ideologies on development of marginalized Ideologies /views /contributions of basaveshwara of basaveshwara towards eradication of caste system in INDIA. Marginalization and social exclusion of OBSs and minority communities in India union and state government programs for OBCs and minorities.

PAPER 2.7 PROJECT MANAGEMENT FOR PARTICPATORY DEVELOPMENT

MARCH	Project formulation and participatory study and problem. Concept of project Concept of project planning and management Planning process.
APRIL	Project design ,project appraisals and operational plan. Logical frame approach.
MAY	

JUNE	Resource mobilization finance management and personnel management techniques of find rising budgeting financial management.
JULY	Project formulation monitoring and evaluation :critical path method (CPM) project evaluation and review technique .PERT)(Project formulation for proposal writing , Drafting project proposal for fund raising , Steps involved in project proposal writing project report ,progress report .

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SEPTEMBER

1. Tissues Types and functions of epithelial tissue, inter-cellular junctions. Connective tissue – extra cellular matrix, Collagens – types, composition, structure and synthesis, Basal lamina.

2. Cytoskeleton and cellular dymamics *Microfilaments;* Assembly and polymerization of G-actin, role of Thymosin-B4, Profilin and Cofilin in polymerization, structural and functional property of F-actin, *Kinesins and dyneins.* Role of microfilaments and microtubules in cell migration. *Intermediate filaments.*

OCTOBER

3. Muscular system Ultra structure of smooth, skeletal and cardiac muscle fibers. Contractile and other proteins of muscle. Energy metabolism in muscle; Phosphagens, neuro-muscular junctions, excitation of striated muscles. muscular dystrophies.

4. Nervous system Types and structure of neuron. Myelin sheath; composition and function. Resting membrane and action potential. Nernst and Goldman equations. Design and use of Patch-Clamp in measuring membrane potential. Neurotransmitters and receptors; synaptic transmission, post-synaptic potentials.

NOVEMBER

5. Digestive system Secretion, regulation of secretion, composition and functions of saliva, gastric, pancreatic and intestinal juices and bile. Gastro-intestinal hormones. Digestion, absorption and transport of carbohydrates, proteins, lipids, nucleic acids and vitamins. Liver – structure and functions. Detoxification mechanisms. Liver function tests.

6. cardiovascular system Systemic and pulmonary circulation. Structure of blood vessels. Regulation of cardiac activity. Blood volume, blood pressure. Plasma composition and functions of plasma liproproteins. Mechanism of blood clotting. Lymph, Cerebro spinal fluid

(CSF): composition and analysis in diagnosis.

DECEMBER

7.Respiratory system Mechanics and regulation of respiration, pulmonary and alveolar ventilation and its control, transport of respiratory gases, respiratory mechanism of acid-base balance.

8.Excretory system Mechanism of urine formation and composition of urine, tubular function tests. Nephritis and nephrosis. Regulation of acid-base electrolyte and water balance. Respiratory and metabolic acidosis and alkalosis.

9.Endocrine system Mechanism of urine formation and composition of urine. Urine analysis for abnormal constituents, tubular function tests. Nephritis and nephrosis. Kidney hormones. Regulation of acid-base electrolyte and water balance. Respiratory and metabolic acidosis and alkalosis.

BCT – 202: Metabolism – I

FEBRUARY

1.Carbohydrate metabolism Introduction, glycolytic pathway and regulation. Gluconeogenesis. pathway and regulation. Role of LDH. The TCA cycle and its regulation. Alternate pathways: HMP pathway, Enter – Doudoroff, Glucuronate and Glyoxylate pathway, Cori's cycle, futile cycles and anaplerotic reactions.

MARCH

2.Glycogen and starch metabolism degradation, synthesis and regulation, glycogen storage disorders. Pasteur effect. Diabetes mellitus, IDDM and NIDDM, diagnosis of Diabetes mellitus and GTT. Pentosuria, fructose and lactose intolerance, fructosuria, galactosemia. Glycosylation of proteins

APRIL

3.Lipid metabolism Oxidation of fatty acids: even and odd numbered, unsaturated and branched chain fatty acid. Metabolism of ketone bodies; their formation, oxidation and clinical significance. Biosynthesis of triacylglycerols, phospholipids and sphingolipids. Sphingolipidodystrophies. Biosynthesis of steroids. Arachidonic acid metabolism-Leukotrienes.

MAY

4.Photosynthesis Introduction, chloroplast/thylakoid structure. Ultrastructure and organization of chloroplast membranes, lipid composition of chloroplast membranes. Hill reaction, light reaction, cyclic- and non-cyclic pho tophosphorylation. Dark reactions, CO_2 fixation into C_4-dicarboxylic acids. Bacterial photosynthesis, photorespiration, RUBISCO.

BCT – 203: Analytical Biochemistry – II

FEBRUARY

1.Chromatography Introduction, partition coefficient phase systems, liquid and solid phases, principle procedure and application of paper chromatography, column chromatography; Ion exchange, ion exchange matrices, examples of cation and anion exchangers, Gel filtration, *Hydrophobic interactions and affinity chromatography.* HPLC, UV, visible fluorescence, electrochemical detectors

2.Gas chromatography G.L.C; principle and application.*Thin layer chromatography:*Introduction; phases used in TLC preparative TLC, metabolic profiling, solvent systems for TLC. Detection of compounds on TLC plates. *Capillary electrophoresis.* zymogram, denaturing electrophoresis (PAGE), SDS-PAGE, isoelectrofocusing. DNA Foot printing.

APRIL

3.Spectroscopic techniques Wave particle duality of light, electromagnetic spectrum, transition in spectroscopy. Principle, design and application of UV-Vis spectrophotometry. . Measurement of fluorescence and chemiluminiscence, use of fluorescence in binding studies.*IR spectroscopyNMR,ESR,.Mass spectroscopy:*Principle, overview of MS-experiment.

MAY

4.Proteomics and BIOINFORMATICS Electrophoresis in proteomics, 2DSDS–PAGE, *basic principle, instrumentation,* analyses of cell proteins, free flow electrophoresis, blue native gel electrophoresis, Microarrays,Genome database,EST tag databases and SNP ,database,BLAST,FASTA,SWIS Prot,homology modeling.

BCT – 302: MOLECULAR PHYSIOLOGY

SEPTEMBER

1.Principles of signal transduction Introduction, basic model of signal transduction pathway, Cell surface receptors, major class of cell surface receptors, evolutionary origin, Diversity of second messengers, signaling proteins, Signaling proteins as molecular switches Localization of signaling proteins.

2.G-protein coupled receptor system Transmembrane Receptors, Domains of Transmembrane (TM) receptors, and Regulation of Receptor Activity,GTPase Superfamily, adenylate cyclase, G-protein coupled receptors that activate phospholipase-C, and G-protein coupled receptors that regulate ion channels. Signaling via Arrestin.

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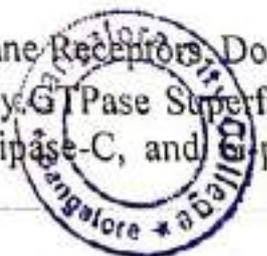
3.SER/Thr specific protein kinases and protein phosphatases

Classification, Structure, and Characteristics, and regulation of Protein kinases, The Protein Kinase Reaction,

regulation of Protein Phosphorylation. Classification and Structure of PKC, activation and regulation of PKC, Receptors of PKC, functions and substrates,

4.Intracellular messenger substances

General Properties, Cyclic AMP, cAMP Signaling, cGMP-Guanylyl Cyclases, Targets of cGMP, Inositol Phospholipid Messengers, PLC, PtdIns(3,4,5)P3, PtIns (4,5)P2 and Diacylglycerol. Ceramide, sphingosine, and Lysophosphatidic Acid as signalling molecules. InsP3 Receptor, *NO Signaling Molecule*; NO and NOS, Physiological Functions of Nitrosylation, Nitrosylation of Metal Centers, Toxic Action of NO and Nitrosative Stress.

NOVEMBER

5.Intracellular signaling proteins

Downstream cascades of Receptor Tyrosine Kinase, Extracellular-signal-regulated kinases, MAPK-Ras–Raf, SOS signaling pathways; Adenylate cyclase, Phospholipase–C, Nitricoxide synthase, guanylate cyclase and their activation. Regulation of signaling cascades, positive modulation and negative modulation.

6.cytokines

Major proteins/protein families that constitute the cytokine group of regulatory molecules; Structural classification of cytokines; Cytokine receptor superfamilies; Human interferons (IFNs) and the cells that produce interferons; Interferon signal transduction; Interferon receptors; JAK–STAT pathway; Interferon JAK–STAT pathway; Biological effects of interferon.

DECEMBER

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7. Cell cycle G0, G1, S, G2 and M-phases of cell cycles-Characteristics of each phase of cell cycles, Restriction point in both cycle and quiescent cells, Synchronization of various check point of cell cycle. Role of ubiquitin protein ligase SCF and APC/C in the control of cell cycle. Role of various cycle-CDK complexes in the transition of mammalian cells-its importance.

8. Apoptosis Overview of Apoptotic Pathways, Caspases: Death by Proteolysis, Mechanism of Caspases, Caspase Activation and Regulation, Inhibitor and Substrates, Family of Bcl-2 Proteins: Gatekeepers of Apoptosis. Death Receptor-Triggered Apoptosis, Fas/CD95 Signaling Pathway, Tumor Necrosis Factor-Receptor 1 and Apoptosis. PI3 Kinase/Akt Kinase and Apoptosis, p53 and Apoptosis
Transcription-Independent Induction of Apoptosis by p53.

9. Cancer Transformation of normal cell to tumor, Basic Characteristics of Tumor Cells, Mutations in Cancer Cell, genetic and epigenetic changes in cancer, microRNA and cancer. Cancer genes; oncogenes and tumor suppressor genes, Rb and ARF proteins, carcinogenesis an volutionary process, Hallmark of cancer. Oncogene activation, p53 —properties and post translational modifications. Drug resistance in cancer chemotherapy.

BCP – 305: Clinical Biochemistry Practical
Analysis of Blood and Urine for diagnostic investigations

SEPTEMBER

1. Estimation of glucose by Folin Wu method.
2. Estimation of glucose by Dubosky's method.
3. Estimation of cholesterol by Zack's method.
4. Estimation of haemoglobin by Wong's method

OCTOBER

5. Estimation of urea in blood by Diacetylmonoxime method.
6. Estimation of serum calcium by Clark and Collips method.
7. Determination of A/G ratio by Biuret method.
8. Analysis of SGOT-SGPT (AST, ALT) / creatine kinase / acid or alkaline phosphatase.

NOVEMBER

9. Qualitative analysis of Urine sample for normal and abnormal constituents.
10. Determination of titrable acidity of urine.
11. Estimation of uric acid in serum and urine by Caraway's method
12. Estimation of creatinine and creatine in serum and urine by Zaffe's method.

DECEMBER

13. Estimation of urea in urine by Nesslerization method (Urease method).
14. Determination of urine Chloride by Volhard-Arnold method.
15. Estimation of 17-ketosteroid by Zimmerman's method.
16. Estimation of urine Bilirubin.

BCT – 401: Molecular Biology – II

FEBRUARY

1.Gene expression in prokaryotes Definition of regulon, operon, cis and trans acting elements. Positive control of lac operon. Utility of merodiploids in understanding regulation of operon.. Catabolite repression, inducer exclusion and prevention mechanism. Anatomy and regulation of arabinose and tryptophan operons. Riboswitches; discovery and models of riboswitch action. *Phage strategies;* Sigma switching in phage infection.

2.Ribosomes Prokaryotic ribosomes; molecular components, *in vivo* assembly, dissociation of subunits, and polysomes. Eukaryotic components and their assembly, organelle ribosomes.

MARCH

3. Gene expression in Eukaryotes

Analysis of gene expression; mapping and quantifying transcripts; Northern blots; S1 mapping of 5' and 3' ends of transcripts. Primer extension, Runoff transcription and G-less cassette transcription. Levels of regulation of gene expression in eukaryotes; Chromatin structure and its effect on transcription. Effect of histones on transcription activation. Nucleosome positioning; SV 40 mini chromosome. *Histone modifications.*

Chromatin remodeling; Major classes of remodeling complexes; assay of remodeling; ChIP. Composition of SW12/SNF2 and ISWI complexes. Model of SW12/SNF2 mechanism. Remodeling in yeast HO gene and human IFN-β promoter. histone methylation, HMTases, SFR and RAP-proteins. Transcription elongation through nucleosomes; FACT and PARP.

4. Molecular biology of Drosophila development

Overview of *D. Melanogaster* development, dorso-ventral patterning of embryo. Regulatory DNAs, role of snail and twist proteins in patterning. Localization of biocoid and nono (oskar) mRNAs in embryo, Regulation of hunchback expression, and gap genes, production of segmentation stripes, Expression of eve gene, and eve stripe-2.

APRIL

5. Transcriptional activators

classification, structure and function, domains of activators. DNA binding motifs; Zn fingers- Gal 4 activator of yeast. Modularity of domains of activators; chimeric transcription factors- Gal4-LexA, two hybrid assay. Dimerization of activators, modular arrangement of enhanceosome. Regulation of transcription factors; modification of activation by ubiquitination, sumoylation and acetylation. Signal transduction pathways; Ras, Raf, JAK stat pathway. Definition, mechanism of RNAi. Classical experiments with petunia and *C. elegans.* miRNAs; control of gene expression by miRNAs example and experimental proofs, pathways of gene silencing by miRNA. Stimulation of translation by miRNAs. Translation repression; processing bodies.

MAY

6. Translation

Initiation of protein synthesis in prokaryotes, Shine-Dalgarno sequence, formation of 30 S and 70 S initiation complexes; effect of GTP hydrolysis by IF2. exchange of ribosomal subunits. Eukaryotic translation. Control of translation in bacteria and eukaryotes. Amino acyl-tRNA synthetases, formation of ternary complex among amino-acyl tRNA, EF-T, and GTP, three site model of ribosome, Inhibitors of prokaryotic and eukaryotic translation. Post-translational modifications of proteins. Mechanism of translational control. *Genetic code;* Co-linearity of genes and proteins, Coding properties of Trna. Wobble base pairing. Properties of

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105-NUTRITIONAL BIOCHEMISTRY

MONTH	SYALLABUS
JANUARY	Carbohydrate-occurrence and physiological functions,lactose intolerance,dental caries,artificial sweetners,role of dietery fibres in health and disease etc. Lipids:concepts of visible and invisible lipids. EFA,PUFA,MUFA,SFA etc.
FEBRUARY	Proteins:concepts of essential and non essential amino acids,protein efficiency ratio,nitrogen balance concept,protein energy malnutrition etc.
MARCH	Energy metabolism: basal and resting metabolism,influencing factors.methods to determine energy requirement,thermogenesis,BMR ,factors affecting BMR,SDA of food. Role of hunger,dietery recommendations –RDA, ICMR & WHO. Macro&micro minerals-ca,P,Mg,Na,Co,K,Cl- Fe,Zn,Se,Cr,I,Mn,Mo etc.
APRIL	Ultra trace elements Balanced diet –disorders related to nutrition,vitamin dietery sources and vitamins likeB12,C,D,Niacin,riboflavin,vitamin deficiency-clinical symptoms,prevention and treatment.

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MONTH	TOPICS TO BE COVERED
AUGUST	**Bioenergetics:** Basic concepts of metabolic energy capture and transfer. Biochemical energetic group transfer reactions of ATP, phosphate group transfer potential of ATP and other high energy phosphate donors. Stages in extraction of energy from fuel molecules. **Biological oxidation:** Biological redox couplers, participation in oxidative metabolism. Free energy changes in electron transfer reactions. Mitochondrial electron transfer system- Chemical nature, topology and thermodynamic design of electron carriers. Sequence of electron carriers isolation of mitochondrial complexes, reconstitution experiments and study of specific inhibitors of Electron Transport Chain. **Oxidative phosphorylation:** Mechanism of proton pumping. Proton motive force and the Mitchell hypothesis. FoF1-ATPase- structure and mechanism, O_{18} exchange. Coupling of electron transfer to ATP synthesis. Uncouplers, inhibitors and ionophores, partial reactions of OP, P/O ratios and their use in localization of sites of ATP synthesis along the chain. Mechanism of oxidative phosphorylation, mitochondrial specific transport systems and energy charge. Microsomal electron transport. Proton motive force in Halobacteria, ATP synthesis in bacteria. H_{+} pumping by bacteriorhodopsin Photosynthetic electron transport. Structure and function of chloroplast ATP- synthase.
SEPTEMBER	**Nitrogen Cycle:** Introduction, biological and non-biological nitrogen fixation, *nif* genes, regulation and utilization of nitrate and nitrite, regulation of nitrate reductase. Assimilation of ammonia, formation of amino acid amides by glutamine synthetase and its regulation. **Nucleotide Metabolism:** Biosynthesis of purine and pyrimidine nucleotides and their inter conversion, regulation of biosynthesis. Other pathways of purine nucleotide formation. Biosynthesis of deoxyribonucleotides and coenzymes nucleotides. Chemical inhibition of

the biosynthesis of nucleic acid precursors. Degradation of purine and pyrimidines, and disorders associated with their metabolism;

OCTOBER

Amino acid Metabolism: General metabolic reaction of amino acids– transamination, pseudotransamnation, glucose – alanine cycle, oxidative deamination (glutamate dehydrogenase), minor pathways of amino acid degradation – transdeamination, amino acid oxidase, and non – oxidative deamination

Urea cycle– regulation and metabolic disorders. Biosynthesis of creatine and creatine phosphate, polyamines– putrescine, spermidine and spermine, glutathione , physiologically active amines gama amino butyric acid, serotonin, histamine and catecholamines – dopamine, epinephrine and epinephrine).

Degradation of the individual amino acids: Pathways in animal, plant and microbial systems; Amino acids forming from pyruvate (alanine, glycine, threonine, serine, cystine and cysteine), oxaloacetate (aspartic acid and asparagine), α- ketoglutarate (glutamic acid, glutamine, arginine, histidine and proline), succinyl CoA (valine, isoleucine and methionine), acetoacetate and/or acetyl CoA (leucine and lysine), pyruvate, formaldehyde, acetoacetate and/or acetyl CoA(tryptophan), and fumarate, acetoaetate and/or acetyl CoA (phenylalanine and tyrosine). Inherited disorders associated with glycine, aromatic, branched chain, basic and sulfur containing amino acid metabolism.

NOVEMBER

Biosynthesis of the individual amino acids: Biosynthesis of non – essential amino acids alanine, serine , aspartic acid, asparagine, glutamic acid and glutamine, essential amino acid tyrosine, non – essential amino acid glycine, proline and arginine, and cysteine. Biosynthesis of essential amino acids; threonine, lysine and methionine, valine and leuvine, pyruvate and α–ketobutyrate, isoleucine, phenylalanine, tyrosine , tryptophan and histidine. Regulation of amino acid biosynthesis by sequential & concerted feedback inhibition.

Heme Metabolism: Biosynthesis and degradation of porphyrin and their

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MOLECULAR BIOLOGY

MONTH	SYALLABUS
AUGUST	CENTRAL DOGMA,DNA as a genetic material,c-value paradox,gene number, Globulins,properties of RNA,tandem repeats,gene cluster , mini &micro satellite etc.semi conservative and conservative replication,discontinuous replication,experimental demonstration.
SEPTEMBER	ENZYMOLOGY: Topoisomerase, gyrase, pol I , Pol II ,helicase,assay of helicase,Bacterial replication,telomerse, isolation of ARS of yeast ,ORC,role of MCM protein etc.
OCTOBER	Viral and bacterial replication.ss+RNA,picorna and carno virus,rhabdo virus,orthorombo virus,replication tumor virus& replication of reo virus etc.
NOVEMBER	Transcription, transcription factors,sigma factor, initiation mechanism etc.
DECEMBER	Transcription in eucaryotes.-RNA polymerases,classII promoter ,TATA box,SV40 early promoter ,enhancers and silencers. Post transcriptional modification, structure of cap, purification of cap,capping substrate, functions of cap.poly adenylation,functions of poly A,mechanism and signals of polyadenylation ,PABP,Mrna, processing,termination etc.

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DEPARTMENT OF BIOCHEMISTRY

BIOMOLECULES

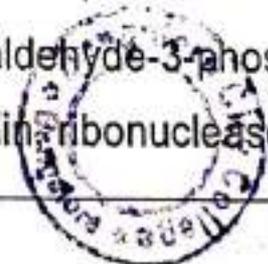| MONTH	TOPICS TO BE COVERED
SEPTEMBER	configurational and conformational aspects of carbohydrates. Structure, properties and importance of structural (cellulose and chitin) and storage polysaccharides (starch and glycogen), glycosaminoglycans, cardioglycosides and bacterial cell wall polysaccharides. Structure elucidation of polysaccharides sequence analysis of oligosaccharides Glycoproteins – structure and functions, blood group antigens, Lectins – characteristics and functions in biological system **Lipids:** Lipid classification, brief account of the chemical properties and structure of lipids, Biological role of fatty acids, acyl glycerols, phospholipids, plasmalogens, sphingolipids, glycolipids, steroids, eicosanoids – prostaglandins, thromboxanes, & leukotrienes, leptin and visfatin.
OCTOBER	**Amino acids and Proteins:** classification, properties and structure of amino acids. Non- standard, non–protein and biologically active amino acids. Ionic properties of peptides and proteins, Peptide synthesis. Naturally occurring peptides. *Primary structure:* Elucidation of primary structure of proteins – Determination of amino acid composition, end group analysis, Manual and modern methods of sequencing and reconstructing the protein sequence. Assignment of disulfide bonds. Secondary structure: Peptide bond – structure and conformation, Ramachandran plot. alpha – helix and other types of helices, beta – pleated sheet, turns, loops and triple helical structures. Structure of fibrous proteins: alpha-keratin, silk fibroin and collagen. Motifs (super secondary structure – triose phosphate isomerase, concanavalin-A and Rossmann fold) and domain structure(glyceraldehyde-3-phosphate dehydrogenase). Secondary structure of insulin, ribonuclease, lysozyme,

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NOVEMBER	myoglobin and chymotrypsin. *Tertiary structure:* Forces stabilizing tertiary structure of proteins. Protein denaturation and renaturation. *Quaternary structure and symmetry:* Structure and function of myoglobin and hemoglobin. oxygen binding to haemoglobin Protein folding pathways, molecular chaperones and protein disulfide isomerase. Disease related to protein folding – Alzheimer's and mad cow disease. **Nucleic Acids:** Structure and properties of Nucleosides and Nucleotides. Structure of nucleic acids– primary, secondary and tertiary structure of DNA. Isolation, fractionation and characterization of nucleic acids.
DECEMBER	Properties of nucleic acids in solution. Secondary structure of tRNA. Chemical synthesis of oligonucleotides Nucleic acid sequencing – Maxam and Gilbert and Sangers method. Rapid sequencing methods Revision

MONTH	TOPICS TO BE COVERED
FEBRUARY	Nomenclature and classification of enzymes. Specificity and active site. Fundamentals of enzyme assay – enzyme units, coupled kinetic assay, immobilized enzymes. Enzyme localization. Criteria of purity of enzymes. Monomeric enzymes, zymogen activation, multifunctional enzymes, oligomeric enzymes and multi- enzyme complexes. **The investigation of active site structure:** The identification of binding sites and catalytic sites–trapping the E-S complex, use of substrate analogs, enzyme modification by treatment with proteolytic enzymes, photo – oxidation and chemical modification of amino acid side chains Affinity labeling studies and super reactive amino acid chains 3-D structural features of active sites of chymotrypsin, trypsin, elastase and triose phosphate isomerase).
MARCH	**Enzyme catalysis:** Chemical nature of enzyme catalysis-General acid-base catalysis, electrostatic catalysis, covalent catalysis, intramolecular catalysis and enzyme catalysis. Mechanisms of action of lysozyme, ribonuclease, lactate dehydrogenase, chymotrypsin, trypsin, elastase, papain and alcohol dehydrogenase pyruvate dehdrogenase complex, pyruvate kinase, creatine kinase, superoxide dismutase & carboxypeptidase – A). **Coenzymes:** The mechanistic role of –Nicotinamide nucleotides, flavin nucleotides, pyridoxal phosphate, coenzyme-A, lipoic acid, thiamine pyrophosphate, biotin, tetrahydrofolate and coenzyme B_{12}. **Kinetics of enzyme-catalyzed reactions:** Methods used in the investigation of the kinetics of enzyme-catalyzed reactions, initial velocity studies, rapid reaction techniques and relaxation technique.

APRIL	Enzyme kinetics of single substrate reactions — Michaelis-Menten and Briggs and Haldane theory (rapid equilibrium and steady state theory). Kinetic data evaluation-linear transformation of Michaelis-Menten equation. Effect of pH & temperature on enzymatic reactions, Arrhenius plot, determination of activation energy. Pre-steady state kinetics. Integrated velocity equation. Haldane equation. King-Altman procedure for deriving the rate equation. **Enzyme Inhibition:** Types of reversible inhibitors; competitive, non-competitive, uncompetitive, and mixed inhibitors. Partial inhibition, substrate inhibition and allosteric inhibition. Irreversible inhibition.
MAY	**Kinetics of bi- substrate reactions:** Sequential mechanism, compulsory order and random order mechanism, non-sequential mechanism, ping pong mechanism, distinction between different kinetic pathways using primary and secondary plots. Inhibition studies and isotopic exchange at Equilibrium in the characterisation of bisubstrate reactions. **Allostery of enzyme action:** Binding of ligands to proteins, Co-operativity, the Hill equation, Adair equation, Scatchard plot and equilibrium dialysis techniques. *Sigmoidal kinetics:* MWC and KNF models. Significance of sigmoidal behavior. Allosteric enzymes and metabolic regulation. Study of ATCase as typical allosteric enzyme. Other mechanisms of metabolic regulation.
JUNE	REVISION

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204 - MEMBRANE BIOCHEMISTRY

MONTH	SYALLABUS
JANUARY	Structure ,nomenclature and properties of glycerolipids,liposomes-preparation properties, lateral heterogeneity of membrane lipids,lipid raft and domains,caveoli. Asymmetry of lipids , membrane sideness etc.
FEBRUARY	Isolation and characterization ,solubilisation of membrane proteins,erythrocyte ghosts, Membrane protein interaction lipid anchored protein,techniques Etc.\
MARCH	
APRIL	Membrane transport -pasive & active,ion channels aquaporins , Na-k channel,cystic fibrosis,MDR1,ABC transporter etc.
	Compartmentalisation of proteins: SNARE,VSNARE,TSNARE , protein sorting in mitochondria,golgi bodies,ER & peroxisomes.endocytosis and exocytosis.

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BTP-301 BIOCHEMISTRY & BIOPHYSICS

MONTH	SYALLABUS
JUNE	CARBOHYDRATES-mono & di saccharides,test for carbohydrates,anomer,epimer etc
	Protein – classification,structure,test ,reactions etc.
JULY	Amino acid-classification, reactions,test & significance.
	Vitamins-A,D,E,K,B1,B12 & coenzyme-structure,source,deficiency disease etc.
AUGUST	Hormones –classification, significance etc.
	Nucleic acids-purine & pyrimidine bases,structure,DNA,RNA and their properties.
SEPTEMBER	Radioactive isotopes-deutrium tritium etc.isotopes application,Geiger muller counter etc.
	Chromatography-column, gas liquid, paper, etc.
	Electrophoresis-SDS & PAGE.
OCTOBER	Spectroscopic techniques –NMR,MASS & ESR.

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MONTH	TOPICS TO BE COVERED
MARCH	Introduction and over view of cloning procedures. Isolation of nucleic acids, characterization and purification of plasmid, bacteriophage genomic DNA
	Restriction enzymes Discovery, classification, properties, and applications. Reactions, application of DNA- and RNA ligase, Phosphatases and kinases, DNase and RNases , S1- and Micrococcal numclease, double and singlestranded exonucleases. DNA and RNA polymerases (Klenow fragment), template independent RNA polymerases. Topoisomerase. Linkers and adapters, TA-cloning.
	Cloning Vectors: Basic properties of plasmids, desirable properties of vectors, plasmids as vectors. Directional cloning in plasmid vectors, blunt end cloning in to plasmids.
	Transformation of competent E.coli. electroporation, Screening colonies using X-gal and IPTG, screening by hybridization. Bacteriophage lambda vectors;Insertional and replacement lambda vectors, transfection, *in vitro* packaging, screening recombinant phages. Cloning in M13 vector and COSMID vectors and their applications.
APRIL	*Expression vectors:* Characteristics of expression vectors, expression vectors for cloning and expression in bacteria, yeast and mammalian cells. Super vectors; characteristic features and utility of BAC and YAC vectors.
	Methodology for construction,Growth, evaluation and storage of genomic libraries, cDNA libraries; screening cDNA libraries;
	Restriction digestion, southern blot, PCR and sequence analysis.
	PCR: Discovery, principle and procedure, varients of PCR- RT-PCR, long PCR, differentialPCR, and inverse PCR. Application of PCR; Rapid amplification of cDNA ends (5'and 3'RACE), Cloning PCR products, PCR in screening clones, colony PCR, Diagnositc application of PCR.
	Sequencing and mutagenesis; Principle of DNA sequencing, automated

MAY	sequencing, extendingthe sequence, shot gun sequencing. Analysis of sequence data; annotation, ORF, exon-intron boundaries, identification of genes and their products. **Gene transfer to animals cells:** over view of strategies, transfection methods, phospholipids asdelivery vehicles, electroporation and direct transfer, transient and stable transformation, Cotransformation and selection of stable transformants, selectable markers for animal cells. Mammalian plasmid expression vectors, reporter genes. Gene transfer by viral vectors; adenoand baculo virues, retroviral vectors. **Gene transfer to plants:** plant cell culture and proptoplast, callus and their manipulations. *Agarobacterium* mediated transformation, Ti plasmid, mechanism of T-DNA transfer, Functionof T-DNA genes, Ti-plasmid derivatives as plant vectors (disarmed T-DNA), cointegrate and binary vectors, high capacity binary vectors, selectable markers for plants, control of transgeneexpression in plants. Direct DNA transfer to plants; protoplast transformation, particle bombardment, *in-planta* and chloroplast transformation. Plant expression vectors; CaMV and TMV vectors.

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DEPARTMENT OF BIOTECHNOLOGY-M.Sc BIOTECHNOLOGY

LESSON PLAN - 2018 -2019

IV SEMESTER

MONTH	THEORY- BTH-401: BIOPROCESS ENGINEERING	PRACTICAL- BTP- 404: BIOPROCESS ENGINEERING AND MEDICAL BIOTECHNOLOGY
FEBRUARY	Unit 1 Introduction	1. Study of fermentor- Demonstration. 2. Production and isolation of antibiotics (Pencillin and Streptomycin)
MARCH	Unit 2 Bioreactors Unit 3 Fermentation media and Fermentation Process:	3. Production and analysis of Single cell protein (Spirulina and yeast) 4. Production of yoghurt and estimation of lactic acid at different time intervals 5. Production of wine – estimation of percentage of alcohol, total acidity & volatile acidity in wine.
APRIL	Unit 4 Downstream processing	6. Production and assay of α-amylase from Aspergillus niger 7. Purification and assay of α amylase by simple precipitation using sodium sulphate, poly amines and organic solvents and immobilization 8. Blood urea analysis by diacetyl monoxyme method
MAY	Unit 5 Immobilization and Biotransformation Unit-6 Production of Industrially important products	9. Analysis of acid and alkaline phosphatase from serum samples 10. Estimation of serum cholesterol 11. Assay of SGOT enzyme activity 12. Assay of SGPT enzyme activity
JUNE	Unit 7 Intellectual Property Rights (IPRs) and Entrepreneurship:	13. Blood sugar analysis by Folin -Wu method 14. Estimation of Creatine and Creatinine from urine samples

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DEPARTMENT OF BIOTECHNOLOGY-M.Sc BIOTECHNOLOGY

LESSON PLAN - 2018 -2019

IV SEMESTER

MONTH	THEORY- BTH-403 GENOMICS AND PROTEOMICS
FEBRUARY	UNIT 1 Introduction:
MARCH	UNIT 2 Genomics UNIT 3 Genome Analysis, Genome Organization and Structure
APRIL	Unit 4 Functional and Comparative Genomics
MAY	UNIT 5 Proteomics
JUNE	UNIT 6 Metabolomics

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Details Of Lesson Plan First semester

Department: Biotechnology (GNT-101)

Class Bsc 2018

Fundamentals of Cell Biology

Month	Class	Theory Title of the chapter	Practical Title of the experiment
July 2018	Bsc I sem	Unit-1: Scope of genetics, B.Microscopy C. Model organisms	Microscopy
August 2018	Bsc I sem	Unit-2: Ultra structure and function of cell	Genetic study of model organisum and their significance
September 2018	Bsc I sem	Unit 3: Ultra structure and function of cell	Staining techniques
October 2018	Bsc I sem	Unit 3: Ultra structure and function of cell	Observation of mitotic stage in permanent slides
November 2018	Bsc I sem	Unit:4: Cell cycle and cell division	Temporary squash preparation of onion root tips for mitosis

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Details Of Lesson Plan Second semester

Department: Biotechnology (GNT-201)

Class Bsc 2019

Principles of Genetics

Month	Class	Theory Title of the chapter	Practical Title of the experiment
Feb 2019	Bsc II sem	Unit-1: a. History of Genetics b. Biography of Medel and his experiments on pea plants c. Law of independent assortment	1. Temporary squash preparation of a. Onion flower buds b. Grasshopper testes lobes
Mar 2019	Bsc II sem	Unit-II: a. Multiple Alleles b. Gene Interactions	2. Study of: a. Flower colour in Antirrhinum/ Mirabilis b. Coat colour in Mice c. Comb pattern in poultry
April 2019	Bsc II sem	Unit III: Elements of Biometry	3. Blood typing 4. Biometrical Computation of
May 2019	Bsc II sem	Unit IV: Sex Determination	5. Problem on a. Genetics problems b. Multiple alleles c. Gene interactions

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Details Of Lesson Plan Fourth semester

Department: Biotechnology (GNT-401)

Class Bsc 2019

Principles of Genetics

Month	Class	Theory Title of the chapter	Practical Title of the experiment
Feb 2019	Bsc IV sem	Unit-1: a. Chemical Basis of heredity b. Nucleic acids c. DNA replication	1. Instrumentation
Mar 2019	Bsc II sem	Unit-II: a. Genome organization b. Gene Expression	2. Extraction Of DNA 3. Paper Chromatography for separation
April 2019	Bsc II sem	Unit III: a. Gene regulation b. Bacterial Genetics c. Introduction to genomics	Electrophoresis
May 2019	Bsc II sem	Unit IV: a. Transposable elements. B. Mutation	Mutations

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DEPARTMENT OF BIOTECHNOLOGY

B.Sc BIOTECHNOLOGY (GENETICS)

LESSON PLAN - 2018 -2019

FIFTH SEMESTER

MONTH	THEORY - GNT 501: RECOMBINANT DNA TECHNOLOGY	PRACTICALS- GNP501: RDT
JUNE	UNIT -1: Introduction to RDT, tools for RDT.	Instrumentation
JULY	UNIT-2: Isolation and construction, GENE TRANSFER METHOD, synthesis of gene.	Vectors
AUGUST	Selection and screening of recombinants	Estimation of DNA by DPA Estimation of RNA by orcinol
SEPTEMBER	UNIT -3: Techniques for RDT	Transgenic organism
OCTOBER	Applications of RDT	Demonstrations

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DEPARTMENT OF BIOTECHNOLOGY

B.Sc BIOTECHNOLOGY (GENETICS)

LESSON PLAN - 2018 -2019

FIFTH SEMESTER

MONTH	THEORY - GNT 502: BASIC HUMAN GENETICS	PRACTICALS- GNP 502: BASIC HUMAN GENETICS
JUNE	UNIT - 1: Human chromosomes, genetic disease and inheritance pattern.	Study of karyotype I
JULY	Pedigree studies. UNIT-2: immunology and immunogenetics	Study of karyotype II SEX CHROMATIN
UGUST	Oncogenetics	Haemocytometer
TEMBER	UNIT -3: dermatoglyphics Prenatal diagnosis	Pedigree analysis Dermatoglyphics
OBER	Genetics and society	Immunology

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LESSON PLAN - 2018 -2019
SIXTH SEMESTER

MONTH	THEORY - GNT 602: APPLIED AND BEHAVIOURAL GENETICS	PRACTICALS- GNP 602: APPLIED AND BEHAVIOURAL GENETICS
JANUARY	UNIT -1: genetics in medicine and industry	WIDAL & VDRL
FEBRUARY	DNA Fingerprinting, Bioinformatics	Study of pollen fertility Study of hybrid animals
MARCH	UNIT-2: genetic resources and biodiversity	Study of mating behaviour in Drosophilla
APRIL	Behavioural genetics Molecular markers	Study of hygienic behaviour in honey bee
MAY	UNIT-3: heterosis in animals and plants	Study of nesting behaviour in ants

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Details Of Lesson Plan Fourth semester

Department: Biotechnology (GNT-601)

Class Bsc 2019

DEVELOPMENTAL, EVOLUTIONARY AND BIOMETRICAL GENETICS

Month	Class	Theory Title of the chapter	Practical Title of the experiment
Feb 2019	Bsc VI sem	Unit-1: a. Deveopmental Genetics b. Genetics of development in plants c. Switching genes on and off during deveoplment	1. Early embryonic development in frog 2. Genetics of developmentin Arabidopsis
Mar 2019	Bsc VI sem	Unit-II: a. Evolutionary and population genetics	3. Genetics of development in Drosophila 4. Study of quantitative inheritance in kernek colour in wheat
April 2019	Bsc VI sem	Unit II: b. Quantitative characters and inheritance	Biometrical problem
May 2019	Bsc VI sem	Unit III: Biometrical genetics	Problem in population genetics

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LESSON PLAN - 2018 -2019

SEMSESTER-III

BTT 301- BIOCHEMISTRY AND BIOPHYSICS

MONTH	TOPICS
JUNE	Unit 1. Amino acids Classification and properties due to intra, centre and side chain, titration against acid and abase
JULY	Unit 2. Proteins Classification based on structure and functions, structural organization of proteins (Primary, secondary, tertiary and quaternary structure) Unit 1.Introduction and scope of Biophysics. Unit 2.pH and buffer concepts.
AUGUST	Unit 3.Chemical bonding – Ionic bond, covalent bond, hydrogen bond and peptide bond Vander waals forces, Principles of thermodynamics Unit 3.Enzymes Introduction, classification, enzyme kinetics, factors influencing enzyme activity, co-Enzymes and co-factors. Unit 4.Carbohydrates Structure, properties and classification with examples, Carbohydrates as a source of Energy.
SEPTEMBER	Unit 5.Lipids Structure, properties and classification and functions. Unit 6.Vitamins Water Soluble and fat-soluble vitamins, Dietary source. Unit 7.Hormones Steroid hormones- structure O, E2, P4, Glucocortocoid hormones. mechanism of steroid hormone action.
OCTOBER	Unit 4. Analytical techniques Principles and applications of a) Chromatography (Paper, thin – layer, column, GLC and HPLC) b) Centrifugation (RPM and G, Ultra centrifugation) 7 Hours Unit 5.Spectroscopic techniques Principles and applications of UV, Visible spectroscopy, X-ray crystallography, NMR, IR, fluorescence & atomic absorption. 3 Hours Unit 6. Iosotopes Types, their importance in biological studies, measure of radioactivity, GM counters and Scintillation counting

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LESSON PLAN - 2018 -2019

SEMSESTER-III (PRACTICAL)

BTP 302- Biochemistry and Biophysics

MONTH	TOPICS
JUNE	1. Preparation of Buffers-Citrate and Phosphate. 2. Estimation of reducing sugars (Glucose, Maltose and Lactose) by DNS and Somoji's Methods.
JULY	3. Estimation of Protein by Biuret method and Lowry's method 4. Assay of enzyme activity- Amylase
AUGUST	5. Separation of Sugars by TLC. 6. Estimation of Amino acids by ninhydrin method
SEPTEMBER	7. Estimation of inorganic phosphate by Subba row method
OCTOBER	2. Estimation of reducing sugars (Glucose, Maltose and Lactose) by DNS and Somoji's Methods.

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LESSON PLAN - 2018-2019

II SEMESTER

MONTH	THEORY-BTH-203: IMMUNOLOGY AND IMMUNOTECHNOLOGY	PRACTICAL-BTP-206: ENZYMOLOGY AND IMMUNOLOGY
FEBRUARY	Unit 1: Immune system and Immune Response	1. Isolation and assay of alpha amylase activity from saliva 2. Isolation and assay of urease from horse gram or kidney gram
MARCH	Unit 2: Antigens and Antibodies Unit 3: Major Histocompatibility Complex and Transplantation	3. Isolation and assay of acid phosphatase from sweet potato 4. Determination of Km and V max 5. Effect of pH and temperature on enzyme activity
APRIL	Unit 4: Hypersensitivity Reactions	6. Determination of specific activity of an enzyme 7. Molecular weight determination of a protein by gel electrophoresis 8. Immobilization of enzyme (Urease/Amylase)
MAY	Unit 5: Autoimmunity and Immunomodulation	9. Partial purification of IgG by ammonium sulphate fractionation and Dialysis 10. Purification of IgG by column chromatography 11. Serum separation and serological reactions (a) agglutination (b) precipitation 12. Enzyme linked immunosorbent assay
JUNE	Unit 6: Immunological Techniques Unit 7: Immunization	13. Isolation of lymphocytes from peripheral blood 14. Ouchterlony double diffusion 15. Single radial immunodiffusion 16. Rocket immunoelectrophoresis

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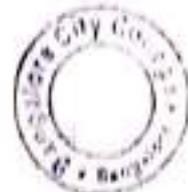
Details of Lesson Plan Second semester

Department: Biotechnology (MBP204)   **Class: Msc 2019**

Environmental Biotechnology

Month	Class	Theory Title of the chapter	Practical Title of the experiment
Feb 2019	MSC II sem	Unit-1 Environment and monitoring	1. Determination of BOD and COD of water sample 2. Estimation of chromium in industrial effluent by colorimetry
March 2019	MSC II sem	Unit 2: Water Management and waste treatment Unit 3: Biomining and Biodiesel	3. Estimation of calcium in water sample by titration method 4. Determination of BOD , DO and COD
April 2019	MSC II sem	Unit 4: Bioremediation Unit 5 : Biowaste traetment	5. Isolation of bacteriophage from sewage 6. Sludge analysis
May 2019	MSC II sem	Unit 6: Global environment problems	7. Microbial analysis of water 8. Determination of phosphate and nitrate from sewage sample

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DEPARTMENT OF BIOTECHNOLOGY-M.Sc BIOTECHNOLOGY

LESSON PLAN - 2018 -2019

I SEMESTER

MONTH	THEORY- BTH- 102: MICROBIAL GENETICS	PRACTICAL- BTP- 107: GENERAL MICROBIOLOGY AND BIOCHEMISTRY
AUGUST	Unit 1 Physical basis of Heredity:	1. Determination of pI of amino acid by titration method 2. Estimation of glucose by Hagerdon and Jensen method
SEPTEMBER	Unit 2 Chromosomes and Genes Unit 3 Genetic Recombination:	3. Estimation of total sugar by Anthrone method 4. Estimation of amino acid by Ninhydrin method 5. Estimation of protein by Lowry"s method 6. Estimation of inorganic phosphate by Fiske-Subbarow method
OCTOBER	Bacterial Recombination Unit 4 Transposable Genetic Elements	7. Determination of (a) Iodine number and (b) Acetyl number of a lipid 8. Separation of amino acids by paper chromatography and TLC 9. Microbes culture in broth and solid media, Colony characteristics and Counting of colony (serial dilution method) 10. Bacterial growth assessment by turbidometry 11. Staining techniques (a) Simple staining (b) Gram staining (c) Endospore staining (d) Capsule staining (e) AFB staining (f) negative staining
NOVEMBER	Unit 5 Mutation Unit 6 Sex Determination and Dosage Compensation	12. Biochemical tests (a) Indole test (b) Methyl red test (c) Voges Proskaeur test (d) Citrate utilization test (e) Triple sugar vion agar test (f) Starch hydrolysis test (g) Gelatin hydrolysis test (h) Catalase test (i) Oxidase test 13. Soil Microbiology Isolation microflora of (a) rhizosphere (b) phylloplane (c) actinomycetes (d) Rhizobium from legume of root nodules (e) Sporocarp by sieve method (f) identification of Rhizobium and agrobacterium
DECEMBER	Population Genetics	14. Air Microbiology Isolation of air microflora (a) exposure plate method (b) rotorod sampler method. 15. Water Microbiology: Testing of quality of water (coliform test), H2S strip method. 16. Estimation of lactate/ Citrate from bacterial culture media

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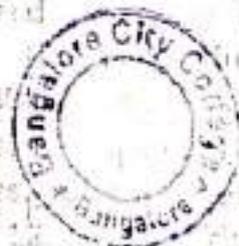Jigani Nagar (Post) Behind BTS ...

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LESSON PLAN - 2018 -2019

I SEMESTER

MONTH	THEORY- BTH- 103: GENERAL MICROBIOLOGY
AUGUST	Unit 1 Microbial classification
SEPTEMBER	Unit 2 Prokaryotic Microorganism- General properties, Structure, and Reproduction:
OCTOBER	Unit 3 Eukaryotic Microorganisms- General characters, Structure and Reproduction
NOVEMBER	Unit 4 Viruses, Virioids and Prions (Acellular entities)
DECEMBER	Unit 5 Microbial Growth and Control Unit 6 Microbiological methods:

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LESSON PLAN - 2018 -2019   III SEMESTER

MONTH	THEORY- BTH-303 GENETIC ENGINEERING	PRACTICAL- BTP- 306: GENETIC ENGINEERING AND BIOINFORMATICS
AUGUST	UNIT 1 Introduction to Genetic Engineering	1. Electrophoresis of restriction digested plasmid DNA, Restriction mapping and determination of molecular weight of digested DNA fragment 2. Ligation of DNA and analysis by electrophoresis
SEPTEMBER	UNIT 2 Tools of Gentic Engineering	3. DNA amplification by PCR and RAPD 4. Preparation of competent cells and transformation by CaCl2 method and Selection of Transformed colony by X-Gal method 5. Determination of molecular weight of proteins by SDS PAGE and analysis by Western blotting
OCTOBER	UNIT 3 Gene Cloning Strategies and Construction of Gene Libraries	6. Analysis of DNA by Southern blotting 7. Labelling of proteins by dinitroflurobenzene and analysis 8. Isolation of total RNA and analysis by formaldehyde gel electrophoresis ; 9. Restriction mapping, Sequence (FASTA and BLAST) searches.
NOVEMBER	UNIT 4 Transformation Techniques UNIT 5 Labelling and Detection Techniques	10. Pair wise comparison of sequences, multiple alignments of sequences. 11. Evolutionary studies / Phylogenetic analysis. 12. Identification of genes in Genomes and Primer Design 13. Protein databank retrieval and visualization Ros mol
DECEMBER	UNIT 6 Chemical Synthesis of Genes and PCR:	14. Ramachandran plot-secondary structure prediction of proteins. 15. Introduction to Auto doc 16. Calculation of SD, Variance and plotting the graph by using MS Excel

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LESSON PLAN - 2018 -2019

III SEMESTER

MONTH	THEORY- OPEN ELECTIVE BTO-304: APPLIED BIOTECHNOLOGY
AUGUST	Unit-1 Bioprocess Engineering
SEPTEMBER	Unit -2 Plant and Agricultural Biotechnology Unit-3 Animal Biotechnology
OCTOBER	Unit-4 Medical Biotechnology Unit-5 Environmental Biotechnology
NOVEMBER	Unit-6 Nanobiotechnology
DECEMBER	Unit-7 IPR,

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DEPARTMENT OF MICROBIOLOGY

B.Sc MICROBIOLOGY

LESSON PLAN - 2018 -2019

MBT 101 - BASIC MICROBIOLOGY

MONTH	TOPICS
JUNE	Microbes and origin of life History and scope of Microbiology as a modern science. Branches of Microbiology.
JULY	Contribution of Scientists to the field of Microbiology - Antony Von Leeuwenhoek, Edward, Jenner, LázaroSpallanzani, Louis Pasteur, Joseph Lister, Robert Koch, Alexander Fleming and Iwanovsky. Microscopy - Principles of Microscopy, resolving power, numerical aperture, working distance and magnification. Principles of photomicrography. Working principles and applications of - Dark field microscope, Phase contrast microscope, Fluorescence Microscope, Electron Microscopy - TEM and SEM Working principles and applications of - Centrifuge, Ultracentrifuge, Spectrophotometer, Chromatography (Paper and TLC)
AUGUST	Stains and Staining Techniques - Nature of dyes , Physical and chemical theories of staining, Staining techniques - principle, procedure and applications of - Simple staining, negative staining, Differential Staining, Grams and acid fast staining, Structural staining cell wall, endosperm, flagella and capsular staining. Sterilization Techniques -Definition of terms - sterilization, disinfectant, antiseptic, sanitizer, germicide, microbicidal agents, microbiostatic agents and antimicrobial agent. Evaluation antimicrobial chime agents -Tube dilution and agar plate techniques - well method and disk plate method.
SEPTEMBER	Physical methods of control - Principle, construction and application of most heat sterilization Boiling, Pasteurization, Fractional sterilization - Tyndallization and Moist heat under pressure autoclave. Dry heat Sterilization - Incineration and hot air oven. Filtration - Diatomaceous earth filter, seitz filter, membrane filter and laminar air flows Radiation Ionizing radiation, y rays and non-ionizing radiation, UV rays. Chemical methods: Alcohol, aldehydes, phenols, halogen, metallic salts, Quaternary ammonium compounds and sterilizing gases as antimicrobial agents. Selection of a chemical agent for practical applications.

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OCTOBER	Antibiotics and other chemotherapeutic agents Definition and classification of antibiotics. Characteristics of antibiotics that qualify them as chemotherapeutic agents. Mode of action of antimictobial agents - a brief account. Antimicrobial spectrum of antibiotics and mode of action of the following antibiotics - Antibacterial - Penicillins, Cephalosporins, Bacitracin, Polymyxins, Streptomycin,chloramphenicols, tetracyclines and Vancomycin Antifungal -Nystatin and cyclohexamide Antiviral - Acrucfoguanosine (nucleoside) Synthetic Chemotherapeutic agents - Nalidixic acid Development of Resistance to antibiotics - a brief account.

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DEPARTMENT OF MICROBIOLOGY

B.Sc MICROBIOLOGY

LESSON PLAN - 2018 -2019(PRACTICAL)

MBP 101 - BASIC MICROBIOLOGY

MONTH	TOPICS
JUNE	1. Safety measures in Laboratory. 2. Study of compound microscope- Construction, working, principle, care to be taken while using the microscope. Use of oil immersion objective
JULY	3. Study of instruments-Autoclave, hot air oven. Laminar air flow bench, calculation of NA (Numerical Aperture), RP (Resolving Power) and colony counter, inoculation loop and needle, Incubator, centrifuge, pH meter, Seitz filter, membrane filter and colorimeter/spectrophotometer.
AUGUST	4. Study of aseptic techniques-preparation of cotton plugs for test tubes and pipettes, wrapping of petri-plates and pipettes, transfer of media and inoculum.
SEPTEMBER	5. Staining of bacteria- a) Simple staining methylene blue staining 6. Cleaning and sterilization of glassware
OCTOBER	b) Gram staining c) Structural staining-cell wall, endosperm staining and capsule staining

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DEPARTMENT OF MICROBIOLOGY

B.Sc MICROBIOLOGY

LESSON PLAN - 2018 -2019

MBT 201 – MICROBIAL TAXONOMY AND CULTURE TECHNIQUES

MONTH	TOPICS
JANUARY	Study of Viruses Early developments of virology Principles of viral taxonomy General structure and properties of viruses Virus Purification and assay Study of Cyanophages and Myco Phages - Structure, reproduction, cultivation and significance of Bacteriophage (T4 and lambda) Plant viruses (TMV) Animal viruses (HIV and Herpes Virus) Prions and Viriods - Nature and significance
FEBRUARY	Comparison of the three domains of organisms: Bacteria, Archaea, Eucarya (tabular and diagrammatic) Study of Bacteria a) Size, Shape and arrangement of bacterial cells b) Fine structure, composition and function of Eubacterial cell wall, cell membrane, cytoplasm, nucleoside, flagella, Pili/fimbriae, slime layer, capsule, spores and cysts c) Classification of Bacteria - Brief account of major characteristics used in bacterial classification.
MARCH	Classification, Morphology, Cultivation, Reproduction and significance of: Rickettsia, Chlamydia Mycoplasma Actinomycetes b. General characteristics, classification, cell structure and reproductionof Cyanobacteria (type study of Anabaena and Spirulina). Parallelism between bacteria and cyanobacteria Brief account of Archaea Fungi –Ultrastructure of fungal cell. Salientfeatures, classification, reproduction and significance of major groups of fungi (phycomycetes,Ascomycetes,Basidiomycetes, andDeuteromycetes).Type study of Rhizopus, Aspergillus, Penicillium, Yeast, Agaricus and Fusarium. Protozoa-General features, classification and significance.
APRIL	Culturing of microorganisms Culture media - Synthetic and non-Synthetic -solid, liquid and semi - solid media, Special Media. Enriched, selective, transport, differential, maintenance and enrichment media. Methods of isolation of bacteria, fungi - Serial dilution, pour plate, spread plate and streak plate.

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	Maintenance of pure cultures. Cultivation of anaerobic bacteria-Anaerobic jar method. Microbial growth: Nutritional requirements of Microorganisms - Macronutrients, micronutrients and growth factors. Nutritional types of microorganisms: Autotrophs and heterotrophs, phototrophs and chemotrophs.
MAY	Physical factors affecting growth of microorganisms: Temperature, pH and Oxygen. Multiplication in bacteria-binary fission, budding and fragmentation. Bacterial growth curve, synchronous growth. Continuous cultivation-chemostat and turbidostat Counting of bacteria: Viable count-SPC, Total count-DMC and trubidimetric estimation.

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DEPARTMENT OF MICROBIOLOGY

B.Sc MICROBIOLOGY

LESSON PLAN - 2018 -2019(PRACTICAL)

MBP 202 – MICROBIAL TAXONOMY AND CULTURE TECHNIQUES

MONTH	TOPICS
JANUARY	1. Preparation of media- Nutrient broth, Nutrient agar, Martin's Rose Bengal medium, Sabouraud's Agar. 2. Isolation of Bacteria and Fungi from soil
FEBRUARY	a) Preparation of serial dilutions. b) Spread plate and pour plate techniques. c) Streaking techniques for isolation and purification of Bacteria.
MARCH	d) Study of colony characteristics of Bacteria. e) Identification of Bacteria and Fungi. 3. Motility of Bacteria by hanging drop technique.
APRIL	4. Measurement of size of cells by micrometry 5. Counting of yeast cells and fungal spores using Haemocytometer. 6. Study of fungi-identification of fungi by tease-mount method using Lactophenol cotton blue
MAY	7. Type study of Aspergillus, Pencillium, Yeast, Rhizopus and Fusarium (Specimens) 8. Demonstration of slide culture technique of fungi. 9. Study of protozoa- Amoeba, Paramaecium and Euglena. (Permanent slides) 10. Study of Blue green algae- Anabena and Spirulina. (Specimens)

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DEPARTMENT OF MICROBIOLOGY

B.Sc MICROBIOLOGY

LESSON PLAN - 2018 -2019

MBT 301 – MICROBIAL PHYSIOLOGY AND MICROBIAL GENETICS

MONTH	TOPICS
JUNE	Bio molecules -A brief account of the properties, classification and importance of carbohydrates, lipids and proteins. Enzymes -Introduction, properties, nomenclature and classification, Mechanism of enzyme action.
JULY	Effect of various factors influencing enzyme activity, enzyme inhibition, enzyme regulation and ribozymes. Bioenergetics - Free energy, ATP and its production, other high energy compounds. Oxidation - Reduction reactions. Energy yielding processes - Breakdown of carbohydrates -Glycolytic pathways -EMP, HMP shunt/pentose phosphate pathway.
AUGUST	ED: TCA: ETS and oxidative phosphorylation, anaerobic respiration, chemoautotrophy oxidation of inorganic compounds - N, S, Fe and H. Fermentation -Fermentative modes in microorganisms - alcoholic, Lactic acid - hetero and homo, acetic acid, propionic acid, butyric acid, mixed acid and butanediol fermentation. Bacterial photosynthesis - photosynthetic pigments of prokaryotes, photosynthesis in purple and green bacteria.
SEPTEMBER	Genetics Genomic organisations in prokaryotes and eukaryotes. Nucleic acids: Chemical compositions of DNA & RNA, Watson & Crick model of DNA, Types of DNA: A,B,Z and H, Super coiling of DNA . DNA replication in Prokaryotes : Semi, Conservative methods, Rolling circle model, origin of replication, Primers and templates, replication fork, unidirectional and bidirectional (Theta model)
OCTOBER	Genetic recombination in bacteria: Conjugation, F+ vs F-, Hfr + vs F-, F-vs F-, transformation: Griffith's experiment and mechanism, transduction: generalized and specialized. Mutations -Molecular basis of mutation, spontaneous and induced mutations, detection and isolation of mutants (Replica plate method) Transposable elements - a brief account

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LESSON PLAN - 2018 -2019(PRACTICAL)

MBP 302 – MICROBIAL PHYSIOLOGY AND MICROBIAL GENETICS

MONTH	TOPICS
JUNE	1.Determination of growth curve for fungi by colony diameter method
JULY	Biochemical tests used for the identification of bacteria. a) IMViC b) Fermentation of glucose, sucrose, and lactose- acid and gas production c) Mannitol motility test d) Starch hydrolysis e) Gelatin liquefaction test f) Catalase test g) Oxidase test
AUGUST	3. Estimation of reducing sugar glucose - by DNS method 4. Estimation of protein by Lowry's method
SEPTEMBER	5. Effect of pH and temperature on bacterial growth 6. Charts on genetic recombination in bacteria Conjugation- F + v/s F , Hfr + v/s F , F' v/s F
OCTOBER	Transformation- Griffith's experiment and mechanism Transduction- generalized and specialized

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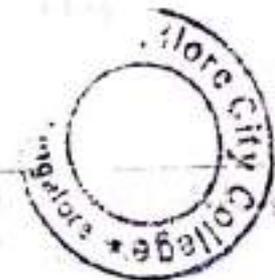
Details Of The Lesson Plan fourth Semester

Department: Microbiology (MBP 401)   Class : B.Sc

Month	Class	Theory Title Of the Chapter	Practical Title of the Experiment
Jan 2019	Bsc IV Sem	Unit:1 Types of RNA and their fumction	• Preparation of buffers: phosphate and citrate
Feb 2019	Bsc IV Sem	Unit 2: protein synthesies in prokaryotes Unit 3: Gene stucture and expression Unit 4: Regulation of gene expression in prokaryotes Recombinant DNA technology Unit:1 History and fundamental of r-DNA technology Unit : 2, Tools of rDNA technology Unit 3: Gene cloning vectors	• Estimation of DNA by DPA method • Estimation of RNA by orcinol method • Estimation of antimicrobial, antibiotic sensitivity test by paper disc plate method
Mar 2019	Bsc Iv Sem	Unit : 4 Vectors of plants Unit : 5 , Vectors of animal Unit: 6, In vitro construction of r-DNA molecule Unit :7, cutting of Dna molecule Unit:8, transformation of rDNA in target host organisum	• Isolation of plasmid DNA (E.coli) • Restriction digestion of DNA
April 2019	Bsc IV Sem	Unit:9, Screening and selection of recombinant host cell	• Invitro DNA ligation of bacteria • Charts of genetic engineering a. pBR 322 b. puc 18 and 19 c. SV40 d. Bacteriophage e. Gene cloning f. Replica plate technique

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Details Of Lesson Plan fifth semester

Department: Microbiology

Class Bsc 2018

Month	Class	Theory Title of the chapter	Practical Title of the experiment
July 2018	Bsc V sem	Unit-1: Microbes and soil fertility Physical and chemical character Unit-2: Interaction between plants and microorganisum	Isolation of bacteria and fungi from rhizosphere and rhizoplane
August 2018	Bsc V sem	Unit 3: Microbes and biogeochemical cycles- Nitrogen, sulphur,carbon, and phosphorous Unit:4: Bioleaching copper,Iron ore form available, areas of deposits methods of leaching, mechanisum and significance	• Isolation of actinomycetes • Study of antagonisum • Study of plant pathogen
September 2018	Bsc V sem	Unit 5: Biodegradation Unit 6 : Microorganism in agriculture Unit 7: Biofertilizers	• Study of air born microorgaisum
October 2018	Bsc V sem	Unit 8: Biopesticides Unit: 9 Study of microbes as plant pathogen **Environmental Microbiology** 1. Introduction atmospheric layer 2. Techniques of trapping air	• Study of air samples
November 2018	Bsc V sem	3. Advantage and disadvantage of techniques 4. Biohazards in occupational environment	• Determination of BOD • Study of fungi

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MONTH	TOPICS
JUNE	Food and Microorganisms-Food as a substrate for microorganisms. Sources of contamination of food .Food spoilage and food poisoning-Spoilage of canned food, cereals,,fruits, vegetables,meat and fish. Food sanitation and control. Food poisioning-Endotoxin, staphylococcalpoisoning, botulism and salmonella is Mycotoxins produced by fungi-Aflatoxin instoredfood and grains.
JULY	Food preservation-Principles of food preservation Methods of food preservation-hightemperature, canning, freezing, dehydration, chemical preservatives and radiation.Microbial examination of food-CMC, viable colony count, examination of fecal streptococciMicroorganisms as food Single cell proteins-yeast and spirulina,Single cell oil
AUGUST	Microorganisms and Milk Physical and chemical properties of milk.Milk as a substrate for microorganisms. Types of microorganisms in Milk-bacteria, fungi and yeast. Sources of microbial contamination of milk – milch animal, utensils andequipment,water, milking environment, personnel and packaging material.
EPTEMBER	Microbiological analysis of milk Rapid platform tests-organoleptic, Clot on boiling (COB), turntable aidity alcohol test,DMC, sedimentation test and pH.Standard plate count, reducates test MBRT, Reszautin test Methods of preservation of milk and milk products Pasteurization, sterilization and dehydration. An account or condensed and dried milk
OCTOBER	Fermentation in milk Souring, lactic and fermentation, colour and flavours fermentation, gassy fermentationand proteolysis.Fermented Milk Products Yogurt-Types & productionCheese-types and production- Cheddar & Cottage Cultured Butter milk,Genetic Engineering and Dairy industry

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LESSON PLAN - 2018 -2019

SEMSESTER-V (PRACTICAL)

MBP 502– Food and Dairy Microbiology

MONTH	TOPICS
JUNE	1. Isolation and identification of microbes from infected fruits and vegetables.
	2. Isolation and identification of microbes from curd, idli batter, and Stored-foods-Jams, Jellies, Sauce and Pickles
JULY	3. Bacterial examination of milk by SPC.
	4. Bacterial examination of milk by DMC
AUGUST	5. MBRT
	6. Estimation of Fat content in milk by Gerber's method 1unit
SEPTEMBER	7. Estimation of Lactose in milk.
	8. Production and detection of Aflatoxins from fungi by paper chromatography and bioassay of aflatoxins.
OCTOBER	9. Study of food borne pathogens-Clostridium, Staphylococcus, and Salmonella

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Details Of The Lesson Plan fourth Semester

Department: Microbiology (MBP 601)

Class : B.Sc

Month	Class	Theory Title Of the Chapter	Practical Title of the Experiment
Jan 2019	Bsc VI Sem	Unit:1 Major developments in medical microbiology	• Isolation and identification of micro oragnisum from ear, nose , throat
Feb 2019	Bsc VI Sem	Unit 2: Koch's Phostulate Unit 3: Factors responsible for microbial pathway Unit 4: Micro flora of human body Unit : 5 Importance of groups of pathogenic microorganism Unit : 6 History and scope of immunology	• Isolation and identification of micro organism from clinical samples • Blood grouping
Mar 2019	Bsc vl Sem	Unit: 7, Immunity Unit :8, Antigen and antibody Unit:9, Antigen and antibody reaction	• Differential WBC count • Coagulase test • WIDAL • VDRL • SPOT ELISA
April 2019	Bsc VI Sem	Unit:10 , Complement system Unit:11, cell, tissue and organ Unit: 12, Immune response Unit : 13, Hypersensitivity Unit: 14, Vaccines	• ODD • RIA • Study of pathogenic Microorganism

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B.Sc MICROBIOLOGY

LESSON PLAN - 2018 -2019

SEMSESTER-VI

MBT 602– Industrial Microbiology and Microbial technology

MONTH	TOPICS
JANUARY	History, scope and development of industrial microbiology. Isolation and screening of industrially important microorganisms. Strain Improvement methods. Types of industrial fermentation processes: Batch continuous, surface, submerged, and SSF. Media components and formulation, crude media components, antifoam agents, precursors, inducer and inhibitors and buffering agents
FEBRUARY	Sterilization of media and raw materials and maintenance of sterility at critical point during fermentation. Inoculum preparation. Process parameters-aeration, agitation, temperature regulation, foam regulation and pH regulation. Fermentor: Basic structure, construction and various types-typical stirred aerated fermentor, tower fermentor, airlift ferment or and bubble cap fermentor.
MARCH	Immobilization of enzymes and cells. Production of chemicals-Fermentative production, of Alcohol-Industrial alcohol and alcoholic beverages-beer-wine and whiskey Organic acids – citric acid Vitamins- B 12 Amino acid – Glutamic acid Antibiotics-pencillium Enzymes- amylase
APRIL	Biofuels: Methane and hydrogen gas production types of substrate process, mechanism byproduces, paint construction and significance production of vaccines- hepatitis B and hormones – human insuilin Production and use of biofertilizers and biopeticides Biotransformation of steroids. Mushroom cultivation
MAY	Down-stream processing steps-Recovery of fermented broth filtration, disintegration Of cells, purification, and concentration methods of byproduct chromatographic techniques affinity column HPLC, ion exchange and GLC

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LESSON PLAN - 2018 -2019(PRACTICAL)

SEMSESTER-VI
MBP 602– Industrial Microbiology and Microbial technology

MONTH	TOPICS
JANUARY	1. Isolation and identification of microorganisms from Ear, nose, throat and sputum.(Growth on Blood Agar, Chocolate agar, Braid Parker, McConkey Agar, Nutrient Agar)
FEBRUARY	2. Isolation and identification of microorganisms from clinical samples – urine (Growth in Alkaline peptone water, Growth on Blood Agar, McCaskey Agar.) a) Semi quantitative estimation of cuff. b) Chemical analysis of urine;crystal identification, Determination of sugar and protein in urine samples
MARCH	3. Blood grouping 4. Differential count of WBC 5. Coagulase test
APRIL	6. WIDAL test 7. VDRL test 8. Spot Elisa 9. IDD-Ouchtlerlony Double diffusion
MAY	10. RID-Radial Immune Diffusion 11. Study of AFB –slide 12. Study of pathogenic microorganisms-Shigella, Clostridium, Staphylococcus, Streptococcus, Entamoeba, Plasmodium, and Candidaia (Slides)

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DEPARTMENT OF BIOTECHNOLOGY

B.Sc BIOTECHNOLOGY

LESSON PLAN - 2018 -2019

SEMSESTER-V

BTT-501 Genetic Engineering & Environ. Biotechnology

MONTH	TOPICS
JUNE	Unit-1 introduction to Genetic Engineering
JULY	Unit-2 tools for Genetic Engineering Unit-3 invitro Construction of recombinant DNA Unit-4 transformation of r-DNA Unit-3 bioremediation
AUGUST	Unit-5 gene libraries Unit-6 expression of cloned DNA in E.coli Unit-8 molecular biology techniques
SEPTEMBER	Unit-9 application of r-DNA Unit-1-Renewable and non Renewables resources of energy Unit-2-convetional fuels Unit-4-treatment of municipal waste
OCTOBER	Unit-5-modern fuels Unit-6-biofertilizers Unit-7-bioleaching Unit-8-Environmental significance of GMO, microbes

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DEPARTMENT OF BIOTECHNOLOGY

B.Sc BIOTECHNOLOGY

LESSON PLAN - 2018 -2019

SEMSESTER-V(PRACTICAL)

BTP -503 Genetic Engineering & Environ. Biotechnology

MONTH	TOPICS
JUNE	1. Isolation of genomic DNA from bacteria, plant,and animal tissues
JULY	2. Isolation of plasmid DNA 3. Restriction digestion of DNA
AUGUST	4. SDA-PAGE 5. Bacterial examination of water by MPN
SEPTEMBER	6. Separation of DNA by Gel electrophoresis 7. Estimation of BOD
OCTOBER	8. VAM staining

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Details of Lesson Plan fifth semester

Department: Biotechnology (BTP 503)   Class Bsc : 2018

Month	Class	Theory Title of the chapter	Practical Title of the experiment
July 2018	Bsc V sem	Unit-1: History and Scope of immunology Unit-2: Types of immunity Unit 3: Cells and organ of immune response and their function	• Blood grouping • Differential count of WBC
August 2018	Bsc V sem	Unit 4: Antigen Unit 5: Antibody Unit 6: complement system	• WIDAL Test and VDRL
September 2018	Bsc V sem	Unit 5: Antigen and antibody reaction Unit 6 : Hypersensitivity and allergic reaction Unit 7: Blood cell components Unit 8: Vaccine and Immunization	• DOT ELISA • ELISA demonstaration
October 2018	Bsc V sem	Animal Biotechnology Unit 1: Scope of animal tissue culture Unit: 2 Cultural media Unit 3: a primary culture b. a primary culture Secondary culture Unit 4: Transfection of animal cell	• ODD (Octer louny double diffusion test)
November 2018	Bsc V sem	Unit 5: Expression of cloned protein in animal cell Unit 6: Production of vaccine in animal cell Unit 7: Production of application of monoclonal antibody	• Isolation of liver parenchyma cell • Rocket electrophoresis
Dec 2018	Bsc V sem	Unit 8: Growth factor Unit 9: Transgenic Animal	• Separation of serum from blood and precipitation of immunoglobulin

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C-402 AC ENVIRONMENTAL AND BIOANALYTICAL CHEMISTRY

MONTH	SYLLABUS
January	**Environmental Chemistry:** Introduction: Environmental chemistry, environmental segments, classification of environmental pollution. **Air Pollution:** Introduction, Air pollutants, Primary pollutants – Sources (CO, NO_x, HC, SO_2, particulates). Particulates – Sources (Inorganic and organic particulate matters). Effects on: Humans, materials, vegetation and animals. Air quality standards, Sampling, monitoring and analysis: CO by gas chromatography, NO_x by Spectrophotometric method using sulphanilamide and NEDA, SO_2 by pararosaniline (PRA), H_2S by colorimetric using ethylene blue, hydrocarbons by chemiluminescence, Control of air pollution: Control of particulate matter and gaseous pollutants **Radioactive Pollution** Introduction, Sources, Radiation from natural and manmade activities, Radioactive effects on human and plants, Storage and disposal of radioactive waste, Detection and monitoring of radioactive pollutants.
February	**Water Pollution:** Introduction, Sources, Water pollutants classification: Organic pollutants –Pesticides, insecticides, detergents. Inorganic pollutants, Sediments, Radioactive materials and Thermal pollutants. Drinking water supplies, Trace elements in water. COD, BOD, TOC definitions. Monitoring techniques and methods: Determination of pH, conductance, dissolved oxygen by Winkler's method, nitrate/nitrite by diazo coupling, chloride by Mohrs and Volhard's method, and fluoride by Alizarin Visual method, Water contamination with cyanide, sulfide, sulphate, phosphate and total hardness. Analysis of Arsenic by Atomic absorption spectroscopy (AAS), cadmium and mercury by dithizone method, chromium by diphenyl carbazide method, lead by polarographic method. Water pollution control and management. **Soil Analysis** Introduction, Origin and nature of soil, Sources of soil pollution and explanation in brief, Purpose of soil analysis, Techniques for the analysis of soil - Lime Potentials: Moisture measurement by gravimetric method, pH using calomel glass electrode method, total nitrogen by kjeldhal method, determination of nitrate-nitrogen by Bratton and Marshal method, determination of potassium and sodium by Flame photometry,

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March	**Food Analysis:** Sampling. Preparation and storage of samples, Estimation of moisture, ash, crude protein, crude fat, sugars, nitrogen, crude fibre, starch in food. **Polyphenols:** Extraction, detection and analysis, characterization and spectral identifications of anthocyanins and anthocyanidins. Estimation of Tannins. **Vitamins:** Estimation of Vitamin-C (Ascorbic acid), Thiamine, Riboflavin, Folic acid Minerals: Preparation of sample, Estimation of calcium, Magnesium, phosphorus, iron, potassium, sodium, copper, tin, zinc, lead, arsenic, mercury. **Lipids:** General composition of edible oils, Physical and chemical characteristics. Composition and structure of free fatty acids. Test for the presence of specific oils: Ground nut oil, Sesame oil, cottonseed oil, linseed oil, argemone oil, presence of mineral oil, Fatty acid analysis. Estimation of fatty acid composition, tests for stability of fats.
April	**Analysis of Drugs:** Drug design: Characteristics of an ideal drug molecule, mechanism of drug interaction, Antibiotics, classification and structure, mode of action, Theory and assay of Aspirin(titrimetry), methyldopa (nonaqueoustitrimetry), Analgin(iodimetry), chloral hydrate (argentiometry), cholesterol (gravimetry), hydrocortisone acetate (tetrazolium assay). **Clinical Chemistry:** Composition of blood, collection, and preservation of samplesanticoagulants, protein precipitants. Interpretation and Clinical analysis of Blood glucose(glucose oxidase methods), proteins, blood urea (Nesslerisation method). Lipids, Calcium, phosphorus, phosphatases, iodine, iron, copper, Sulfur, Magnesium, Chloride, sodium

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C-401: OC: ORGANOMETALLIC AND HETEROCYCLIC CHEMISTRY

MONTH	SYLLABUS
January	**Organometallic Compounds in Organic Synthesis-I** Chemistry of Organotransition metal complexes: General introduction. 18- and 16-Electron rules. General rules. Complexation and De-complexation Reactions: s-Bonded systems including h1 ligands. p- Bonded systems involving dihapto to octahapto ligands such as- olefins, acetylenes, allyl moieties, butadiene, cyclobutadiene, arenes, cyclopenta, cyclohexa and cycloheptadienyl moieties; cyclohepta, cyclooctatrienes, and cyclooctatetraene moieties. Use of organotransition metal complexes as protecting and stabilizing groups: Protection of olefins, acetylenes and dienes. Stabilization of cyclobutadines and norbornadienones. Organometallics as electrophiles and nucleophiles: Nucleophilic addition to h2, h5 and h6 complexes. Electrophilic addition to h4, h6 and carbene complexes. Organometallics in coupling and cyclization reactions: Coupling and cyclization of organic nucleophiles with olefins (including Heck reaction), and coupling of olefins with acetylenes (including Felkin's reaction). Organometallics in isomerization, oxidation and reduction reactions: Isomerization of olefins, allylic alcohols and allylic ethers. Oxidation of olefins (including Wacker's process and epoxidation) and reduction of olefins and α,β-unsaturated compounds (including Wilkinson's reaction).
February	**Organometallic Compounds in Organic Synthesis-II** Carbonylation reactions: Use of zirconium complexes in the synthesis of esters, acids, aldehydes or acyl halides from alkyl halides and in the hydroformylation of olefins and dienes. Use of iron complexes for the insertion of CO group into organic molecules such as dienes, alkyl halides, and vinyl epoxides. Use of cobalt complexes in the synthesis of ketones from epoxides, lactones from allylic alcohols and in the hydroformylation of olefins. Use of palladium complexes for the carbonylation of alkyl halides, dienes and allenes.
March	Application of the following organometallics in Organic Synthesis: Organozincs: Preparation, reaction with compounds containing acidic protons, reaction with C-C multiple bonds, trans-metallation, addition reactions of zinc reagents with carbonyl compounds. Simmons Smith, and Reformatsky reaction. Organolithiums: Preparation. Deprotonation reactions, nucleophilic addition

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	reactions, reactions with imines, nitriles and isonitriles. Organocopper reagents: (Gilman reagents-lithium dialkylcuprates): Preparation, reactions with alkyl, allyl, vinyl, benzyl and aryl halides, aldehydes, ketones (including a,b-unsaturated carbonyl compounds) and epoxides.
April	**Heterocyclic Chemistry-I** Small ring heterocycles: Properties and reactions of 3- and 4-membered heterocycles:-oxiranes, thiranes, aziridines, azetidines, oxetanes and thietanes. Benzo-fused heterocycles: Synthesis and reactions of benzofurans, benzothiophenes, benzoxazoles, benzothiazoles and benzimidazoles. Six-membered heterocycles with two or more heteroatoms: Synthesis of Diazines, triazines, tetrazines and thiazines. **Heterocyclic Chemistry-II** Seven and large membered heterocycles: Synthesis and reactions of azepanes, oxepines, thiepines, diazepines, thiazepines, azocines, diazocines, dioxocines and dithiocines. Heterocycles containing P, As, Sb and Bi: Synthesis of 5- and 6-membered heterocycles with P, As, Sb and Bi. Mesoionic compounds: General classification, chemistry of some important meso-ionic heterocycles of type-A and type-B and their applications

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C-402 OC STEREOCHEMISTRY AND RETROSYNTHETIC ANALYSIS

MONTH	SYLLABUS
January	**STEREOCHEMISTRY** **Optical activity in the absence of chiral atoms** Chirality in biphenyls, adamentanes, ansa compounds, cyclophanes, *trans*-cyclooctene, catenanes, rotaxanes and helicenes. Assignment of R, S- configuration to these classes of compounds. **Optical activity due to the presence hetero atoms** Chirality of organic compounds due to the presence of silicon, nitrogen, phosphorous, arsenic and sulphur atoms. Determination of R,S-configuration of these compounds using CIP rules. **Transannular reactions** Conformational analysis of medium rings. Trasnannular reactions: Hydrolysis of medium ring epoxides and bromination of C_8–C_{10} cyclic dienes.
February	**Determining absolute and relative configuration 10h** i). Chemical correlation of configuration: Methods without involving the chiral centre. Chemical transformation involving the chiral centre. Chemical correlation involving diastereomers. ii). Methods based on comparison of optical rotation: Distance rule, Rule of shift, Rule of optical superposition, Mill's rule, Method based on molecular rotation difference iii) The method of quasi-racemate. iv). Use optical rotatory dispersion curves: α-axial haloketone rule and its applications, octant rule (application of these rules in the determination of absolute configuration of substituted cyclohexanones, decalones and cholestanones). v). Method based on anomalous X- ray scattering.
March	**RETROSYNTHETIC ANALYSIS** **Disconnection approach** Introduction to synthons, and synthetic equivalents, disconnection approach. Basic principles and terminologies used in disconnection approach. One group C-X and two group C-X disconnections. Chemoselectivity, reversal of polarity, cyclisation reactions.

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April	**Protecting groups** Principle of protection of alcohols, amines, acids and carbonyl groups **C-C one group and C-C two group disconnections 10h** Synthesis of alcohols, carbonyl compounds and alkenes. Use of acetylides and aliphatic nitro compounds in organic syntesis. Diels-Alder reaction, 1,3-difunctionalised compounds, α,β-unsaturated compounds, carbonyl compounds condensations, 1,5- difunctionalised compounds. Micheal addition and Robinson annelation. **Ring Synthesis** Synthesis of saturated heterocycles and 3-, 4-, 5- and 6-membered rings. **Synthesis of some complex molecules using disconnection appoach** Aromadendrene, longifloene, cortisone, reserpine, vitamin-D, juvabione, fredericamycin-A and Lycorane.

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DEPARTMENT OF CHEMISTRY

Lesson plan

C-403 OC ORGANIC SYNTHESIS

MONTH	SYLLABUS
January	**C-C and C-N bond forming reactions 12h** Darzen's reaction, Use of acetylides in C-C bond formation reactions. Acid-catalyzedself condensation of olefins, Prins reaction, Shapiro reaction, Dieckmann cyclization, Robinson annulations, Hofmann-Loeffler-Freytag reaction. Hofmann-Martius reaction. Acyloincondensation. Houben-Hoesch reaction. Stork-enamine synthesis. Meyer synthesis. Use of nucleophilic nitrogen and electrophilic carbon (NH_3, amines and nitrite as nucleophiles in substitution, NH_3 and amines in addition to ketones and aldehydes) and electrophilic nitrogen and nucleophilic carbon (nitration, nitrosation) for the bond formation reactions (including Chichibabin reaction, Skraup synthesis, Mitsunobu reaction, N-Nitroaromatic amine rearrangement, Fisher-Hepp reaction. Japp- Klingemann reaction).
February	**Reagents in organic synthesis** Use of the following in organic synthesis and functional group tansformations. Aluminium iso-propoxide, NBS, LDA, DCC, DDQ, Corey-Chaykovsky reagent, Raney-Nickel,diazomethane, TMS-chloride, 1,3-Dithiane (reactivity and umpolung), PPA, Yamaguchi reagent. Woodward and Prevost hydroxylation. **Oxidations-** Cr (VI) oxidants, Mn (VII) oxidants, OsO_4, SeO_2, $Pb (OAc)_4$, HIO_4, Ag_2O, DMSO.
March	**Oxidations-II** ozone, peroxides (H_2O_2, t-BuOOH, dibenzoylperoxide) and peracids (Preparation, properties and applications of CF_3COOOH, m-CPBA, momoperphthalic acid) as oxidizing agents. Dess-Martin oxidation. **Reductions** Complex metal hydrides, dissolving metal reductions (including Birch, Benkeser, Clemmensen reductions), diimide reduction, catalytic hydrogenation (homogeneous and heterogeneous), organoboranes as reducing agents. Wolf-Kishner reduction, McMurry reaction. Pummer, Willgerdot, Corey-Bakshi-Shibata and Tishchenko reactions.

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April	**Asymmetric Synthesis** 'θθ' and methods of determination of 'θθ'. Stereoselectivity: classification, terminology and principle. Asymmetric synthesis and asymmetric induction. Double diastereoselection and double asymmetric induction. Acyclic stereoselection: Addition of nucleophiles to carbonyl compounds (1,2- 1,3- and 1,4- asymmetric induction). Asymmetric aldol condensation. Addition of allylmetal and allylboranes to carbonyl group. Diastereoselection in cyclic systems: Nucleophilic addition to cyclic ketones (formation of axial and equatorial alcohols, catalytic hydrogenation, alkylation, diastereoselectiveoxidations and stereoselective cyclization of poylenes). Enantioselective synthesis: Reduction with chiral hydride donors [(S)-PBMgCl, (-)-BOAlCl₂, alpine-borane, (S)-BINAL-H, (R,R)-DIOP, and (S,S)-CHIRAPHOS). Enantioselective alkylation of ketones *via* hydrazones. Enantioselective alkylation with chiral PTC. Enantioselective Michael addition. Enantioselective intramolecular aldol condensation. Use of (+)- and (−)- DET in asymmetric epoxidation. Polymer-bound chiral catalysts in asymmetric induction.

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Lesson plan

C-205: SOFT CORE: MATHEMATICS FOR CHEMISTS

MONTH	SYLLABUS
February	**Vectors:** vectors, dot and cross products; scalar and vector triple products and their applications. Tensors and their applications. **Matrix Algebra:** Review of different types of matrices (including Hermetian and skew Hermetian); matrix addition and multiplication; determinant of a square matrix, transpose, adjoint and inverse of a square matrix. Solution to system of linear equation (a) by matrixmethod and (b) by Cramer's Rule. Characteristic equation of a square matrix, eigenvalues andeigenvectors.
March	**Calculus:** Rule for differentiation; Chain rule (for $f(x)=U_n$, $\sin u$, $\log u$ etc). Implicit differentiation and parametric differentiation and successive differentiation of order 2 (for explicit functions only).Applications of differentiation: Derivative as a slope of the tangent, derivative as a ratemeasure-velocity and acceleration. Increasing and decreasing functions-Maxima and minima-second derivative test-point of inflections-problems restricted to polynomial.
April	**Integrations:** Basic rules-simple substitution-Method of partial fractions-Integration by parts. Define integral and application to areas of plane curves. Functions of several variables: partial derivatives; co-ordinate transformation from cartesian coordinates to spherical and cylindrical coordinates and vice-versa. **Elementary differential equation:** Variable separable, exact first order equations, linear and homogeneous equation.
May	Second order homogeneous differential equation with constant coefficients $f(D)$, $y=0$. Solution of differential equation by power series method. **Fourier series:** Simple problems. **Probability:** Review of permutations and combinations. Probability and addition theorem for mutually exclusive events and multiplication theorem for independent events.Curve fitting-Method of least squares.

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C-301 OC: ORGANIC REACTION MECHANISMS

MONTH	SYLLABUS
August	**Aliphatic nucleophilic and electrophilic substitution reactions 10h** *Nucleophilic substitution reactions:* Substitution at allylic carbon (allylic rearrangement), at a trigonal carbon (hydrolysis of esters and amides, use of DCC in the formation of anhydrides), substitution at a vinylic carbon. Neighboring group participation and $S_N i$ reactions. *Electrophilic substitution reactions:* SE_2, SE_1 and SE_i mechanisms. Hydrogen exchange, migration of double bonds, α-halogenation of aldehydes, ketones and acids. Aliphatic diazonium coupling, nitrosation at carbon bearing active hydrogens, diazo transfer reaction, carbene and nitrene insertion, decarboxylation of aliphatic acids, haloform reaction, Haller-Bauer reaction.
September	**Free-radical chemistry** Generation of free-radicals: Thermal homolysis of peroxides, peresters and azo compounds, photochemical methods. Free radical reactions: Free-radical mechanisms in general. Free-radical substitution mechanisms. Mechanisms at an aromatic substrate. Neighboring group assistance in free-radical reactions. Reactivity for aliphatic substrates, reactivity at a bridgehead, reactivity in aromatic substrates, reactivity in the attacking radical. Halogenation at an alkyl carbon and an allylic carbon, hydroxylation at an aliphatic carbon, hydroxylation at an aromatic carbon, oxidation of aldehydes to carboxylic acids, formation of hydroperoxides and peroxides, Gomberg-Bachmann reaction, Meerweinarylation, Sandmeyer reaction, Kolbe reaction and Hunsdiecke reaction.
October	**Photochemistry** Physical and Chemical processes, Jablonski diagram. Photosensitization, quantum efficiency, quantum and chemical yields. *Photochemistry of functional groups:* i) *Olefins:* Cis-trans isomerism, [2 + 2]-cycloaddition, rearrangements. Reaction of conjugated olefins; di-π-methane rearrangements (including oxa- and aza- di-π-methane rearrangements). ii) *Ketones:* Excited state of C=O. Norrish type-I and type-II cleavages. Paterno-Buchi reaction. α,β-unsaturated ketones. [2+2] addition. Rearrangement of cyclohexadienones (application in the synthesis of some important natural products). iii) *Aromatic compounds:* Photorearrangement of benzene and its derivatives, cycloaddition of benzene. iv) *Photochemical oxidations and reductions:* Cycloaddition of singlet molecular oxygen

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{[2+2], [4+2]-additions}. Oxidative coupling of aromatic compounds, photoreduction by hydrogen abstraction.

Pericyclic reactions

Molecular orbital symmetry, Woodward-Hoffmann correlation diagrams. FMO and PMO approaches. Frontier orbitals of ethylene, 1,3-butadiene, 1,3,5-hexatriene and allyl system.

Electrocyclic reactions: conrotatory and disrotatory motions, $4n$, $4n+2$ and allyl systems.

Cycloadditions: antarafacial and suprafacial additions, $[\pi m_s + \pi n_a]$ and $[\pi m_s + \pi n_s]$-cycloadditions. $[\pi 2_s + \pi 2_s]$ and $[\pi 4_s + \sigma 2_s]$-cheletropic reactions.

November	**Pericyclic reactions-II**

Regio, enantio and Endo selectivities in Diels-Alder reactions. Hetero Diels-Alder reaction. Sigmatropic rearrangements: suprafacial and antarafacial shifts of H, sigmatropic shifts involving carbon moieties. $[i, j]$- sigmatropic rearrangements (including Walk, Claisen, Cope, oxy and aza-Cope rearrangements).

Biochemical mechanisms

Introduction. The mechanistic role of the following in living systems.

i). Thiamine pyrophosphate (TPP) in decarboxylation of α-ketoacids and in the formation of α-ketols.

ii). Pyridoxal phosphate (PLP) in transamination, decarboxylation, dealdolisation and elimination reactions of amino acids.

iii). Lipoic acid in the transfer of acyl group reactions.

iv). Coenzyme A (CoASH) in the transfer of acyl group.

v). Biotin and

vi). Vitamin KH_2 coenzyme in carboxylation reactions.

vii). Tetrahydrofolic acid (H_4F) in one-carbon transfer reactions.

viii). Vitamin B_{12} coenzymes in molecular rearrangement reactions and in the synthesis of methionine and methane.

ix). Nicotinamide and

x). Flavin coenzymes in biological redox reactions

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Lesson plan

C-302 OC CHEMISTRY OF NATURAL PRODUCTS

MONTH	SYLLABUS
August	**Terpenoids and Carotenoids** Classification, nomenclature, occurrence and isolation. Isoprene rules. Stereochemistry of citral, farnesol, limonene, 1,8-cineole, menthols and borneols. Correlation of configurations of terpenoids. Structure elucidation of camphene, α-pinene, β-caryophyllene, α-santonin and gibberrillic acid. Synthesis and biosynthesis of the following: Linalool, α-terpineol, fenchone, eudesmol, abietic acid. Commercial synthesis of camphor. Biosynthesis of squalene and cyclisation of squalene into α-lanosterol and friedelene. Carotenoids: Methods of isolation. Structural relationship of α-, β- and γ-carotenes. Structure elucidation and synthesis of β-carotene.
September	**Alkaloids** Definition, nomenclature, occurrence, isolation, classification, General methods of structure elucidation. Synthesis and biosynthesis of the following alkaloids: Ephedrine, hygrine, coniine and cocaine. Cinchona alkaloids: Cinchonine and quinine. Opioid alkaloids: Morphine, codeine, thebiene and heroin. Structure elucidation and synthesis of papaverine, reserpine and ergotamine. Photochemical synthesis of Nuciferine, coradyline and tylophorine
October	**Porphyrins and vitamin** Structure elucidation and synthesis of haemin, chlorophyll-a and vitamin-B$_{12}$ (synthesis of Vitamin-B$_{12}$ from cobyric acid). **Nucleic acids** Introduction, components of nucleic acids, nucleosides, nucleotides and oligonucleotides. Structure elucidation and synthesis of nucleosides and nucleotides. Chemical synthesis of oligonucleotides: Protecting groups for hydroxy group in sugar, amino group in the base and phosphate functions. Methods of formation of internucleotide bonds: DCC, phosphodiester approach, phosphotriester approach, phosphitetriester and phosphoramidite methods. Solid phase synthesis of oligonucleotides.

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November	**Prostaglandins** Introduction, nomenclature, classification and biological role of prostaglandins. Structure elucidation and stereochemistry of PGE_1, PGE_2 and PGE_3. Synthesis of PGE_1 and PGE_2 by Corey's and Stork's approaches. Synthesis of PGE_3 by Upjohn's approach. Synthesis of prostacyclin I_2 and thromboxane B_2. Biosynthesis of prostaglandins. **Insect pheromones** Introduction, classification. Pheromones in pest control. Syntheses of (one synthesis should be stereoselective synthesis) i) Grandisol (component of boll weevil pheromone) ii) Farenal (trail pheromone of pharaoh's ants) iii) Brevicomin (pheromone from *Dendroitisbrevicomis*) iv) (+)-Disparlure (gypsy moth sex pheromone). v) 3,11-Dimethyl-2-nonacosanone (pheromone of German cockroaches). vi) Bombykol (sex pheromone of silkworm moth). vii) Multistriatin (Elm bark beetle sex pheromone).

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Lesson plan

C303: OC: ORGANIC SPECTROSCOPY

MONTH	SYLLABUS
August	**Ultraviolet and visible spectroscopy** Classification of electronic transitions, Terminology, Substituent and solvent effects, UV spectral study of alkenes, polyenes, enones and aromatic compounds. Empirical rules for calculating λ_{max}. **Vibrational Spectroscopy:** Sampling techniques, Group frequencies, factors affecting group frequencies. Bond order, Mass effect, Conjugation, Inductive, resonance, steric effects. Intramolecular interactions. Application of IR in the study of H-bonding, stereoisomerism and tautomerisam. Complimentarity of IR and Raman. Identification of the following organic compounds by IR: Alkanes, Alkenes, Alkynes, Aromatic compounds, Aldehydes, Ketones, Alcohols, Acids, Acid chlorides, Amides, Amines, Esters, Halides, Nitro compounds, etc., problems using UV and IR.
September	**Nuclear magnetic resonance spectroscopy-I** Introduction, Magnetic properties of nuclei- Resonance condition. Nuclear spin, population of nuclear spin levels and NMR isotopes, Relaxation methods. Insturmetnation and sample handling. FT-NMR. Chemical shift. Mechanism of shielding and deshielding in Alkanes, Alkyl halides, Alkenes, Aromatic compounds, Carbonyl compounds and Annulenes. Pascal's triangle-low and high resolution, spectrum of ethnaol. Karplus Curve, Diamagnetic and paramagnetic effects and magnetic anisotropy. Equivalence of protons-chemical and magnetic equivalence. Spinsystems:First order and second order coupling of AB systems, Simplifications of complex spectras. Problems. Spin-spin interactions: AX, AX_2, AX_3, AMX, AB types. Vicinal, geminal and long range coupling-Spin decoupling. Chemical shift reagents and deuterium exchange. Stereochemistry and hindered rotations. Temperature effects.
October	**Nuclear magnetic resonance spectroscopy-II** CIDNP, Nuclear Overhauser effect (NOE). Factors influencing coupling constants and Relative intensities. Protons attached to elements other than carbon. ^{13}C NMR Spectroscopy: Range and factors affecting chemical shifts of alkanes, alkyl halides, alkenes, alcohols, ethers, alkynes, carbonyl compounds and aromatics..

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	Multiple resonance spectroscopy: Introduction to 2D-techniques: DEPT, COSY, HETCOR, and INADEQUATE. Explanation of the principle, applications to structure elucidation and stereochemistry of simple organic molecules. Dynamic NMR. NMR spectroscopy of other nuclei with spin $I = \frac{1}{2}$. Introduction to ^{15}N, ^{19}F, ^{29}Si and ^{31}P NMR spectroscopies. Chemical shift values for ^{15}N, 19F, ^{29}Si and ^{31}P containing compounds.
November	**Mass spectrometry and Composite Prooblems** Basic principles-instrumentation – ion production-ion analysis-magnetic sector instruments Quadrapole mass spectrometers. Time of flight mass spectrometers-ion cyclotron resonance spectrometers-Mass spectrum-molecular ion-types of ions in mass spectra and effects of isotopes on mass spectra. Methods of ionization, EI, FAB mass and MALDI methods. Fragmentation of Alkanes, Alkenes, alkyl halides, alcohols, aldehydes, ketones, acids, esters,ethers, amines, nitro and halo compounds peptides, Nitrogen rule, Factors affecting cleavage patterns. MeLafferty and MeLafferty +1 rearrangment. Determination of molecular formula. Composite problems. Use of HRMS to determine exact molecular formulae of compounds. Application of UV, IR, NMR and MS methods and chemical reactions in the structure elucidation of organic compounds.

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Lesson plan

C-204: SPECTROSCOPY-I

MONTH	SYLLABUS
February	**Symmetry and Group Theory in Chemistry** Definition of groups, subgroups, cyclic groups, conjugate relationships, classes, simple theorems in group theory. Symmetry elements and symmetry operations, point groups, Schöenflies notations, representations of groups by matrices, reducible and irreducible representations, characters of representations, Great Orthogonality Theorem (without proof) and its applications, character tables and their uses (representations for the C_n, C_{nv}, C_{nh}, D_n etc groups to be worked out explicitly) Mulliken symbols for irreducible representations Direct products, Applications of group theory to quantum mechanics- identifying non-zero matrix elements, derivation of the orthonormalization conditions **Unifying principles** Interaction of electromagnetic radiation with matter- time-dependent perturbation theory, transition moment integral, selection rules symmetry and spin forbidden transitions
March	**Microwave Spectroscopy** Rotations of molecules, rigid diatomic molecule- rotational energy expression, energy level diagram, rotational wave functions and their symmetry, selection rules, expression for the energies of spectral lines, computation of intensities, effect of isotopic substitution, centrifugal distortion and the spectrum of a non-rigid rotor. Rotational spectra of polyatomic molecules- linear, symmetric top and asymmetric top Molecules Stark effect, techniques and instrumentation **Infrared Spectroscopy-I** Vibrations of molecules, harmonic and anharmonic oscillators- vibrational energy expression, energy level diagram, vibrational wave functions and their symmetry, selection rules, expression for the energies of spectral lines, computation of intensities, hot bands, effect of isotopic substitution Diatomic vibrating rotor, Born-Oppenheimer approximation, vibrational-rotational spectra of diatomic molecules, P, Q and R branches, breakdown of the Born-Oppenheimer approximation.
April	**Infrared Spectroscopy-II** Vibrations of polyatomic molecules: Normal coordinates, translations, vibrations and rotations, vibrational energy levels and wave functions, fundamentals, overtones and combinations Vibration-rotation spectra of polyatomic molecules- parallel and perpendicular vibrations of linear

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		and symmetric top molecules Techniques and instrumentation, FTIR
		Raman Spectroscopy Classical theory of the Raman effect, polarizability as a tensor, polarizability ellipsoids, quantum theory of the Raman effect, Pure rotational Raman spectra of linear and asymmetric top molecules, vibrational Raman spectra, Raman activity of vibrations, rule of mutual exclusion, rotational fine structure- O and S branches, Polarization of Raman scattered photons. Structure determination from Raman and IR spectroscopy-AB_2 and AB_3 molecules. Techniques and instrumentation
	May	**Electronic Spectroscopy** Born-Oppenheimer approximation, vibrational coarse structure, intensities by Franck- Condon principle, Dissociation energy, rotational fine structure, Fortrat diagram, predissociationElectronic structure of diatomic molecules- basic results of MO theory, classification of states by electronic angular momentum-σ, π, δ, and ϕ molecular orbitals, selection rules, spectrum of singlet and triplet molecular hydrogen Electronic spectra of polyatomic molecules- localized MOs, spectrum of HCHO, change of shape on excitation Decay of excited states- radiative (fluorescence and phosphorescence) and non-radiative decay, internal conversion

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Lesson plan

C-202: ORGANIC CHEMISTRY- II

MONTH	SYLLABUS
February	**Aromatic Substitution Reactions** Electrophilic Substitution Reactions: The arenium ion mechanism. Orientation and reactivity.Energy profile diagrams. The *ortho/para* ratio, *ipso* attack, orientation in other ring systems.Quantitative treatment of reactivity in substrates and electrophiles.Effect of leaving group.Amination, sulfonylation reactions; Diazonium coupling, Vilsmeier-Hanck reaction, Gatterman reaction, Gatterman-Koch reaction and Hoesch reaction. Nucleophilic substitution reactions: The SNAr, SN1, benzyne and SRN1 mechanisms. Reactivity: effect of substrate structure, leaving group and attacking nucleophile. Goldberg reaction, Bucherer reaction, Schiemann reaction, von Richter reaction, Sommelet-Hauser and Smiles rearrangements.
March	**Addition Reactions** Addition to carbon-carbon multiple bonds: mechanistic and stereochemical aspects of addition reactions involving electrophiles, nucleophiles and free radicals. Regio, stereo- and chemoselectivities.Orientation and reactivity. Addition to cyclopropane ring.Hydrogenation of double and triple bonds, hydrogenation of aromatic rings.Addition of alkenes and/or alkynes to alkenes and/or alkynes. Ene synthesis. Michael reaction.Addition to carbon-heteroatom multiple bonds: Mechanism of metal hydride reduction (NaH, LiH, LiAlH₄, NaBH₄) of saturated and unsaturated carbonyl compounds, acids, esters and nitriles. Addition of Grignard reagents and organolithium reagents to carbonyl compounds and unsaturated carbonyl compounds. Conversion of aldehydes to nitriles. Hydrolysis of nitriles and addition of amines to isocyanates. Formation of xanthates. Wittig, Mannich and Stobbe reactions.
April	**Elimination Reactions** The E2, E1 and E1cB mechanisms and their spectrum.E2C and E2H mechanisms.Orientation of the double bond.Reactivity-effects of substrate structure, attacking base, the leaving group and the medium.Mechanism and orientation in pyrolytic elimination reactions (including Chugaev reaction). **Rearrangements** Wagner-Meerwein, Pinacol-Pinacolone, Fries, Wolff, Beckmann, Hofmann, Curtius, Lossen and Schmidt rearrangements. Benzil-benzilic acid rearrangement, Arndt-Eistert reaction, Tiffeneau- Demjanov reaction, Firtsch-Buttenberg-Wiechell rearrangement. Stevens, Wittig and Favorskii rearrangements, Dienone-phenol, Baker-

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May	Venkatramanrearrangement. Baeyer-Villiger oxidation. Neber rearrangement. Benzidine rearrangement, **Amino acids and Peptides** Synthesis and reactions of amino acids. Classification and nomenclature of peptides.Sanger and Edman methods of sequencing.Cleavage of peptide bond by chemical and enzymatic methods.Peptide synthesis- Protection of amino group (Boc-, Z- and Fmoc-) and carboxyl group as alkyl and aryl esters. Use of DCC, EEDQ, HOBt and active esters, acid halides, anhydrides in peptide bond formation reactions. Deprotection and racemization in peptide synthesis.Solution and solid phase techniques. Synthesis of oxytocin, gramicidin, enkephalins, LH-RH.Introduction to peptidomimetics.

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C-101 INORGANIC CHEMISTRY – I

SYLLABUS

MONTH	
September	Chemical Bonding- VSEPR model, Bent rules and energetics of hybridization; electronegativity and partial ionic character; Bonds- Multicenter, Synergic and Agostic bonding. Lattice energy: Born-Lande equation,
October	Kapustinskii equation; polarizability and partial covalent character, radius-ratio rules, structures of simple solids, Zintl- isoelectronic relationship in solids. Molecular orbital theory: LCAO and MO diagrams of heteronuclear diatomic (CO, NO, HF, ICI) and triatomic molecules (CO_2 and NO_2^-) Chemistry of main group elements- Structure and bonding in boranes, carboranes, metallocarboranes, Wades rules, borazines, phosphazenes, S,N- compounds. Silicates- Classification, structures, isomorphous replacement, pyroxenes, layered and vitreous silicates, zeolites and molecular sieves.
November	HSAB concept: Basis of HSAB concept, acid-base strength, hardness and softness, symbiosis, applications of HSAB concept; Acid- base concept in non-aqueous media, reactions in BrF_3, N_2O_4, anhydrous H_2SO_4, CH_3COOH. Isopoly and heteropoly acids of W, Mo and V, preparations, properties, structure and applications. Stereoisomerism- Chirality, optical activity- CD, ORD, Cotton effect, absolute configuration of metal complexes, magnetic circular dichroism.
December	M-M bond and metal atom clusters, halide clusters, bonding in $[ReCl_8]^{2-}$ Metal carbonyl clusters- LNCC's and HNCC's. Electron counting in carbonyl clusters, Wades-Mingos and Lauher rules. Nuclear Chemistry-The atomic nucleus-elementary particles, quarks, classification of nuclides based on Z and N values, nuclear stability, nuclear potential, binding energy. Nuclear Models: Shell model-salient features, forms of the nuclear potential, filling of orbitals, nuclear configuration, Liquid drop model, Fermi gas model, Collective model and Optical model.Radioactivity, radioactive decay kinetics, Parent-daughter decay-growth relationship-secular and transient equilibria, theories of α, β-, β+ and γ-decay, internal conversion, Auger effect

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C-105: PHOTOCHEMISTRY (SOFT CORE)

MONTH	SYLLABUS
September	**Photochemistry:** Importance of Photochemistry, Laws of Photochemistry: Grothus –Draper Law, Stark-Einsteins Law, Laws of light absorption, Quantum yield and numerical problems. Photochemistry and spectroscopy, units and dimensions. Electronic energy states of atoms, term symbols for atoms, energy levels for the electronic configuration of carbon and oxygen illustrating spin orbit coupling and Hunds rules, inverted multiplets as applied to simple atoms and also for inner transition metals, Laporte's selection rules. Physicochemical Properties of electronically excited molecules: Nature of changes on electronic excitation: acidity, dipole moment, redox potentials etc. Fates of excited species, Electronic, vibrational, rotational energies-potential energies diagram. Shapes of absorption band and Franck Condon principle.
October	Quantum mechanical formulation of Franck Condon, crossing of potential energy surfaces, Non crossing rule of Teller for potential energy surface. Emission spectra, fluorescence and phosphorescence. Environmental effect on absorption and emission spectra, solvent red shift and blue shift in absorption spectra. Experimental techniques to determine the intermediates in photochemical reactions. Classification of photochemical reactions, Rate constants and life times of reactive energy state. Effect of light intensity on the rate of photochemical reaction Photo-fragmentation of photodissociation-Gas phase photolysis.
November	Photosensitized reaction, photofragmentation in liquid phase, photodegradation of polymers, Isomerization and other rearrangement reactions. Atmospheric photochemistry. **Some current topics in photochemistry:** Semiconductors: Bonding and conductivity, mechanism of conductivity, energy bands in semiconductors, impurity semiconductors. Photo voltaic effect: p-n junction solar cells, silicon cells, GaAs solar cells, schottky barrier solar cells.
December	Photoelectrochemistry: Introduction, efficiency of conversion of light to chemical and electrical energy, frequently measured quantities. Photosplitting of water using colloidal suspensions. Photocatalysis: Photocleavage of waste which are environmentally hazardous by using TiO_2, Photooxidation and photoreduction reactions

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Lesson plan

C-201: INORGANIC CHEMISTRY- II

MONTH	SYLLABUS
February	Metal-Ligand equilibria in solution- Step-wise and overall formation constant and theirrelationship, trends in step-wise constant, kinetic and thermodynamic stability of metal complexes, factors affecting the stability of metal complexes with reference to the nature ofthe metal ion and ligand, chelate effect, macrocyclic effect and their thermodynamic origin.Determination of binary formation constant by pH metry, spectrophotometry, polarographyand ion exchange methods.Structure and bonding- Structure and bonding in hydride, dihydrogen,dioxygen,isocyanide, CO, NO, N_2 and tertiary phosphine complexes of transition metals.
March	Metal- ligand bonding- Stereoisomerism- coordination numbers 3 to 8. Crystal field theory,salient features, spectrochemical series, splitting of d-orbitals in tetragonal, square planar, trigonal bipyramidal and square-pyramidal geometry, applications of CFT-colours oftransition metal complexes, magnetic properties of octahedral complex, distortion ofoctahedral complex, CFSE and their uses, factors affecting CFSE,limitations of CFT,experimental evidence for metal-ligand covalent bonding in complexes, nephelauxeticeffect,Ligand Field Theory, MO theory: tetrahedral and octahedral complexes (including ð-bonding), angular overlap model.Stereochemical non-rigidity, self assemblyin supramolecular chemistry.
April	Electronic spectra of coordination compounds- Spectroscopic ground states, selectionrules, term symbols for dn ions, Racah parameters, Orgel, Correlation and Tanaube-Suganodiagrams, spectra of 3d metal-aqua complexes of trivalent V, Cr,divalentMn, Co and Ni,$CoCl_4^{2-}$ calculation of Dq, B and â parameters, CT spectra.Spectral properties of Lanthanide and Actinide metal complexes.
May	Magnetic properties of coordination compounds- Types of magnetic behaviour, magnetic susceptibility and its determination- Gouy, Faraday, VSM method. Diamagnetic correction, orbital contribution, spin-orbital coupling, ferro- and antiferromagnetic coupling, spincrossover.Magnetic properties of Lanthanide and Actinide metal complexes.Photochemical reactions of transition metals complexes

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M.Sc., PHYSICS (CBSC Scheme)

LESSON PLAN

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Kalyan Nagar (Post) Behind BT
CHELIKERE, BANGALORE

P101: CLASSICAL MECHANICS

SYLLABUS

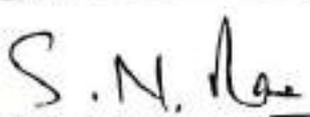| MONTH	
August	Centre of mass, total angular momentum and total kinetic energies of a system of particles, conservation of linear momentum, energy and angular momentum. Constraints and their classification, degrees of freedom, generalized coordinate, virtual displacement. Lagrange's equations and their applications such as Atwood's machine, bead sliding on a uniformly rotating wire in a free space.
September	Reduction of two particle equations of motion to the equivalent one-body problem, reduced mass of the system, first integrals of the motion, classification of orbits, conditions for closed orbits, general description of scattering, cross-section, impact parameter. Rutherford scattering, center of mass and laboratory co-ordinate systems, notion of pseudo forces, equations of motion in a rotating frame of reference, the Coriolis force, the Foucault pendulum.
October	Degrees of freedom of a free rigid body, angular momentum and kinetic energy of a rigid body, moment of inertia tensor, principal moments of inertia, classification of rigid bodies as spherical, symmetric and asymmetric, Euler's equations of motion for a rigid body,. precession of earth's axis of rotation, Euler angles, angular velocity of a rigid body, notions of spin, precession and nutation of a rigid body.
November	Types of equilibria, quadratic forms for kinetic and potential energies of a system in equilibrium, Lagrange's equations of motion, normal modes and normal frequencies, in longitudinal vibrations of two coupled harmonic oscillators, Normal modes and normal frequencies of a linear, symmetric, triatomic molecule and oscillations of two linearly coupled plane pendula.
December	Generalized momenta, canonical variables, Legendre transformation and the Hamilton's equations of motion, the Hamiltonian of a particle in a central force field, the simple harmonic oscillator, cyclic co-ordinates and conservation theorems, derivation of Hamilton's equations from variational principle. Generating functions (four basic types), canonical transformations, the harmonic oscillator in one dimension, Poisson brackets, equations of motion in terms of Poisson brackets, properties of Poisson brackets Poisson brackets of angular momentum, The Hamilton-Jacobi equation, Linear harmonic oscillator using Hamilton-Jacobi method.

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P102: ELECTRONIC CIRCUITS AND DEVICES

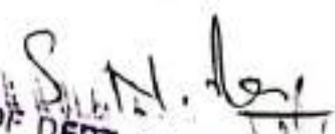| MONTH	SYLLABUS
August	p-n junction, abrupt junction, band structure depletion region, depletion capacitance, current and voltage characteristics. BJT band structure, transistor action, static characteristics. JFET structure, working, characteristics. MOS structure, MOSFET working and its characteristics, width of depletion region, junction capacitance, threshold voltage. Metal semiconductor contacts, photoconductor efficiency, current gain, response time.
September	Effect of light on I-V characteristics of a junction photo device, principle and working of a photodiode, Light emitting devices, principle, working and factors affecting the efficiency of LED. Block diagram of an operational amplifier, Characteristics of an ideal operational amplifier, Operational amplifier as a open loop amplifier Operational amplifier as a feedback amplifier: closed loop gain, input impedance, output impedance of inverting and non-inverting amplifiers - Voltage follower - Differential amplifier: voltage gain.
October	Applications of op-ampPhase and frequency response of low pass, high pass and band pass filters summing amplifier in inverting and non-inverting configurations, subtractor, difference summing amplifier. ideal and practical Differentiator, Integrator.Non - linear applications: comparators, positive and negative clippers, positive and negative clampers, small signal half wave rectifiers. Review of gates i.e., AND,OR,NAND,NOR,NOT,EX-OR, Boolean laws and theorems, simplification of SOP equations,
November	Simplification of POS equations, Simplification using Karnaugh Map conversion of binary to Grey code - Flip flops: Latch using NAND and NOR gates- RS flip flop , clocked RS flip flop, JK flip flop, JK master slave flip flop - racing –Shift Registers basics. Counters: Ripple counters-truth table-timing diagram,Synchronous counters-truth table-timing diagram, Decade counter.
December	Ladder and weighted resistor types. ADCs-counter method, successive approximation and dual slope converter. Application of DACs and

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P103: QUANTUM MECHANICS -I

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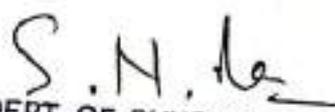| MONTH	SYLLABUS
August	Empirical basis, wave-particle duality, electron diffraction, Wave packets, Gaussian wave packet, Heisenberg uncertainty principle for position and momentum, Schrodinger equation, conservation of probability, probability interpretation of wave function, expectation values, Ehrenfest theorem.
September	Time- independent Schrodinger equation, stationary states, momentum space representation. Free-particle solution, momentum eigen functions, box normalization, particle in square well potential, transmission through a potential barrier, simple harmonic oscillator. Hilbert space and observables, linear operators and observables, Dirac notation, degeneracy and simultaneous observables.
October	Generalized uncertainty principle for two non-commuting observables, Unitary dynamics, projection operators and measurements, time-dependence of observables: Schrodinger, Heisenberg and interaction pictures, Simple harmonic oscillator by operator method. Orbital angular momentum commutation relations, Eigen values and eigen functions.
November	Central potential, separation of variables in the Schrodinger equation, the radial equation. The Hydrogen atom. General operator algebra of angular momentum operators ,Ladder operators,
December	Eigen values and eigenkets of J2 and Jz, Matrix representations of angular momentum operators, Pauli matrices, Addition of angular momentum, Clebsch-Gordan coefficients, computation of Clebsch-Gordan coefficients in simple cases (j1 = j2=1/2).

P104: MATHEMATICAL METHODS OF PHYSICS -I

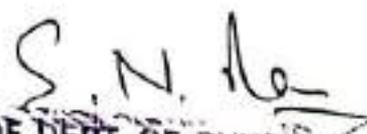| MONTH	SYLLABUS
August	Vector spaces and subspaces, Linear dependence and independence, Inner product, Orthogonality, Gramm-Schmidt orthogonalization procedure, Basis and Dimensions, linear operators, Matrix representation, Similarity transformations, Characteristic polynomial of a matrix, Eigen values and eigenvectors, Self adjoint and Unitary transformations, Eigen values and eigenvectors of Hermitian and Unitary transformations.
September	Gradient, Divergence and Curl operations, Vector Integration, Gauss' and Stokes' theorems, Curvilinear co-ordinates, tangent and normal vectors, contravarient and covariant components, line element and the metric tensor, Gradient, Curl, divergence and Laplacian in spherical polar and cylindrical polar co-ordinates.
October	Tensors, contravariant and covariant components of tensors, raising and lowering of tensor indices, sum, outer, inner products and contraction of tensors, Quotient law, symmetric, antisymmetric tenors, Levi civita symbol, Covariant differentiation and Christoffel symbols.
November	Concept of variation, Euler's equation, Applications of the Euler equation, Several independent variables, Hamilton's principle and Lagrange's equations, Lagrangian multipliers, phase space trajectories, limit cycle motion, logistic map. Linear ordinary differential equations. Separation of Poisson and Helmholtz equations in spherical polar and cylindrical polar coordinates
December	Series solutions – Frobenius' method, Series solutions of the differential equations of Bessel, Legendre, Leguerre and Hermite polynomials, Generating functions, Some recurrence relations, orthogonality properties of these functions, Brief discussion of spherical Bessel functions and spherical harmonics.

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P105: EXPERIEMENTAL TECHNIQUES IN PHYSICS

MONTH	SYLLABUS
August	Occupational health and safety, chemical substances, radiation safety, general electrical testing standards, General laboratory and workshop practice. Measurement, result of a measurement, sources of uncertainty and experimental error, Systematic error, random error.
September	Reliability- chi square test, Analysis of repeated measurement, Precision and accuracy, Elementary data fitting. Transducers, Transducer characteristics, selection of a instrumentation transducer, Transducer as an electrical element, modelling external circuit components, circuit calculations, ac and dc bridge measurements.
October	Introduction to vacuum, characteristics of vacuum, applications of vacuum, Rotary, oil diffusion, turbo molecular pumps, Ion pumps, Pumping speed of a vacuum pump.
November	Pirani and Penning gauges, Thin film techniques, film thickness monitors, film thickness measurement. Resistance thermometers, thermocouples.

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201: STATISTICAL MECHANICS

MONTH	SYLLABUS
January	Thermodynamics: Postulates of equilibrium thermodynamics, Intensive and extensive variables, Entropy –Calculation of entropy changes in reversible processes. Equilibrium between two thermodynamic systems, Thermodynamic potentials –Enthalpy, Helmholtz and the Gibbs functions. The Maxwell relations. Variational principles in thermodynamics
February	Classical Statistical Mechanics: Basic postulates of statistical mechanics, Macro-and micro states, Statistical equilibrium, Phase space, Ensemble: micro canonical, canonical. grand canonical. Density function, Liouville's theorem. Canonical distribution function: Evaluation of mean values in a canonical ensemble. Partition function--connection with thermodynamics.
March	Statistical definition of entropy-Boltzmann equation and its significance; Ideal monoatomic gas, Gibbs' paradox. Equipartition theorem, specific heat of solids. Basic concepts – Quantum ideal gas, Identical particles and symmetry requirements, Quantum distribution functions.
April	Bose-Einstein statistics, Ideal Bose gas, black body radiation, Bose- Einstein condensation, specific heat, Fermi-Dirac statistics, Ideal Fermi gas. properties of simple metals. Pauli paramagnetism, electronic specific heat. Quantum statistics in the classical limit.
May	Random walk in one dimension, Brownian motion, Langevin equation, Fluctuation dissipation theorem. Einstein relation, Fourier analysis of random functions, Wiener- Khintchine relations Nyquist's theorem, Fluctuations and Onsager relations.

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202: ELECTRODYNAMICS

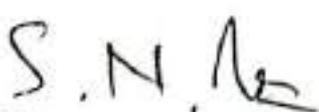| MONTH	SYLLABUS
January	Coulomb's law, Electric field, Gauss's law, applications of Gauss's law, Electric Potential, Poisson's equation and Laplace's equation, Work and energy in electrostaticspotentials: Laplace's equation in one, two and three dimensions, boundary conditions and uniqueness theorems. Method of Images, Multipole expansion, Dielectrics, Polarization, Field inside a dielectric, Electric displacement, Linear dielectrics.
February	Magnetization, field of a magnetized object, magnetic field inside matter, linear and non linear magnetic media. Time dependent fields, Faraday's law, Maxwell's displacement current, Differential and integral forms of Maxwell's equations.
March	Monochromatic plane waves in vacuum, Reflection and transmission at interfaces, Fresnel's laws, Electromagnetic waves in conductors: Modified wave equation, monochromatic plane waves in conducting media, Dispersion in nonconductors, free electrons in conductors and plasmas. Guided waves. Retarded potentials, Electric dipole radiation, magnetic dipole radiation.
April	
May	L-W potentials, fields of a point charge in motion, power radiated by a point charge. Review of special theory of relativity, Lorentz transformations. Minkowski four vectors, energy-momentum four vector, and covariant formulation of mechanics. Transformation of electric and magnetic fields under Lorentz transformations, field tensor, invariants of electromagnetic field.

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203: QUANTUM MECHANICS

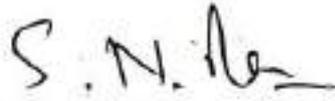| MONTH	SYLLABUS
January	Time independent perturbation theory for a non-degenerate energy level, time independent perturbation theory for a degenerate energy level, Applications in one dimensional harmonic oscillator subjected to a perturbing potential in x, x^2 and x^3, the fine structure of the hydrogen atom and the Zeeman effect.
February	Variational Method: Bound states (Ritz Method), Expectation value of the energy. Applications in ground state of Helium and van de Waals interaction. WKBapproximation. Statement of the problem, approximate solution of the Schrodinger equation, constant perturbation, harmonic perturbation, transition to a continuum, the Fermi golden rule.
March	Scattering experiment, relationship of the scattering cross section to the wave function, scattering amplitude and scattering cross-section. Born approximation, scattering by a spherically symmetric potential, cross-section for scattering in a screened coulomb potential, validity of Born's approximation. Method of partial waves: Expansion of a plane wave in terms of partial waves, scattering by a central potential, optical theorem.
April	Spatial translation symmetry and conservation of linear momentum, time translation symmetry and conservation in energy. Rotations in Space: Conservation of angular momentum. Parity, Time reversal. Permutation symmetry, symmetric and antisymmetric wave functions, Slater determinant, scattering of identical particles, ortho and para helium.
May	Klein-Gordan equation for a free relativistic particle, Plane wave solutions, probability density and probability current density. Dirac Hamiltonian for a free relativistic particle, properties of alpha and beta matrices, probability density and probability current, orthogonality, intrinsic spin of the Dirac particle, Negative energy sea, gamma matrices, covariant form of Dirac equation, Non-relativistic approximation of Dirac equation in the presence of central potential and spin-orbit energy, Dirac particle in an external magnetic field, magneticmoment

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204: MATHEMATICAL METHODS OF PHYSICS-II

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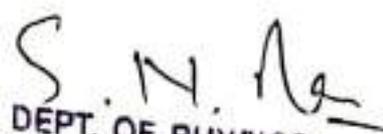| MONTH	SYLLABUS
January	Fourier Series : Definition, Properties, Convergence, Application of Fourier series, Fourier Integral and Fourier transform, Convolution theorem, Parseval's theorem, Laplace transform and its properties, convolution theorem, inverse Laplace transforms, solution of differential equations using Laplace transforms, Fourier transform & Laplace transform of Dirac Delta function.
February	Boundary value problems, The Sturm-Liouville differential operator, Green's function of one-dimensional problems, discontinuity in the derivative of Green's functions, Properties of Green's functions, Construction of Green's functions in special cases and solutions of inhomogeneous differential equations, Eigen function expansion of Green's function.
March	Examples of linear integral equations of first and second kind, Solution of the Fredholm and Volterra integral equations by Neuman series method, Separable kernels, Fredholm alternate method. Functions of a complex variable, Analytic functions, Cauchy-Riemann relations, Conjugate and harmonic nature of the real and imaginary parts of an analytic function.
April	Cauchy's theorem, Cauchy's integral formula, Taylor and Laurent expansions, analytic continuation, classification of singularities, residue theorem, Evaluation of definite integrals, Dispersion relations.
May	Group theory: Basic definitions, Multiplication table, Subgroups, Cosets and Classes, Permutation Groups, Homomorphism and isomorphism, Reducible and irreducible representations, Schur's lemma, Elementary ideas of Continuous groups $GL(n)$, $SO(3)$, $SU(2)$, $SO(3,1)$, $SL(2,C)$.

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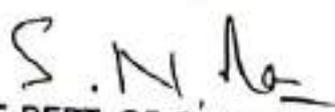| MONTH	
January	Introduction to Biophysics and scope of biophysics. Chemical and physical forces between atoms and molecules: Atomic and molecular forces. Inter-atomic molecular bonds: Ionic, covalent and Van der Waals bonds, coordinate bonds and hydrophobic interaction. Mechanism of bond formation based on electronic orbitals. Formation of molecular orbitals, Sigma and Pi bonds, Hybridization. Examples of bond formation between C-C, C-N and carbon and other atoms.
February	Biological macromolecules. General classification. Physical methods of determining size and shape of molecules. Separation methods: Diffusion, Sedimentation and osmosis. Viscosity and surface tension measurements. Instrumental methods of analysis of biological systems:Light scattering by macromolecules. Optical activity.
March	Absorption spectroscopy and spectrophotometry, Calorimetry, IR and Raman spectroscopy for study of biomolecules. NMR spectroscopy for studying interactions and identification of biomolecules. XRD and microscopy for studying living matter.Isotopes and Radioactivity: Radioactive decay laws, production of radioisotopes, allocation of radioactive traces, isotopic tracer method.
April	Assay using radioactive substances. Labelling and detection methods using fluorescent molecules. Radiation sources, Interaction of radiation with matter , energy transfer process, measurement of radiation, Dosimetry. Biological effects of radiation, effect of radiation on living systems, radiation protection and radiation therapy.

P301: NUCLEAR AND PARTICLE PHYSICS (GENERAL)

SYLLABUS

MONTH	SYLLABUS
August	Interaction of charged particles: Energy loss of heavy charged particles in matter, Bethe-Bloch formula, energy loss of fast electrons, Bremsstrahlung. (b) Interaction of gamma rays: Photoelectric, Compton, and pair production processes. Characteristics of nuclear forces, Ground state of the deuteron using square- well potential, relation between the range and depth of the potential, Inadequacies of the central force, experimental evidence for the tensor force, magnetic moment and quadrupole moment of the deuteron, deuteron ground state as an admixture of s and d states.
September	Scintillation Detectors-NaI(Tl), Scintillation spectrometer, Semiconductor detectors: Surface barrier detectors, Li ion drifted detectors, relation between the applied voltage and the depletion region in junction detectors. Preamplifiers: voltage and charge sensitive preamplifiers, Linear pulse amplifier, Schmitt trigger as a discriminator, differential & integral discriminators, ADC, MCA, functional block diagram and its working and use in data processing.
October	
November	Semi-empirical mass formula, stability of nuclei against beta decay, mass parabola, Shell model: Evidence for magic numbers, prediction of energy levels in an infinite square well potential, spin-orbit interaction, prediction of ground state spin, parity and magnetic moment of odd-A nuclei, Nordheim's rules.Fermi's theoryof beta decay,Kurieplotsand–ftlvalues, selection rules.Multipolarity of gamma rays, Selection rules, Internal conversion. Types of interactions between elementary particles, hadrons and leptons, detection of neutrinos.
December	Symmetries and conservation laws: conservation of energy, momentum, angular momentum, charge and isospin, parity symmetry.Violation of parity in weak interactions, Lepton number conservation, Lepton family and three generations of neutrinos. Charge conjugation symmetry, CP violation in weak interactions, Strange particles, conservation of strangeness in strong interactions, Baryon number conservation, Gell-Mann Nishijima formula, eight fold way (qualitative only), quark model, quark content of baryons and mesons.

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P302: CONDENSED MATTER PHYSICS (GENERAL)

MONTH	SYLLABUS
August	Crystal structure:Crystalline state - periodic arrangement of atoms-lattice translation vectors The basis and crystal structure, primitive and non-primitive lattice cell-fundamental types of lattice, -2d and 3-d Bravias lattice and crystal systems. Elements of symmetry operations- points and space groups-nomenclature of crystal directions and crystal planes-miller indices. XRD: Scattering of x-rays, .Laue conditions and Bragg's law, atomic scattering factor, geometrical structure factor.
September	Free electron model, Electrons moving in one dimensional potential well, three dimensional potential well, quantum state and degeneracy, the density of states. Fermi-Dirac statistics, effect of temperature on Fermi distribution function, the electronic specific heat. Electrical conductivity of metals, relaxation time and mean free path, electrical conductivity and Ohm's law, Thermal conductivity, Wiedemann - Franz law, thermionic emission, Hall effect
October	
November	Elementary ideas of formation of energy bands. Bloch function, Kronig-Penney model, number of states in a band, Energy gap. Distinction between metals, insulators and intrinsic semiconductors.concept of holes, equation of motion for electrons and holes, effective mass of electrons and holes.
December	Introduction to semi conductors, band structure of semi conductors, Intrinsic and extrinsic semiconductors. expression for carrier concentration (only for intrinsic), ionization energies, charge neutrality equation, conductivity-mobility and their temperature dependence. Hall effect insemiconductors. Superconductors: Critical temperature-persistent current-occurrence of super conductivity- ideal and non-ideal superconductors-Destruction of super conductivity by magnetic field – Meissner effect- heat capacity-energy gap-microwave and infrared properties- Isotope effect- BCS theory (qualitative)-Josephson tunneling-exotic superconductors- high T_c super conductors. classification of magnetic materials-Langevin theory of diamagnetism, para-magnetism and Ferromagnetism – domains-Weiss molecular field theory (classical)-Heisenberg exchange interaction theory-. Antiferro-magnetism and

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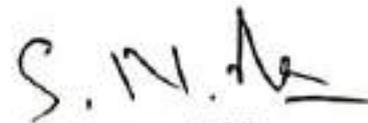|	
August	Basic concepts of Astronomy: Co-ordinate system, Time system-Solar and Sidereal times, Apparent and Absolute magnitudes, Trigonometric Parallax, Atmospheric extinction, Optical telescopes and their characteristics, Modern Optical telescopes, Astronomical Instruments – Photometer, Photographic plates, Spectrographs, Charge Coupled Detector
September	Observational properties of stars- spectral and luminosity classification of stars- H-R Diagram, Saha Equation, , Star Formation - Jeans mass, Jeans Length and Free fall timescale, Main Sequence Evolution, Mass- luminosity relation, White Dwarfs – Chandrasekhar's Limit.
October	Neutron Stars, Pulsars, Supernovae, Stellar Black holes,Overview of Sun, Solar Interior structure- Core, Radiative zone and Convective Zone, solar atmosphere- photosphere, Chromospheres, Properties of Interior planets and exterior planets satellites of planets, Kuiper Belt objects, Oort Cloud.
November	Theories of formation of the solar system. Hydrostatic Equilibrium, Mass conservation, Luminosity gradient equation, Temperature gradient Equations, Lane – Emden equation for polytrophic stars and its physical solution, estimates of central pressure and temperature, Radiation pressure.
December	Equation for generation and luminosity, equation of temperature gradient for radiative and convective equilibrium, Schwarzschild criterion, gas pressure and radiation pressure, Linear Model and its properties, Volt – Russell theorem, Zero age main sequence, Mass – Luminosity relation.

P304 – E5: Material Science

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MONTH	SYLLABUS
August	Introduction to Materials Science- Engineering materials - structure - property relationship, Review of ionic, covalent and molecular bindings, bond angle, bond length and bond energy, lattice energy - Madelung constant- cohesive energy, van der Waal's Interaction- Lennard- Jones Potential.
September	Closed packed structure-packing efficiency and density of materials. Crystal imperfections. Atomic model of elastic behavior-rubber like Elasticity-anelastic behavior, viscoelastic behavior, fracture of materials-Ductile and brittle fracture – Ductile brittle transition.
October	Plastic deformation by slip-shear strength of perfect and real crystals- CRSS ratio, maximum stress to move dislocation. methods of strengthening crystalline materials against plastic deformation-strain hardening, grain refinement, solid solution strengthening, precipitation strengthening.
November	Classification of composite materials, matrix materials-polymer, metals, ceramics, rein forcing materials- fibers, particles, concrete-concrete making materials, structure, composition, properties and applications, polymer-concrete composites, fabrication, structure, application of polymer matrix composites, metal matrix composites, ceramic matrix composites.
December	Classification of composite materials, matrix materials-polymer, metals, ceramics, rein forcing materials- fibers, particles, concrete-concrete making materials, structure, composition, properties and applications, polymer-concrete composites, fabrication, structure, application of polymer matrix composites, metal matrix composites, ceramic matrix composites, metal matrix composites, ceramic-matrix composites.

P401: Atomic and Molecular Physics

MONTH	SYLLABUS
August	Interaction of radiation with matter: Einstein's coefficients, Beer's law for attenuation and amplification of light. The width and shape of spectral-lines: natural broadening, Doppler broadening-estimation of half width, General treatment of other broadening mechanisms-collision and power broadening.
September	Brief review of early atomic models. Hydrogenic atoms: Energy levels and selection rules, Relativistic corrections and fine structure, hyperfine structure, Lamb shift and isotope shift. Interaction with external fields: Zeeman effect, Paschen-Back effect, Stark effect.
October	Two electron atom: Ortho and para states and role of Pauli's exclusion principle, level schemes of two electron atoms. Many electron atoms: LS and JJ coupling schemes, Lande interval rule. Born-Oppenheimer approximation, Rotational spectroscopy: Classification of rotors. Diatomic molecule as a rigid rotator.
November	Centrifugal distortion and non – rigid rotator, energy levels and spectra, Intensity of rotational lines, experimental techniques. Raman scattering, Polarizability, Rotational Raman spectroscopy (diatomics). Experimental technique.
December	Diatomic molecule as a simple harmonic oscillator, anharmonicity, effect of anharmonicity on vibrational terms, energy levels and selection rules. Vibrating rotator-energy levels and rovibrionic spectra, Experimental technique and IR spectrometry. Applications of IR spectroscopy. Mutual exclusion principle.

P402: Numerical Analysis and Computational Physics

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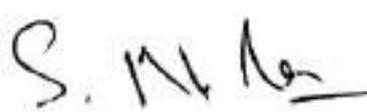| MONTH	SYLLABUS
August	Introduction to nanomaterials: Definition, reason for interest in nanomaterials, classification of nanostructures – 1D, 2D and 3D confinement.Gas reactive applications of nanostructured materials: Catalysis, electrocatalysis processes, impact of nanostructure, Gas Sensors: physical principles of semiconductor sensors and nanostructure design,Hydrogen storage and its applications.
September	Domain and domain walls – bulk and nanostructures, magnetization processes in particulate nanomagnets and layered nanomagnets, applications.Methods for preparation of Nano-materials: Bottom Up. Nano Structures: quantum dots, quantum well structures, molecular beam epitaxy methods of growth –MOVPE – MOCVD.
October	Physical vapour deposition for nanoparticles.Top Down: Ball milling: details, size and time of milling, shaker mills, planetary mills, attrition mills. Electron Beam, Lithography resists- use of positive and negative resists – lift of process. Ion-beam lithography.
November	Self-assembled molecular materials. XRD- Crystallinity, particle/crystallite size determination and structural analysis. SEM-Morphology, grain size and EDX.
December	TEM- Morphology, particle size and electron diffraction. STM- surface imaging and roughness, AFM - surface imaging and roughness; other scanning probe techniques. PLE spectroscopy, Infrared (IR) and Raman spectroscopy.

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P101: CLASSICAL MECHANICS

SYLLABUS

MONTH	
August	Constraints and their classification, degrees of freedom, generalized coordinate, virtual displacement, Lagrange's equations and their applications such as Atwood's machine, bead sliding on a uniformly rotating wire in a free space.
September	Classification of orbits, conditions for closed orbits, general description of scattering, cross-section, impact parameter, Rutherford scattering, center of mass and laboratory co-ordinate systems. notion of pseudo forces, equations of motion in a rotating frame of reference, the Coriolis force, the
October	Angular momentum and kinetic energy of a rigid body, moment of inertia tensor, principal moments of inertia, classification of rigid bodies as spherical, symmetric and asymmetric, Euler's equations of motion for a rigid body, precession of earth's axis of rotation, Euler angles, angular velocity of a rigid body, notions of spin, precession and nutation of a rigid body.
November	Quadratic forms for kinetic and potential energies of a system in equilibrium, Lagrange's equations of motion, normal modes and normal frequencies, in longitudinal vibrations of two coupled harmonic oscillators, Normal modes and normal frequencies of a linear, symmetric, triatomic molecule and oscillations of two linearly coupled
December	plane pendula.
	Hamilton's equations of motion, the Hamiltonian of a particle in a central force field, the simple harmonic oscillator, cyclic co-ordinates and conservation theorems, derivation of Hamilton's equations from variational principle.Generating functions (four basic types), canonical transformations, the harmonic oscillator in one dimension, Poisson brackets, equations of motion in terms of Poisson brackets, properties of Poisson brackets Poisson brackets of angular momentum, The Hamilton-Jacobi equation, Linear harmonic oscillator using Hamilton-Jacobi method.

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P403-E8: PHYSICS OF SOLIDS

MONTH	SYLLABUS
August	Classification of imperfections, crystallographic imperfections, point defects - concentrations of Schotky and Frenkal defects, line defects-edge dislocations, screw dislocation, Burger vectors, dislocation motion, stress fields around dislocations, observation of dislocations, plane defects- grain boundaries, tilt and twin boundaries -surface imperfections.
September	Lattice vibrations and phonons: Elastic vibrations of continuous media, Group velocity of harmonic wave trains, Wave motion of one dimensional atomic lattice, lattice with two atoms with primitive cell, Some facts about diatomic lattice, number of possible normal modes of vibrations in a band, phonons, momentum of phonons.
October	Classical calculations of lattice specific heat, Einstein theory of specific heats, Debye's model of lattice specific heat, Debye approximation, An-harmonic crystal interactions, thermal expansion, lattice thermal conductivity of solids- Umklapp process.
November	Inter-atomic forces and bonding in solids: Forces between atoms-binding energy-cohesion of atoms and cohesive energy- calculation of cohesive energy-bond energy of Nacl molecule- calculation of lattice energy of ionic crystals-calculation of Madelung constant of ionic crystals-calculation of repulsive exponent from compressibility data.
December	Optical properties, color centers, types of color centers, generation of color centers- properties-models and applications. Elastic constants: Stress components. Analysis of elastic strains, elastic compliance and stiffness constants, elastic energy density.

MONTH	SYLLABUS
August	Interpolation, solution of linear algebraic equations using Gauss elimination method, Curve fitting by least square fit method, Numerical integration, Trapezoidal and Simpson's rules, Numerical differentiation, Euler and Runge-Kutta methods, Finding roots, bisection method, Newton-Raphson method.
September	Random variables, Fundamental probability laws, permutations and combinations, binomial distribution, Poisson distribution, Gauss' normal distribution, general properties of distributions, multivariate Gaussian distributions, Errors of observation and measurements, Fitting of experimental data
October	Elementary information about digital computer principles, compilers, interpreters and operating systems, Constants and variables, arithmetic expressions, data types, input and output statements, control statements, switch statements, the loop statements, format specifications, arrays, algorithms, flowcharts, functions and some simple programming examples in C.
November& December	C program for (i) finding roots using Newton-Raphson method, Bisection method, (ii) solving simultaneous linear algebraic equations, (iii) evaluating integrals using Simpson's and trapezoidal rules, (iv) solving ordinary differential equations using Euler andRunge-Kutta method, (v) least square fitting (vi)Lagrange' interpolation

S. M. Le

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BANGALORE CITY COLLEGE

Details of the lesson plan I semester

Department : Mathematics   Name of the faculty: Madhushree M ?

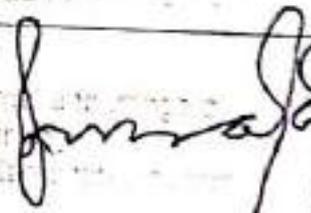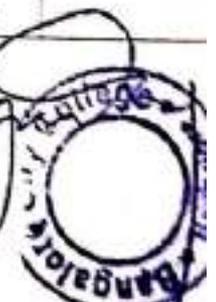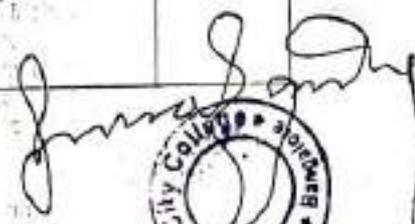| Month	Title of the Paper: Algebra – I	No of classes
Sep	**Introduction :** Group Theory (Recapitulation) Groups, Subgroups, Cyclic groups, Normal Subgroups, Quotient groups, Homomorphism, Types of homomorphisms	5hrs
Sep	**Unit-1** Permutation groups, symmetric groups, cycles and alternating groups, dihedral groups Isomorphism theorems and its related problems, Automorphisms, Inner automorphisms, groups of automorphisms and inner automorphisms and their relation with centre of a group	8 hrs
Sep	**Unit-2:** Group action on a set, Orbits and Stabilizers, The orbit-stabilizer theorem, The Cauchy-Frobenius lemma, Conjugacy, Normalizers and Centralizers. Class equation of a finite group and its applictions.	10 hrs
	Unit-3: Sylow's groups and subgroups, Sylow's theorems for a finite group, Applications and examples of p-Sylow subgroups.	8hrs
Oct	**Unit-4:** Solvable groups, Simple groups, Applications and examples of solvable and simple groups. Jordan - Holder Theorem	5 hrs 3 hrs
Oct	Ring Theory (Recapitulation): Rings, Some special classes of rings (Integral domain, division ring, field).	
	Unit-5: Homomorphisms of rings, Kernel and image of Homomorphisms of rings, Isomorphism of rings, Ideals and Quotient rings, Fundamental theorem of homomorphism of rings.	6hrs
Nov	**Unit-6:** Theorems on principle, maximal and prime ideals, Field of quotients of an integral domain, Imbedding of rings	5hrs
Nov	**Unit-7:** Euclidean rings, Prime and relatively prime elements of a Euclidean ring, Unique factorization theorem, Fermat's theorem, Polynomial rings, The division algorithm.	6hrs
Dec	**Unit-8:** Polynomials over the rational field, Primitive polynomial, Content of a polynomial- Gauss lemma, Eisenstein criteria, Polynomial rings over commutative rings, Unique Factorization Domains. Internal assessment .Revision	5 hrs

BANGALORE CITY COLLEGE

Details of the lesson plan I semester

Department : MathematicsName of the faculty : R.Radhabai

Month	Title of the Paper: Discrete mathematics and graph theory	No.of classes
Sep	Unit-1: Logic: Introduction to logic, Rules of inference (for quantified statements). Validity of Arguments, Normal forms. Methods of proof: Direct, Indirect proofs, Proof by contradiction, Proof by Cases etc.	6 hrs
Sep	Unit-2: Counting Techniques: The product rule, The sum rule, The inclusion–exclusion principle, The Pigeonhole Principle and examples. Simple arrangements and selections. Arrangements and selections with repetitions, Distributions, Binomial Coefficients.	10 hrs
Sep	Unit-3: Modeling with recurrence relations with examples of Fibonacci numbers and the tower of Hanoi problem, Solving recurrence relations. Divide-and-Conquer relations with examples (no theorems). Generating functions, definition with examples, solving recurrence relations usinggenerating functions, exponential generating functions. Difference equations.	12 hrs
Oct	Unit-4: Definition and types of relations: Representing relations using matrices and digraphs. Closuresof relations, Paths in digraphs, Transitive closures, Warshall's Algorithm. Order relations, Posets, Hasse diagrams, extomal elements, Lattices.	13hrs
Oct	Unit-5: Introduction to graph theory, types of graphs, Basic terminology, Subgraphs, Representinggraphs as incidence matrix and adjacency matrix. Graph isomorphism. Connectedness in simplegraphs. Paths and cycles in graphs. Distance in graphs: Eccentricity, Radius, Diameter, Center, Periphery. Weighted graphs Dijkstra's algorithm to find the shortest distance paths in graphs and digraphs.	10hrs
Oct	Unit-6: Euler and Hamiltonian Paths: Necessary and sufficient conditions for Euler circuits and pathsin simple, undirected graphs. Hamiltonicity: noting the complexity of hamiltonicity, TravelingSalesman's Problem, Nearest neighbor method.	10 hrs
Nov	Unit-7: Planarity in graphs, Euler's Polyhedron formula. Kuratowski's theorem (statement only) Vertex connectivity, Edge connectivity, covering, Independence.	8hrs
Nov	Unit-8: Trees, Rooted trees, Binary trees, Trees as models. Properties of trees. Minimum spanning trees. Minimum spanning trees. Prim's and Kruskul's Algorithms.	8 hrs
Dec	Internal assessment ,Revision	

BANGALORE CITY COLLEGE

Details of the lesson plan I semester

Department : Mathematics   Name of the faculty: Dr.P.M.Balagondar

Month	Title of the Paper: Ordinary differential Equation	No.of classes
Sep	Unit-1 Linear differential equations of nth order, fundamental sets of solutions, Wronskian - Abel'sidentity, theorems on linear dependence of solutions, adjoint - self - adjoint linear operator, Green'sformula, Adjoint equations, the nthorder nonhomogeneous linea equations - Variation of parameters - zeros of solutions - comparison and separation theorems.	14
Oct	Unit-2: Fundamental existence and uniqueness theorem, Dependence of solutions on initialconditions, existence and uniqueness theorem for higher order and system of differential equations -Eigenvalue problems - Sturm-Liouville problems - Orthogonality of eigenfunctions - Eigenfunction expansion in a series of orthonormal functions; Green's function method.	15
Nov	Unit-3: Power series solution of linear differential equations - ordinary and singular points ofdifferential equations, Classification into regular and irregular singular points; Series solution aboutan ordinary point and a regular singular point - Frobenius method- Hermite, Laguerre, Chebyshev and Gauss Hypergeometric equations,and their general solutions Generating function, Recurrence relations, Rodrigue's formula Orthogonality properties Behaviour of solution at irregular singularpoints and the point at infinity.	14
Dec	Unit-4: Linear system of homogeneous and non-homogeneous equations (matrix method) Linear and Non-linear autonomous system of equations - Phase plane - Critical points - stability - Liapunov direct method - Limit cycle and periodic solutions-Bifurcation of plane autonomous systems.	13

BANGALORE CITY COLLEGE

Details of the lesson plan I semester

Department : Mathematics   Name of the faculty: Dr.P.M.Balagondar

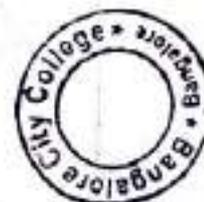| Month	Title of the Paper: Ordinary differential Equation	No.of classes
Sep	Unit-1: Linear differential equations of nth order, fundamental sets of solutions, Wronskian - Abel'sidentity, theorems on linear dependence of solutions, adjoint - self - adjoint linear operator, Green'sformula, Adjoint equations, the nth order nonhomogeneous linear equations - Variation of parameters - zeros of solutions - comparison and separation theorems.	14
Oct	Unit-2: Fundamental existence and uniqueness theorem. Dependence of solutions on initialconditions, existence and uniqueness theorem for higher order and system of differential equations -Eigenvalue problems - Sturm-Liouville problems - Orthogonalty of eigenfunctions - Eigenfunction expansion in a series of orthonormal functions- Green's function method.	15
Nov	Unit-3: Power series solution of linear differential equations - ordinary and singular points ofdifferential equations, Classification into regular and irregular singular points; Series solution aboutan ordinary point and a regular singular point - Frobenius method- Hermite, Laguerre, Chebyshev and Gauss Hypergeometric equations,and their general solutions. Generating function, Recurrencerelations, Rodrigue's formula Orthogonality properties. Behaviour of solution at irregular singularpoints and the point at infinity.	14
Dec	Unit-4: Linear system of homogeneous and non-homogeneous equations (matrix method) Linear and Non-linear autonomous system of equations - Phase plane - Critical points - stability - Liapunov direct method - Limit cycle and periodic solutions-Bifurcation of plane autonomous systems.	13

BANGALORE CITY COLLEGE

Details of the lesson plan I semester

Department : Mathematics   of the faculty: Dr.P.M.Balagondar

Month	Title of the Paper: Real anaylsis	No.of classes
Sep	Unit-1: The Riemann - Stieltjes Integral: Definitions and existence of the integral, Linear properties of the integral, the integral as the limit of sums, Integration and Differentiation, Integration of vectorvalued functions. Function of bounded variation- First and second mean value Theorems, Change of variable rectifiable curves.	14
Oct	Unit-2: Sequence and series of Functions: Pointwise and Uniform Convergence, Cauchy Criterion for uniform convergence, Weierstrass M-test, Uniform convergence and continuity, Uniform convergence and Riemann - Stieltjes Integration, Bounded variation, Uniform convergence and Differentiation. Uniform convergence and bounded variation - Equicontinuous families of functions,uniform convergence and boundedness.	15
Nov	Unit-3: The stone-Weierstrass theorem and Weierstrass approximation of continuous function,illustration of theorem with examples.Properties of power series, exponential and logarithmic functions, trigonometric functions. Topology of R_n, k-cell and its compactness, Heine-Borel Theorem, Bolzano Weirstrass theorem, Continuity, Compactness and uniform continuity.	14
Dec	Unit-4: Functions of several variables, continuity and Differentiation of vector-valued functions, Linear transformation of R_k, properties and invertibility, Directional Derivative, Chain rule, Partial derivative, Hessian matrix. The Inverse Functions Theorem and its illustrations with examples. The Implicit Function Theorem and illustration and examples. The Rank theorem illustration andExamples Internal assessment and Revision	13

BANGALORE CITY COLLEGE

Details of the lesson plan I semester

Department : Mathematics   Name of the faculty: Shakil Ahamed

Month	Title of the Paper: Topology I	No.of classes
Sep	**Unit-1**: Finite and Infinite sets. Denumerable and Non denumerable sets, Countable and Uncountable sets. Equivalent sets. Concept of Cardinal numbers, Schroeder- Bernstein Theorem. Cardinal number of a power set–Addition of Cardinal numbers, Exponential of Cardinal numbers, Examples ofCardinal Arithmetic, Cantor's Theorem. Card X < Card P(X). Relations connecting $\aleph_0$ and c. Continuum Hypothesis. Zorn's lemma (statement only).	14
Oct	**Unit-2**: Definition of a metric. Bolzano - Weierstrass theorem. Open and closed balls. Cauchy and convergent sequences. Complete metric spaces. Continuity, Contraction mapping theorem. Banach fixed point theorem, Bounded and totally bounded sets. Cantor's Intersection Theorem. Nowhere dense sets. Baire's category theorem. Isometry. Embedding of a metric space in a complete metric space.	15
Nov	**Unit-3**: Topology: Definition and examples, Open and closed sets. Neighborhoods and Limit Points. Closure, Interior and Boundary of a set. Relative topology. Bases and sub-bases. Continuity and homeomorphism, Pasting lemma.	14
Dec	**Unit-4**: Connected spaces: Definition and examples, connected sets in the real line, Intermediate value theorem, components and path components, local connectedness and path connectedness.	13
Dec	Internal assessment and Revision	

BANGALORE CITY COLLEGE

Details of the lesson plan I semester

Department : Mathematics   Name of the faculty: Shakil Ahamed

Month	Title of the Paper: Mathematical Analysis	No.of classes
Sep	**Unit-1:** Recap of limits, continuity and differentiability of functions, Continuity and compactness, Continuity and connectedness. Infinite limits and limits at infinity.	8
Sep	**Unit-2:** Mean value theorems, The continuity of derivatives, Derivatives of higher order, Taylor's theorems.	9
Oct	**Unit-3:** Numerical sequences & series of real numbers, convergent sequences, Cauchy sequences, upper & lower limits, Some special sequences, Series, Series of non-negative terms, The number 'e'	10
Nov	**Unit-4:** Tests of convergence, Power series, Summation by parts, Absolute convergence, Addition and multiplication of series, Rearrangements. Double series, infinite products.	12
Dec	Internal assessment and Revision	

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Details of the lesson plan II semester

Department : Mathematics   Name of the faculty: Radhabai R

Month	Title of the Paper: Algebra II	No.of classes
Feb	Extended Ring Theory (Recapitulation) : Rings, Some special classes of rings (Integral domain,division ring, field, maximal and prime ideals).	2
Feb	Unit-1: Local ring, the Nil radical and Jacobson radical, operation on ideals, extension andcontraction. The prime spectrum of a ring.	6
Mar	Unit-2: Modules Theory: Modules, submodules and quotient modules, module homomorphisms,Isomorphism theorems of modules.	6
Mar	Unit-3: Direct sums, Free modules, Finitely generated modules, Nakayama Lemma, Simple modules, Exact sequences of modules.	6
Apr	Unit-4: Modules with chain conditions - Artinian and Noetherian modules, modules of finite length, Artinian rings, Noetherian rings, Hilbert basis theorem.	8
Apr	Unit-5: Field Theory: Extension fields, Finite and algebraic extensions. degree of extension, algebraic elements and algebraic extensions, adjunction of an element of a field.	8
Apr	Unit-6: Roots of a polynomial, Splitting fields, Construction with straight edge and compass.	6
May	Unit-7: More about roots (Characteristic of a field), Simple and separable extensions, Finite field.	6
May	Unit-8: Galois Theory: Elements of Galois Theory, Fixed fields, Normal extension, Galois groups over the rationals, degree, distance.	8

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Details of the lesson plan II semester

Department : Mathematics   Name of the faculty: Madhu shree M.R

Month	Title of the Paper: Complex analysis	No.of classes
Feb	Unit-1: Analytic functions, Harmonic conjugates, Elementary functions, Cauchy's Theorem and Integral formula, Morera's Theorem, Cauchy's Theorem for triangle, rectangle, Cauchy's Theorem in a disk, Zeros of Analytic function. The index of a closed curve, counting of zeros. Principle of analytic Continuation. Liouville's Theorem, Fundamental theorem of algebra.	12
Mar	Unit-2: Series, Uniform convergence, Power series, Radius of convergences, Power series representation of Analytic function, Relation between Power series and Analytic function, Taylor's series, Laurent's series.	9
Mar	Rational Functions, Singularities, Poles, Classification of Singularities, Characterization of removable Singularities, poles. Behaviour of an Analytic function at an essential singular point.	8
Apr	Unit-3: Entire and Meromorphic functions. The Residue Theorem, Evaluation of Definite integrals, Argument principle, Rouche's Theorem, Schwartz lemma, Open mapping and Maximum modulus theorem and applications, Convex functions, Hadmard's Three circle theorem.	14
May	Unit-4: Phragmen-Lindelof theorem, The Riemann mapping theorem, Weistrass factorization theorem. Harmonic functions, Mean Value theorem. Poisson's formula, Poisson's Integral formula, Jensen's formula, Poisson's Jensen's formula.	14

BANGALORE CITY COLLEGE

Details of the lesson plan II semester

Department : Mathematics   Name of the faculty: Shakil ahamed

Month	Title of the Paper: Topology II	No.of classes
Feb	Unit-1: Compact spaces, Compact sets in the real line, limit point compactness, sequential compactness and their equivalence for metric spaces. Locally Compact spaces, compactification, Alexandroff's one point compactification.7 Hrs. The axioms of countability: First axiom space, Second countable space, Separability and the Lindelof property and their equivalence for metric spaces.	8
Mar	Unit-2: The product topology, the metric topology, the quotient topology, Product invariant properties for finite products, Projection maps.	9
Mar	Separation axioms: T_0–space and T_1 spaces –definitions and examples, the properties are hereditary and topological. Characterisation of T_0- and T_1 –spaces.	8
Mar	Unit-3: T_2- space, unique limit for convergent sequences, Regularity and the T_3-axiom. Characterisation of regularity, Metric spaces are T_2 and T_3..Complete regularity, Normality and the T_4 - axiom, Metric space is T_4, compact Hausdorff space andregular lindelof spaces are normal.	10
Apr	Unit-4: Urysohn's Lemma, Tietze's Extension Theorem, Complete normality and the T_5-axiom	8
May	Local finiteness, Paracompactness, Normality of a paracompact space, Metrizability, Urysohn metrization theorem.	5

BANGALORE CITY COLLEGE

Details of the lesson plan II semester

Department : Mathematics   Name of the faculty: Dr.P.M.Balagondar

Month	Title of the Paper:Partial differential equations	No.of classes
Feb	Unit-1: First Order Partial Differential Equations: Basic definitions, Origin of PDEs, Classification. Geometrical interpretation. The Cauchy problem, the method of characteristics for Semi linear, quasi linear and Non-linear equations, complete integrals, Examples of equations to analytical dynamics, discontinuous solution and shockwaves.	12
Mar	Unit-2: Second Order Partial Differential Equations: Definitions of Linear and Non-Linear equations, Linear Superposition principle, Classification of second-order linear partial differential equations into hyperbolic, parabolic and elliptic PDEs, Reduction to canonical forms, solution of linear Homogeneous and non-homogeneous with constant coefficients, Variable coefficients, Monge's method.	14
Apr	Unit-3: Wave equation: Solution by the method of separation of variables and integral transforms The Cauchy problem, Wave equation in cylindrical and spherical polar coordinates.6 Hrs.	6
	Laplace equation: Solution by the method of separation of variables and transforms. Dirichlet's, Neumann's and Churchills problems, Dirichlet's problem for a rectangle, half plane and circle, Solution of Laplace equation in cylindrical and spherical polar coordinates.	7
Apr	Unit-4: Diffusion equation: Fundamental solution by the method of variables and integral transforms, Duhamel's principle, Solution of the equation in cylindrical and spherical polar coordinates	7
May	Solution of boundary value problems: Green's function method for Hyperbolic, Parabolic and Elliptic equations.6 Hrs.	6

BANGALORE CITY COLLEGE

Details of the lesson plan II semester

Department : Mathematics   Name of the faculty: Dr.P.M.Balagondar

| Month	Title of the Paper: Numerical Analysis I	No.of classes
Feb	Examples from algebraic and transcendental equations where analytical methods fail. Examples from system of linear and non-linear algebraic equations where analytical solutions are difficult or impossible. Floating-point number and round-off, absolute and relative errors.	4
Feb / Mar	Unit-1: Solution of nonlinear equation in one variable Fixed point iterative method - convergence and acceleration by Aitken's 2-process. Newton-Raphson methods formultiple roots and their convergence criteria, Ramanujan method, Bairstow's method. Sturm sequence for identifying the number of real roots of the polynomial functions, complex roots-Muller's method. Homotopy and continuation methods.	12
Mar	Unit-2: Solving system of equations Review of matrix algebra. Gauss-elimination with pivotal strategy. Factorization methods (Crout's, Doolittle and Cholesky). Tri-diagonal systems-Thomas algorithm. Iterative methods: Matrix norms, error analysis and ill-conditioned systems- Jacobi and Gauss-Seidel methods. Chebyshev acceleration. Introduction to steepest descent and conjugate gradient methods. Solutions of nonlinear equations: Newton-Raphson method, Quasilinearization (quasi-Newton's) method, successive over relaxation method.	16
Apr	Unit-3: Interpolation Review of interpolations basics, Lagrange, Hermite methods and error analyses, Splines-linear, quadratic and cubic (natural, Not a knot and clamped), Bivariate interpolation, Least-squares, Chebyshev and rational approximations.	15
May	Unit-4: Numerical integration Review of integrations. Gaussian quadrature - Gauss-Legendre, Gauss-Chebyshev, Gauss-Lagaurre, Gauss-Hermite and error analyses, adaptive quadratures, multiple integration with constant and variable limits.	10
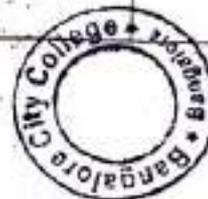
BANGALORE CITY COLLEGE

Details of the lesson plan II semester

Department : Mathematics   Name of the faculty: Monica

Month	Title of the Paper: elementary number theory	No.of classes
Feb	Unit-1: Divisibility and Primes: Recapitulation of Division algorithm, Euclid's algorithm, Least Common Multiples, Linear Diophantine equations. Prime numbers and Prime-power factorisations. Distribution of primes, Fermat and Mersenne primes, Primality testing and factorization.	9
Mar	Unit-2: Congruences : Recapitulation of basic properties of congruences, Residue classes and complete residue systems, Linear congruences. Reduced residue systems and the Euler-Fermat theorem, Polynomial congruences modulo p and Langrange's theorem, Simultaneous linear congruences, Simultaneous non-linear congruences, An extension of Chinese Remainder Theorem, Solving congruences modulo prime powers.	11
Apr	Unit-3: Quadratic Residues and Quadratic Reciprocity Law : Quadratic residues, Legendre's symbol and its properties, Euler's criterion, Gauss lemma, The quadratic reciprocity law and its applications, The Jacobi symbol, Applications to Diophantine equations.	11
May	Unit-4: Sums of squares, Fermat's last theorem and Continued fractions: Sums of two squares, Sums of four squares, The Pythagoras theorem, Pythagorean triples and their classification, Fermat's Last Theorem (Case n = 4).	8

BANGALORE CITY COLLEGE

Details of the lesson plan III semester

Department : Mathematics   Name of the faculty: Madhu shree M R

Month	Title of the Paper: Differential geometry	No.of classes
Aug	Unit-1: Calculus on Euclidean Space: Euclidean space. Natural coordinate functions. Differentiablefunctions. Tangent vectors and tangent spaces. Vector fields. Directional derivatives and theirproperties. Curves in E₃. Velocity and speed of a curve. Reparametrization of a curve. 1-forms andDifferential forms. Wedge product of forms. Mappings of Euclidean spaces. Derivative map.	13
Sep	Unit-2: Frame Fields: Arc length parametrization of curves. Vector field along a curve. Tangent vector field, Normal vector field and Binormal vector field. Curvature and torsion of a curve. TheFrenet formulas Frenet approximation of unit speed curve and Geometrical interpretation. Properties of plane curves and spherical curves. Arbitrary speed curves. Cylindrical helix Covariant derivativesand covariant differentials. Cylindrical and spherical frame fields. Connection forms. Attitude matrix.Structural equations. Isometries of E₃- Translation, Rotation and Orthogonal transformation. Thederivative map of an isometry.	13
Oct	Unit -3: Calculus on a Surface: Coordinate patch. Monge patch. Surface in E₃. Special surfaces –sphere, cylinder and surface of revolution. Parameter curves, velocity vectors of parameter curves,Patch computation. Parametrization of surfaces-cylinder, surface of revolution and torus. Tangent vectors, vector fields and curves on a surface in E₃. Directional derivative of a function on a surface of E₃. Differential forms and exterior derivative of forms on surface of E₃. Pull back functions on surfaces of E₃.	15
Nov - Dec	Unit-4: Shape Operators: Definition of shape operator. Shape operators of sphere, plane, cylinder and saddle surface. Normal curvature, Normal section. Principal curvature and principal direction. Umbilic points of a surface in E₃. Euler's formula for normal curvature of a surface in E₃. Gaussian curvature, Mean curvature and Computational techniques for these curvatures. Minimal surfaces. Special curves in a surface of E₃- Principal curve, geodesic curve and asymptotic curves. Special surface - Surface of revolution.	13

BANGALORE CITY COLLEGE

Details of the lesson plan III semester

Department : Mathematics

Name of the faculty: Dr. P.M Balagondar

Month	Title of the Paper: Fluid mechanics	No.of classes
Aug	Unit-1: Coordinate transformations: Cartesian tensors - Basic Properties – Transpose - Symmetric and Skew tensors - Isotropic tensors - Deviatoric Tensors - Gradient, Divergence and Curl of a tensor field- Integral Theorems.Continuum Hypothesis: Configuration of a continuum - Mass and density - Description of motion -Material and spatial coordinates - Material and Local time derivatives- Stream lines - Path lines -Vorticity and Circulation - Examples. Transport formulas - Strain tensors - Principal strains, Strain-rate tensor- Stress components and Stress tensor - Normal and shear stresses - Principal stresses.	8 8
Sep	Unit-2: Fundamental basic physical laws: Law of conservation of mass - Principles of linear and angular momenta - Balance of energy Examples.6Hrs. Motion of non-viscous fluids: Stress tensor- Euler equation- Bernoulli's equation- simple consequences-Helmholtz vorticity equation - Permanence of vorticity and circulation - Dimensional analysis - Nondimensional numbers.	6
Oct	Unit-3: Motion of Viscous fluids: Stress tensor - Navier-Stokes equation - Energy equation -Simple exact solutions of Navier-Stokes equation (i) Plane Poiseuille and Hagen-Poiseuille flows (ii) Generalized plane Couette flow (iii) Steady flow between two rotating concentric circular cylinders (iv) Stokes's first and second problems. Diffusion of vorticity - Energy dissipation due to viscosity.	13
Nov - Dec	Unit-4: Two dimensional flows of inviscid fluids: Meaning of two-dimensional flow -Stream function - Complex potential - Line sources and sinks - Line doublets and vortices - Images - Milne-Thomson circle theorem and applications - Blasius theoremand applications.	13

BANGALORE CITY COLLEGE

Details of the lesson plan III semester

Department : Mathematics   Name of the faculty: Shakil Ahamed

Month	Title of the Paper: Functional analysis	No.of classes
Aug	**Unit-1**: Normed linear spaces. Banach Spaces : Definition and examples. Quotient Spaces. Convexity of the closed unit sphere of a Banach Space. Examples of normed linear spaces which are not Banach. Holder's inequality. Minkowski's inequality. Linear transformations on a normed linear space and characterization of continuity of such transformations.10 Hrs. The set B(N,N') of all bounded linear transformations of a normed linear space N into normed linear space N'. Linear functionals, The conjugate space N*. The natural imbedding of N into N**. Reflexive spaces.	4
Sep	**Unit-2**: Hahn - Banach theorem and its consequences, Projections on a Banach Space. The open mapping theorem and the closed graph theorem. The uniform boundedness theorem. The conjugate of an operator, properties of conjugate operator.	12
Oct	**Unit-3**: Inner product spaces, Hilbert Spaces: Definition and Examples. Schwarz's inequality. Parallelogram Law, polarization identity. Convex sets, a closed convex subset of a Hilbert Space contains a unique vector of the smallest norm. Orthogonal sets in a Hilbert space. Bessel's inequality. orthogonal complements, complete orthonormal sets, Orthogonal decomposition of a Hilbert space. Characterization of complete orthonormal set. Gram-Schmidt orthogonalization process.	7
Oct	**Unit-4**: The conjugate space H* of a Hilbert space H. Representation of a functional f as f(x)=(x, y) with y unique. The Hilbert space H*. Interpretation of T* as an operator on H. The adjoint operator T* on B (H). Self-adjoint operators, Positive operators. Normal operators. Unitary operators and their properties.	6
Nov - Dec	Projections on a Hilbert space. Invariant subspace. Orthogonality of projections. Eigen values and eigen space of an operator on a Hilbert Space. Spectrum of an operator on a finite dimensional Hilbert Space. Finite dimensional spectral theorem.	7

BANGALORE CITY COLLEGE

Details of the lesson plan III semester

Department : Mathematics   Name of the faculty: Shakil Ahamed

Month	Title of the Paper: Functional analysis	No.of classes
Aug	Unit-1: Normed linear spaces. Banach Spaces : Definition and examples. Quotient Spaces. Convexity of the closed unit sphere of a Banach Space. Examples of normed linear spaces which are not Banach. Holder's inequality. Minkowski's inequality. Linear transformations on a normed linear space and characterization of continuity of such transformations.10 Hrs.	
	The set B(N,N') of all bounded linear transformations of a normed linear space N into normed linear space N'. Linear functionals, The conjugate space N*. The natural imbedding of N into N**. Reflexive spaces.	4
Sep	Unit-2: Hahn - Banach theorem and its consequences, Projections on a Banach Space. The open mapping theorem and the closed graph theorem. The uniform boundedness theorem. The conjugate of an operator, properties of conjugate operator.	12
Oct	Unit-3: Inner product spaces, Hilbert Spaces: Definition and Examples, Schwarz's inequality. Parallelogram Law, polarization identity. Convex sets, a closed convex subset of a Hilbert Space contains a unique vector of the smallest norm. Orthogonal sets in a Hilbert space. Bessel's inequality. orthogonal complements, complete orthonormal sets, Orthogonal decomposition of a Hilbert space. Characterization of complete orthonormal set. Gram-Schmidt orthogonalization process..	7
Oct	Unit-4: The conjugate space H* of a Hilbert space H. Representation of a functional f as f(x) = (x, y) with y unique. The Hilbert space H*. Interpretation of T* as an operator on H. The adjoint operator T* on B (H). Self-adjoint operators, Positive operators. Normal operators. Unitary operators and their consequences, properties.	6
Nov - Dec	Projections on a Hilbert space. Invariant subspace. Orthogonality of projections. Eigen values and eigen space of an operator on a Hilbert Space. Spectrum of an operator on a finite dimensional Hilbert Space. Finite dimensional spectral theorem	7
		6

BANGALORE CITY COLLEGE

Details of the lesson plan III semester

Department : Mathematics   Name of the faculty: R.Radhabai

Month	Title of the Paper: Linear Algebra	No.of classes
Aug	Recapitulation: Vector Spaces, Subspaces, Linear Combinations and Systems of Linear Equations. Linear dependence and independence, Basis and Dimension, Maximal linearly independence subsets, Direct sums, Linear transformation, Linear Operators.	4
Aug	Unit-1: Algebra of Linear transformations, Minimal polynomials, Regular and singular transformation. Range and rank of a transformation and its properties, characteristic roots and characteristic vectors.	8
Sep	Unit-2: The matrix representation of a linear transformation, Composition of a linear transformation and matrix multiplication, The change of coordinate matrix, transition matrix, The dual space.	6
Sep	Unit-3: Characteristic polynomials, Diagonalizability, Invariant subspaces. Cayley-Hamilton theorem.	6
Oct	Unit-4: Canonical Forms: Triangular canonical form, Nilpotent transformations, Jordan canonical forms. The rational canonical form.	8
Oct	Unit-5: Inner Product Spaces, Orthogonal complements, Gram-Schmidt orthonormalization process 6 Hrs.	6
Nov	Unit-6: Positive Definite Matrices, Maxima, minima and saddle points, Tests for positive definiteness, Singular value Decomposition and its applications.	
Nov - Dec	Unit-7: Bilinear forms, symmetric and skew-symmetric bilinear forms, real quadratic forms, rank and signature, Sylvester's law of inertia.	6

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Details of the lesson plan III semester

Department : Mathematics   Name of the faculty: Dr.P.M. Balagondar

Month	Title of the Paper: Numerical analysis II	No.of classes
Aug	Unit-1: Examples from ODE where analytical solution are difficult or impossible. Examples from PDE where analytical solution are difficult or impossible.	4
Sep	Numerical solution of ordinary differential equations: Initial value problems: Picard's and Taylor series methods. Euler's and Modified Euler's methods, Runge-Kutta methods of second and fourth order, Runge-Kutta-Fehlberg methods, Multistep methods - the Adams-Bashforth and Adams-Moulton predictor-corrector methods. Local and global errors,	10
Oct	stability analyses for the above methods. Methods for systems and higher orderdifferential equations. Boundary value problems: Shooting methods and cubic spline methods.	12
Oct	Unit-2: Numerical solution of partial differential equations: Elliptic equations: Difference schemes Hyperbolic equations: Difference methods for one-dimension-explicit and implicit schemes.	
Nov	D'Yakonov split and Lees alternating direction implicit methods for two-dimensional equations. Stability and convergence analyses for the above equations.	13

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Details of the lesson plan IVsemester

Department : Mathematics   Name of the faculty: Shakil Ahamed

| Month	Title of the Paper:Measure and Integration	No.of classes
fEB Mar	Unit-1: Algebra of sets, sigma algebras, open subsets of real line, F and G sets, Borel sets (Lebesgue) Outer measure of a subset of R, existence, non-negativity and monotonicity of Lebesgueouter measure, Relation between Lebesgue outer measure and length of an interval; Countable subadditivity of Lebesgue outer measure; translation invariance. (Lebesgue) measurable sets,(Lebesgue) measure, Complement, union, intersection and difference of measurable sets, denumerableunion, and intersection of measurable sets	14
Mar	Unit-2: Countable additivity of measure; The class of measurable sets as an algebra, sigma-algebra, the measure of the intersection of a decreasing and increasing sequence of measurable sets; measures of limit superior, limit inferior of sequences of measurable sets. Measurable functions: Scalar multiple, sum, difference, and product of measurable functions.	10
Apr	Unit-3: Measurability of a continuous function and measurability of a continuous image ofmeasurable function. Convergence pointwise and convergence in measures of a sequence ofmeasurable functions. Lebesgue Integral: Characteristic function of a set, simple function, Lebesgue integral of a simple function, Lebesgue integral of a bounded measurable function, Lebesgue integral and Riemann integral of a bounded function defined on a closed interval; Lebesgue integral of a non-negative function; Lebesgue integral of a measurable function, Properties of Lebesgue integral.	14
May	Unit-4: Convergence theorems and Lebesgue Integral; The bounded convergence theorem, Fatou's lemma, Monotone convergence theorem, Lebesgue convergence theorem. Differentiation of monotone functions: Vitali covering lemma, Functions of bounded variation, Differentiability of an integral, Absolute continuity and indefinite integrals.	14

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Details of the lesson plan IV semester

Department : Mathematics   Name of the faculty: Dr.P.M. Bala gondar

Month	Title of the Paper: Mathematical Methods	No.of classes
Feb - Mar	Unit-1: Integral Transforms: General definition of integral transforms, Kernels, etc. Development of Fourier integral, Fourier transforms - inversion, Illustration on the use of integral transforms, Laplace, Fourier, Hankel transforms to solve ODEs and PDEs - typical examples. Discrete orthogonality and Discrete Fourier transform. Wavelets with examples, wavelet transforms.	14
Mar	Unit-2: Integral Equations: Definition, Volterra and Fredholm integral equations. Solution by separable kernel, Neumann's series resolvent kernel and transform methods, Convergence for Fredholm and Volterra types. Reduction of IVPs BVPs and eigenvalue problems to integral equations. Hilbert Schmidt theorem, Raleigh Ritz and Galerkin methods.	14
Apr	Unit-3: Asymptotic Expansions: Asymptotic expansion of functions, power series as asymptotic series, Asymptotic forms for large and small variables. Uniqueness properties and Operations Asymptotic expansions of integrals; Method of integration by parts (include examples where the method fails), Laplaces method and Watson's lemma, method of stationary phase and steepest descent.	12
May	Unit-4: Perturbation methods: Regular and singular perturbation methods: Parameter and co-ordinate perturbations. Regular perturbation solution of first and second order differential equations involving constant and variable coefficients. Include Duffings equation, Vanderpol oscillator, small Reynolds number flow. Singular perturbation problems, Matched asymptotic expansions, simple examples. Linear equation with variable coefficients and nonlinear BVP's. Problems involving Boundary layers. Poincare - Lindstedt method for periodic solution. WKB method, turning points, zeroth order Bessel function for large arguments, solution about irregular singular points.	14
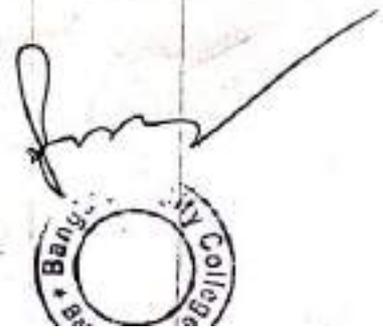
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Details of the lesson plan IV semester

Department : Mathematics   Name of the faculty: Madhu shree M R

Month	Title of the Paper: Special functions	No.of classes
Feb - Mar	Unit-1: Hypergeometric series: Definition – convergence - Solution of second order ordinary differential equation or Gauss equation - Confluent hypergeometric series - Binomial theorem, Integral Representation - Gauss's Summation formula - Chu-Vandermonde Summation formula-Pfaff-Kummer Transformation Formula - Euler's transformation formula.	12
Mar	Unit-2: Basic-hypergeometric series: Definition-Convergence- q– binomial theorem- Heines transformation formula and its q-analogue- Jackson transformation formula- Jacobi's triple product identity and its applications (proof as in ref. 9)- Quintuple product identity (proof as in reference 10)- Ramanujan's 1 ψ1 summation formula and its applications- A new identity for ; - with anapplication to Ramanujan partition congruence modulo 11- Ramanujan theta-function identities involving Lambert series.	14
Apr	Unit-3: q–series and Theta-functions: Ramanujan's general theta-function and special cases- Entries 18, 21, 23, 24, 25, 27, 29, 30 and 31 of Ramanujan's Second note book	12
Apr	Unit-4: Partitions: Definition of partition of a +ve integer- Graphical representation- Conjugate- Self-conjugate- Generating function of p (n)- other generating functions- A theorem of Jacobi- Theorems 353 and 354- applications of theorem 353- Congruence properties of p (n)- p (5n + 4) ≡ 0 (mod 5) andp (7n + 4) ≡ 0 (mod 7).	14
May	Unit-5: Two theorems of Euler- Rogers-Ramanujan Identities-combinatorial proofs of Euler's identity, Euler's pentagonal number theorem- Franklin combinatorial proof. Restricted partitions- Gaussian. (portion to be covered as per Chapter-XIX of 'An Introduction to the Theory of Numbers' written by G. H. Hardy and E. M. Wright)	12

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Details of the lesson plan IV semester

Department : Mathematics

Name of the faculty: Dr.P.M .Balagondar

Month	Title of the Paper:	No.of classes
Feb -Mar	Unit-1: Electrodynamics: Electrostatics and electromagnetic units – derivation of Gauss law- Faraday's law- Ampere's law and solenoidal property- conservation of charges-electromagnetic boundary conditions. Dielectric materials.	13
Mar	Unit-2: Basic Equations: Derivation of basic equations of MHD - MHD approximations - Non-dimensional numbers – Boundary conditions on velocity, temperature and Magnetic field. Classical MHD: Alfven's theorem - Frozen - in - phenomenon - illustrative examples - Kelvin's circulation theorem-Bernoulli's equations - Analogue of Helmholtz vorticity equation-Ferraro's law of isorotation.	13
Apr	Unit-3: Magnetostatics: Force free magnetic field and important results thereon-Illustrative examples on abnormality parameter-Chandrasekhar's theorem-Bennett pinch and instabilities associated with it. Alfven waves: Lorentz force as a sum of two surface forces- cause for Alfven waves-applications. Flow Problems: Hartmann flow- Hartmann–Couette flow- Temperature distribution for these flows.	14
May	Unit-4: Alfven wave equations in incompressible fluids- equipartition of energy - experiments on Alfven waves-dispersion relations - Alfven waves in compressiblefluids- slow and fast waves- Hodographs.	12

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Details of the lesson plan IV semester

Department : Mathematics   Name of the faculty: Radhabai & Maya

Month	Title of the Paper:	No.of classes
Feb -Mar	Graph Theory (Recapitulation): Graph, subgraphs, spanning and induced subgraph, degree, distance, standard graphs, Graph isomorphism. Unit-1: Connectivity: Cut-vertex, Bridge, Blocks, Vertex-connectivity, Edge-connectivity and some external problems, Mengers Theorems, Properties of n-connected graphs with respect to vertices and edges.	10
Mar	Unit-2: Planarity: Plane and Planar graphs, Euler Identity, Non planar graphs, Maximal planar graph Outer planar graphs, Maximal outer planar graphs, Characterization of planar graphs, Geometric dual, Crossing number.6 Hrs.	6
Apr	Unit-3: Colorability: Vertex Coloring, Color class, n-coloring, Chromatic index of a graph, Chromatic number of standard graphs, Bichromatic graphs, Colorings in critical graphs, Relation between chromatic number and clique number/independence number/maximum degree, Edge coloring, Edge chromatic number of standard graphs Coloring of a plane map, Four color problem, Five color theorem, Uniquely colorable graph. Chromatic polynomial.	12
Apr	Unit-4: Matchings and factorization: Matching - perfect matching, augmenting paths, maximum matching, Hall's theorem for bipartite graphs, the personnel assignment problem, a matching algorithm for bipartite graphs, Factorizations, 1-factorization, 2-factorization. Partitions-degree sequence, Havel's and Hakimi algorithms and graphical related problems.	14
Apr	Unit-5: Domination concepts and other variants: Dominating sets in graphs, domination number of standard graphs, Minimal dominating set, Bounds of domination number in terms of size, order, degree, diameter, covering and independence number, Domatic number, domatic number of standard graphs.	12
May	Unit-6: Directed Graphs: Preliminaries of digraph, Oriented graph, indegree and outdegree, Elementary theorems in digraph, Types of digraph, Tournament, Cyclic and transitive tournament, Spanning path in a tournament. Tournament with a hamiltonian path, strongly connected tournaments. 6 Hrs	6

BANGALORE CITY COLLEGE

M.A. ENGLISH

MONTH	BRITISH LITERATURE SYLLABUS
FEB	UNIT-I PROSE-THE SOCIAL NOVEL Dickens-Oliver Twist Swift-Gulliver's Travels[on the land of Laputa] Hopkins-The windhover T.S.Eliot- The Wasteland
MAR	Austen- Pride and Prejudice J.M. Synge-Riders to the Sea V. Woolfe-A Room of One's Own Sylvia Plath-Daddy Thomas Hardy- Life's Little Ironies
APRIL	Charlotte Bronte-Jane Eyre Owen-Dulce et Decoram est W.B:Yeast-The Second Coming. Easter-1916. Joyce-Chapter 1 from Ulysses.
MAY	Emily Bronte-Wuthering Heights Seamus Heaney- Digging Ted Hughes-The Thought Fox.

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M.A. ENGLISH

MONTH	GENDER STUDIES SYLLABUS
FEB	PROBLEMATISING GENDER Key concepts Body, Post Feminism, Queer theory. Men's Movement, Shikandin Story from The Mahabaratha, Rajasthan Folk Tale
MAR	Gay studies, Lesbianism, Stereotype. Judith Butler: from Gender Trouble Ismat Chugtai: The Quilt, Ambedkar:The Hindu Code Bill. The Supreme court judgement on sexual harassment. Monto's Partition-story on rape "Open it". A chapter from Radha Kumar's The Women's Movement in India.
APRIL	Identity politics, Pornography. Violence. Nivedita Menon: How Natural is Normal?, Dostadna. Extracts from Ammu Joseph's Book on Sensation, Extract from Uma Chakravarthy's Gendering cast.
MAY	Shakespeare's Sonnets A Revathi: extract from a self-narrative. Repeal of 377: Ruling by the Delhi Highcourt of India.

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M.A. ENGLISH

MONTH	INDIAN LITERATURE IN ENGLISH SYLLABUS
FEB	Vachanas: Basavanna, Akka Mahadevi Bankim Chandra: Anandmadh O.Chandu Menon: Indulakha Karnad: Tale Danda
MAR	Sangam poetry: Selection from Ramanujan's poems of Love and War Bhishm Sahni: Tamas Patriotic poems by Bharathi, Iqbal U.R.Ananthamurthy: Samaskara Mahaswetadevi: Rudali
APRIL	Women poet in the Bhakthi Movement: Selection from women writing in India Bama: Karukku Basheer: The Card- Sharper's daughter
MAY	Abhuri Chaya Devi: Bonsai Life Selection from Modern Indian poetry. Ed by Vinay Dharwarkar.

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M.A. ENGLISH

MONTH	EUPOPEAN CLASSICS REVISITED SYLLABUS
FEB	Zola: Nana Hugo; Extracts from The Hunchback of Notre Dame Ibsen: Ghosts Kafka: The Trial Simone de Beauvoir: Chapter 1 of The Second Sex
MAR	Dostoevsky: The Brothers Karamazod Tolstoy: Film text of Anna Karenina Nietzsche: Thus spake Zarathustra
APRIL	Pirandello: Six Character in search of an Author Brecht: The Caucasian Chalk Circle Camus: The Outsider
MAY	Akhmatova: The Requiem Singer: Gimpel the Fool

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M.A. ENGLISH

MONTH	AMERICAN LITERATURE SYLLABUS
FEB	Ezra Pound: In a Station of the Metro, The River- Merchant's Wife: A Letter. Robert Frost: The Mending Wall, Birches. Arthur Miller- Death of a Salesman
MAR	E.E.Cumming: I(a Robert Frost: The Road Not Taken Wallace Stevens: Anecdote of the Jar, Of Modern Poetry Tennessee Williams: A Street Car Named desire
APRIL	Marianna Moore: Poetry Anne Sexton: Sylvia's death Allen Gilsberg: A Supermarket in California Ernest Hemmingway: The Old Man and the Sea
MAY	Maya Angelou: I Know Why The Caged Bird Sings F. Scott Fitzgerald: The Great Gatsby

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M.A. ENGLISH

MONTH	COMMUNICATIVE ENGLISH SYLLABUS
FEB	Unit.1- English sentence analysis Basic Sentence Pattern, Noun PHRASE, verb Phrase, Adverbials, Finite and Non-finite Clauses, Passives, Co-ordination and Subordination of Clauses, Sentence types and Sentence functions.
MAR	UNIT-II Writing Skills Discourse Types-Narration,Description, Exposition and Argument, Discourse Organization-organising information within a clause,organising information between clauses. Abstracting and Summarising Note Taking
APRIL	Strategies for the writing process. Generating ideas through pre-writing-free writing, Brain storming, Clustering, Branching, Idea Mapping, Maintaining a Journal- Getting the message across- audience, purpose, subject, time and place. Process of Writing- Planning and Research, Writing, Drafting, Revising, Editing.
MAY	Written Communication Paragraph Writing, Report Writing, Curriculum Vitae and Cover-letters, Memos, Letters, Notes, Circulars, Reference Skills.

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M.A. ENGLISH

MONTH	LITERARY CRITICISM AND CRITICAL READING SYLLABUS
FEB	UNIT I TERMS AND CONCEPTS Absurd, Carnival, Existentialism. Essentialism. Gender and Sexuality. Arnold: The study of Poetry. The future of Poetry…for its end, Indeed there can be no more…substance and matter. Herbert Reed: The Nature of Criticism.
MAR	Hegemony, Marxist Criticism. Nationalism. Semiotics, Subaltern. T.S.ELIOT: Tradition and the Individual Talent.
APRIL	Structuralism, Stereotype, Audience. Copywrite. Masscommunication. I.A.Richards: The Fourkinds of Meaning.
MAY	Popular Culture, Media Studies. World Wide Web. Discourse, Post Structuralism. Virginia Woolfe : Modern Fiction.

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M.A. ENGLISH

MONTH	POST COLONIAL STUDIES IV SYLLABUS
FEB	Abrogation, Appropriation, Contrapuntal reading, Cartography Language: The Language of African Literature- Ngugi wa Thiong'o The Fact of Blackness- Frantz Fanon Anthilla of the savannah- Chinua Achebe
MAR	Cultural diversity/ Cultural difference, Decolonisation, Ethnography, Globalization Postcoloniality and the artifice of History- Deepesh Chakravarthy Writing in colonial –Dennis Lee Telephone conversation- Wole Soyinka
APRIL	Subaltern, Miscegenation, Nativism, Neo-colonialism Minute on Indian Education- Thomas Macaulay The Beginning of English Literary Study in British India- Gauri Vishwanathan, The 16th Century atlas
MAY	Postcolonial Reading, Fanonism, Transculturation Can the subaltern speak?-Gayathri C. Spivak Dopdi- Mahasweta Devi Extract from Why I am not a Hindu- Kancha Illiah

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M.A. ENGLISH

MONTH	LITERARY AND CULTURAL STUDIESSYLLABUS
FEB	Civil Society, cultural Industry, Ethnography. Children literature: harry potter and the philosopher's stone by J.K. Rowling Queer Identities in south Asia by Aravind Narain Conclusion in culture and society by Raymond Williams
MAR	Institution, life-world, Meritocracy. The Legend of loftus hall by Rick Welam The Demon lover by Elizabeth Bowen Seven steps around the fire by Mahesh Dattani
APRIL	Power, popular music, television. subjectivity. Bombay and Tamanna film text by Clippings The work of Art in the age of Mechanical production.
MAY	The Question of cultural identity by Stuart Halls.

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M.A. ENGLISH

MONTH	LITERARY AND CULTURAL STUDIESSYLLABUS
FEB	Civil Society, cultural Industry, Ethnography. Children literature: harry potter and the philosopher's stone by J.K. Rowling Queer Identities in south Asia by Aravind Narain Conclusion in culture and society by Raymond Williams
MAR	Institution, life-world, Meritocracy. The Legend of loftus hall by Rick Welam The Demon lover by Elizabeth Bowen Seven steps around the fire by Mahesh Dattani
APRIL	Power, popular music, television, subjectivity. Bombay and Tamanna film text by Clippings The work of Art in the age of Mechanical production.
MAY	The Question of cultural identity by Stuart Halls.

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M.A. ENGLISH

MONTH	MODERN LINGUISTICS SYLLABUS
FEB	Phrase structure grammar Chomsky- Transformational Generative Grammar Competence and Performance Generative Grammar Grammaticality X-Bar syntax S-Structure and D- Structure Transformations
MAR	Halliday: Scale Category Grammar Levels of Language Unit. Structure, Class and System. Rank, Delicacy, and Exponence Sentence and Clause Elements of Clause Structure Nominal, Verbal, and Adverbial groups Systematic Grammar
APRIL	Functions of language Ideational, Interpersonal, Textual Semantics Reference and Sense Sentence, Utterances and Propositions Synonymy, Antonymy, Hyponymy and Polysemy
MAY	Macro linguistics Cohesion and coherence-Text and Discourse Discourse structure- Relations and Functions Speech Act Theory Conversations Analysis Pragmatics Presupposition Conversational Implicature

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M.A. ENGLISH

MONTH	TEACHING ENG LANGUAGE AND LITERATURE SYLLABUS
FEB	UNIT 1- Teaching Literatures in English English Studies in India- The shift from English Literatures from Literatures in English, Objective- Literary Sensibility, Literary competence, Need and Significance of Learning Language and Literature. Aims-Utilitarian, Cultural and Literary. Teaching various Literary Genres - poetry, drama, prose. Novel, Grammar.
MAR	UNIT-II-TESTING AND EVALUATION The need for Evaluation, Characteristics of a Test and types of Tests, Difference between Test and Evaluation. Nature of Evaluating Teaching Materials, Testing Skills –Criteria.
APRIL	UNIT-III TECHNIQUES OF TEACHING AND LEARNING, USE OF MULTIMEDIA RESOURCES AND IMPROVISATION IN CLASSROOM INSTRUCTION Use of Computers- Internet, Advantage of using Software, Significance of Websites, Power point Presentation; Language Laboratory, Professional competence-Seminars, Conference, Workshop, Action Research, Importance and uses of Literary activities in language techniques.
MAY	UNIT-IV PRACTICE TEACHING Designing a Lesson Plan for a topic and discussing lessons in the light of stated objectives, Observing classroom practice. teaching different groups of students, Concept of Feedback.

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M.A. ENGLISH

MONTH	CRITICAL THEORY IV SYLLABUS
FEB	Terry Eagleton: extract from The Significance of Theory Wolfgang Iser: Indeterminancy and the Reader's Response
MAR	Helene Cixous: The Laugh of the Medusa Roland Barthes: From Work to Text
APRIL	Foucault: Scientia Sexualis
MAY	Raymond Williams: Introduction to Key terms.

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I SEM, B.A.OPTIONAL ENGLISH

MONTH	BRITISH LITERATURE & FACETS OF LANGUAGE SYLLABUS
JULY	The Medieval Age: Geoffrey Chaucer – The Squire The Origins of Essay: Francis Bacon – Of parents and children Facets of language: Language
AUG	The Elizabethan age: Edmund Spencer – Sonnet 54 William Shakespeare – sonnet 65 The periodical Essay : Joseph Addison – Silence Facets of language : Speech Sounds in English
SEP	Metaphysical poetry: John Donne – The Sunne Rising George Herbert – The Temper Andrew Marvell – To His Coy Mistress Dr. Samuel Johnson – Extract from Preface to Shakespeare Facets of language: The Structure of Words
OCT	The Neoclassical Age: Alexander pope – An extract from An Essay on Criticism Oliver Goldsmith – Sights and Monsters Drama: Shakespeare Macbeth

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II SEM, B.A OPTIONAL ENGLISH

MONTH	BRITISH LITERATURE & FACETS OF LANGUAGE SYLLABUS
JAN	The Age of Transition : William Blake – Holy Thursday The Personal Essay: Charles Lamb – The Praise of Chimney Sweepers Facets of Language – The Structure of Sentences
FEB	The Romantic Age: William Wordsworth – Three years she grew in Sun and Shower William Hazlitt – On the Feelings of Immortality in youth Facets of Language – Discourse
MARCH	Samuel Taylor Coleridge –Frost at Midnight Lord Byron – On This Day I Complete My Thisty-Sixth year Percy Bysshe Shelley – Extract From A Defence of Poetry Novel: Jane Austen – Emma
APRIL	Percy Bysshe Shelley – To a Skylark John Keats – Ode to a Nightingale Mary Wollstonecraft – Extract from A Vindication of the Rights of Women Novel – Emma.

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III SEM, B.A. OPTIONAL ENGLISH

MONTH	BRITISH LITERATURE, AMERICAN LITERATURE & FACETS OF LANGUAGE SYLLABUS
JULY	The Victorian Age: From in Memoriam – Ring Out, Wild Bells, to the wild sky Robert Browning – Porphyria's Lover D.H. Lawrence –Odour of Chrysanthemums Facets of language – Negotiating Discourse : speech and writing Introduction
AUG	Elizabeth Barrett Browning – Extract from Aurora leigh Gerard Manley Hopkins – Thou art indeed, Just, Lord R.L. Stevenson – An Apology for Idlers Facets of language – speech and writing
SEP	Modernism and Modern Poetry:– W.B. Yeats – A Prayer for my Daughter W.H. Auden The Shield of Achilles Charles Dickens – Hard Times
OCT	T.S. Eliot – The Function of Criticism Virginia Woolf – Extract from A Room of One's Own Facets of Language – Tenor and Domain Novel – Hard Times.

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IV SEM, B.A. OPTIONAL ENGLISH

MONTH	AMERICAN LITERATURE & FACETS OF LANGUAGE SYLLABUS
JAN	A Brief Introduction to American Literature Transcendentalism: Walt Whitman – I Have Said that the soul is not more than the body. Emily Dickinson – I measure every grief I meet Nathaniel Hawthorne – The Minister's Black veil
FEB	Robert Frost – After apple Picking Wallace Stevens – Of Modern Poetry Philip Roth – Defender of Faith Frederick Douglass – The Narrative of the Life of Frederick Douglass Facets of language – Stylistic Analysis Introduction to Style
MAR	African – American Literature Langston Hughes – Freedom Train Maya Angelou – And Still I Rise A short History of the Native Americans: Chief Seattle – speech Novel – Tennesse William The Glass Menagerie
APRIL	Thoreau – Extract from Civil Disobedience Novel – The Glass Menagerie Facets of Language – stylistic Analysis : A Framework

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V SEM, B.A. OPTIONAL ENGLISH (PAPER VII)

| MONTH	LITERATURE OF INDIA: AN INTRODUCTION SYLLABUS
FEB	Nissim Ezekiel: Poet, Lover, Birdwatcher KekiDaruwala : The King Speaks to the Scibes Short story in Malayalam : O.V. Vijayan – After Hanging Essays : Sudhirkakar – Sita : The ego-ideal
MAR	Kabita Sinha : Eve Speaks to God K. Satchidanandan : Gandhi and Poetry Literature of North- Eastern India TemsulaAo – The jungle Major Drama : Mahesh Dattani – Dance like a man
APRIL	ChandrashekaraKambar – The Fiend of folktales Dalit Literature : JyothiLanjewar – Mother Gita Hariharan – The Remains of the Feast Rajeshwari sunder Rajan– Language Debate
MAY	Mahesh Dattani –Dance like a Man Novel – Mahaswetha Devi – Mother of 1084 Revision

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VI SEM, B.A. OPTIONAL ENGLISH (PAPER VIII)

MONTH	EUROPEAN AND NON-EUROPEAN WRITING SYLLABUS
FEB	Postcolonial Literature and Criticism : Pablo Neruda –I am Explaining a few things Australian poetry : A.D .Hope – Australia Katherine Mansfield : The Garden Party LITERARY CRITICISM : Theory and concepts Postcolonial criticism – Extract from Hans Bertens Literary Theory The Basic
MAR	CANDIAN POETRY : Margaret Atwood – Helen of troy does countertop Dancing Pakistani poetry: ZulfikarGhose – This landscape. These People Latin American Literature : Gabriel Garcia Marquez – Avery old man with Enormous wings Robert Cross – A post-Colonial Reading of Lagaan
APRIL	African poetry: Gabriel okara – You Laughed and Laughed and Laughed Poetry of South Asia: Yasmine Gooneratne – On an Asia poet Fallen Among American Translators
MAY	Latin American literature : Jorge Luis Borge – The gospel According to Mark Novel : Chinua Achebe – No Longer at Ease Jean Rhys – Wide Sargasso Sea revision
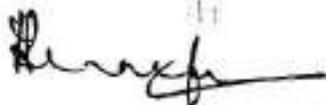
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Bangalore City College
B.A Journalism/B.COM/BBA/BBA-A additional English-II Semester
Lesson Plan 2019

Month	Syllabus
January	1) Lesson 1 " A Door " Reading Act/About Explanation and Notes
February	2) Lesson 2 "The Tell-Tale Heart" About the Author/Reading Explanation and notes
March	1) Lesson 3 "The dead man who wore Pajjamas": About the author Reading/Explanations and notes 2) Lesson 4 "On Travel by train" About the author reading/Explanation and notes. 3) Lesson 5 "The Obligations to Endure " About the Poet / Reading Explanation and notes 4) Poem "IF" about the poet/ Reading explanation and notes
April	1) Poem "Just keep quite and Nobody will Notice" About the poet/ reading/Explanations and notes 2) Grammar Do as Direct and Prefix Suffix Idioms Degree of comparison 3) Hyponyms and super ordinate 4) Drafting "Brochure" "Leaf Lets" and Invitations"
May	1) Revisions

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Bangalore City College
B.Com/BBA English-II Semester
Lesson Plan 2019

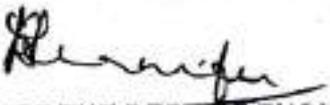| Month	Syllabus
January	1) Introduction on basic grammar (Language skills and parts of speech) 2) Lesson 1 money language activity of clauses(In sensitive formation) 3) Explanation on the clauses and types of clause. 4) Detail explanation of clauses, verbs and adverbs, adjective and noun clause.
February	1) Lesson 2 The toys of peace 2) Grammar speech and its parts. 3) Letter writing 4) Making enquiries 5) Sentence patterns 6) Quotations
March	1) Lesson 3 Alone 2) Synthesis of sentences 3) Simple sentences and compound sentences with exercise 4) Lesson no. 4 cartooning 5) Language activity (reported speech)
April	1) Homeless in global village 2) Language activity transformation of sentences 3) Ascertain sentences and interrogative sentences 4) Lesson 6 Rule Britannia- Kamala Das 5) Language Activity precise writing 6) Patterns of letter writing 7) Caged bird (Poem 7)
May	1) Language Activity 2) Transformation of sentences Part II 3) Lesson 8 The wall 4) Extended Reading

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B.SC/BCA English-II Semester
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Month	Syllabus
January	1) Poem 1 The Earth never dies 2) Grammar(Listening Skills) 3) Types of listening skills and English speaking skills
February	1) Lesson 2 the adventure of the three students 2) Grammar question forms 3) Lesson 3 The death of government clerk 4) Tenses and its types
March	1) Grammar present simple and present program forms of verb 2) Lesson 4 Ignorance Isn't Bliss 3) Language activity (Passive verb forms) 4) Lesson5 The Bonds of friendship 5) Reading skills
April	1) Inferential and factual reading 2) Lesson 6 A corps in the well 3) Language activity types of letter writing 4) Lesson 7 Refuge 5) Reported speech 6) Changes in pronoun
May	1) Writing skills 2) Lesson 8 Its time to call the Bluff 3) Writing a review 4) Spelling/punctuations 5) Lesson 9 The Kannada English combat 6) Extended Reading

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Bangalore City College
BA(Journalism) English-II Semester
Lesson Plan 2019

Month	Syllabus
January	1) Of Mothers, Among other Things 2) Degrees Comparison 3) Types of degrees
February	1) Lesson 2 Worm 2) Remedial grammar adverbs 3) Formation of verbs and sentences 4) Lesson 3 The boy who broke the Ban 5) Vocabulary (Grammar Patterns)
March	1) Direct and indirect speech 2) Lesson 4 two friends 3) Declarative and assertive 4) Imperative and interrogative sentence 5) Lesson 5 the all seeing Blind
April	1) Patterns of letter writing 2) Lesson 6 on Crisis of Civilization 3) Lesson 7 Education
May	1) Lesson 8 Kailash Satyarti's Nobel Award Acceptance speech 2) Extended Readig.

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I SEMESTER
1.3 MANAGEMENT PROCESS

MONTH	SYLLABUS
JUNE	Business - meaning -business and profession, requirements of a successful business- Organisation - meaning - importance of business organisation. Forms of business Organisation-Sole traders, partnership, Joint Hindu family firm - Joint Stock Companies - Cooperative Organisations - Public Utilities and Public Enterprises.
JULY	Nature and Scope of Management process – Definitions of Management – Management: a science or an art? - Scientific Management - Managerial functions and roles – The evolution of Management Theory.
AUGUST	Planning: meaning and purpose of planning - steps in planning - types of planning. Objectives and Policies - Decision making: Process of Decision making - types of Decisions.
SEMPTEMBER	Organising: Types of organisation - Organisationalstructure - span of control - use of staff units and committees. Delegation: Delegation and centralisation - Line and Staff relationship. Staffing: Sources of recruitment - Selection process - training.
OCTOBER	Directing: Nature and purpose of Directing. Controlling: Need for co-ordination - meaning and importance of controls - control process - Budgetary and non-Budgetary controls - Modern trends in Management Process - case studies.

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Department of Commerce and Management
BBA Aviation Management Lesson Plan
I SEMESTER
1.4 FINANCIAL ACCOUNTING

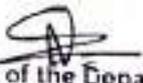| MONTH	SYLLABUS
JUNE	Basic Accounting concepts - Kinds of Accounts – Financial Accounting vs. Cost Accounting - Financial Accounting vs. Management Accounting -Double Entry Book Keeping – Rules of Double Entry System – Preparation of Journal and Ledger Accounts- problems - Subsidiary books - cash book – types of cash book -problems - purchase book - sales book - sales return and purchase return books.
JULY	Trial balance - Errors – types of errors - Rectification of errors – problems - Bank reconciliation statement – problems.
AUGUST	Manufacturing - Trading - Profit & Loss Account - Balance sheet. – Problems with simple adjustments.
SEMPTEMBER	Accounting for non-trading institutions-Income &Expenditure Account- Receipts and Payment Accounts and Balance sheet - Accounting for depreciation – methods of depreciation – problems (straight line method and written down value method only).
OCTOBER	Preparation of accounts from incomplete records. (Theory and problems may be in the ratio of 20% and 80%respectively).

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1.5 MATHEMATICS FOR MANAGEMENT- I

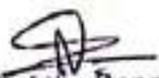| MONTH	SYLLABUS
JUNE	Sets and set operation - Venn Diagrams - Elements of Co-ordinate system. Matrices, Fundamental ideas about matrices and their operational rules – Matrix multiplication - Inversion of square matrices of not more than 3rd order- solving system of simultaneous liner equations.
JULY	Mathematics of Finance and series simple and compound interest - Arithmetic progression - Geometric progression (Simple problems only).
AUGUST	Meaning and Definitions of Statistics - Scope and Limitations. Statistical enquiries - Scope of the problem - Methods to be employed types of enquiries - Presentation of data by Diagrammatic and Graphical Method - Formation of Frequency Distribution.
SEMPTEMBER	Measures of Central tendency - Arithmetic Mean, Median, Mode, Geometric and Harmonicmean, Measures of variation and standard, mean and quartile deviations - Skewness and Kurtoses Lorenx curve, Simple Correlation - Scatter diagram - Karl Pearson's Co-efficient of correlation – Rank correlation - Regression lines.
OCTOBER	Analysis of Time Series: Methods of Measuring - Trend and Seasonal variations - Index number - Unweighted indices - Consumers price and cost of living indices.

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I SEMESTER

1.5 MATHEMATICS FOR MANAGEMENT- I

MONTH	SYLLABUS
JUNE	Sets and set operation - Venn Diagrams - Elements of Co-ordinate system. Matrices, Fundamental ideas about matrices and their operational rules – Matrix multiplication - Inversion of square matrices of not more than 3rd order- solving system of simultaneous liner equations.
JULY	Mathematics of Finance and series simple and compound interest - Arithmetic progression - Geometric progression (Simple problems only).
AUGUST	Meaning and Definitions of Statistics - Scope and Limitations. Statistical enquiries - Scope of the problem - Methods to be employed types of enquiries - Presentation of data by Diagrammatic and Graphical Method - Formation of Frequency Distribution.
SEMPTEMBER	Measures of Central tendency - Arithmetic Mean, Median, Mode, Geometric and Harmonicmean, Measures of variation and standard, mean and quartile deviations - Skewness and Kurtoses Lorenx curve, Simple Correlation - Scatter diagram - Karl Pearson's Co-efficient of correlation – Rank correlation - Regression lines.
OCTOBER	Analysis of Time Series: Methods of Measuring - Trend and Seasonal variations - Index number - Unweighted indices - Consumers price and cost of living indices.

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1.6 ENTREPRENEURSHIP AND PROJECT MANAGEMENT

MONTH	SYLLABUS
JUNE	Meaning of Entrepreneurship - characteristics, functions and types of entrepreneurship - Intrapreneur - Role of entrepreneurship in economic development.
JULY	Factors affecting entrepreneur growth - economic – non-economic. Entrepreneurship development programmes - need - objectives – course contents - phases - evaluation. Institutional support to entrepreneurs.
AUGUST	Project Management: Meaning of project - concepts - categories - project life cycle phases - characteristics of a project – project manager - role and responsibilities of project manager.
SEMPTEMBER	Project identification - selection - project formulation – contents of a project report - planning commission guidelines for formulating a project - specimen of a project report.
OCTOBER	Source of finance for a project - Institutional finance supporting projects project evaluation - objectives - types - methods.

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II SEMESTER
2.3 ORGANISATIONAL BEHAVIOUR

MONTH	SYLLABUS
JANUARY	Importance and scope of organisational psychology – Individual differences - Intelligence tests - Measurement of intelligence - Personality tests - nature, types and uses.
FABRAURY	Perception - Factors affecting perception - Motivation - theories - financial and non-financial motivation - techniques of motivation - Transactional Analysis - Brain storming.
MARCH	Job satisfaction - meaning - factors – theories - Management of job satisfaction - Morale - importance - Employee attitude and behaviour and their significance to employee productivity - job enrichment - job enlargement.
APRIL	Hawthorne Experiment - importance - Group Dynamics - Cohesiveness – Co-operation competition - conflict - Types of Conflict – Resolution of conflict - Sociometry - Group norms - Role - Status – supervision style - Training for supervisions.
MAY	Leadership - types - theories – Trait, Managerial Grid, Fiedder's contingency - Organisational culture, Organisational change - organisational effectiveness – organisational development - counselling and guidance - Importance of counsellor- types of counselling - merits of counselling.

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II SEMESTER
2.4 ECONOMICS FOR EXECUTIVES

MONTH	SYLLABUS
JANUARY	Objectives of business firms - Profit Maximisation - Social responsibilities - Demand analysis - Law of Demand - Elasticity of demand.
FABRAURY	Production function - Factors of production - Laws of diminishing returns and Law of variable proportions - Economics of Scale – Cost and Revenue Curves - Break - even-point analysis.
MARCH	Market structure and prices - Pricing under perfect Competition - Pricing under Monopoly - Price discrimination - Pricing under Monopolistic competition - Oligopoly.
APRIL	Pricing under factors of production; wages - Marginal productivity theory - Interest - Keyne's Liquidity preference theory – Theories of Profit - Dynamic theory of Profit - Risk Theory - Uncertainty theory.
MAY	Government and Business - Performance of public enterprises in India - Price policy in public utilities, Government measures to control Monopoly in India - MRTP Act.

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II SEMESTER

2.5 MATHEMATICS FOR MANAGEMENT- II

MONTH	SYLLABUS
JANUARY	Introduction to Operations Research - Meaning - Scope – Models - Limitation. Linear Programming - Formulation – Application in Management decision making (Graphical method only)
FABRAURY	Transportation (Non- degenerate only) - Assignment problems - Simple Problems only.
MARCH	Game Theory:- Queuing theory - Graphical Solution – mx2 and 2xn type. Solving game by Dominance property - fundamentals - Simple problems only. Replacement problem – Replacement of equipment that detoriates gradually (value of money does not change with time).
APRIL	CPM - Principles - Construction of Network for projects – Types of Floats – Slack- crash programme.
MAY	PERT - Time scale analysis - critical path - probability of completion of project - Advantages and Limitations.

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II SEMESTER

2.6 COST AND MANAGEMENT ACCOUNTING

MONTH	SYLLABUS
JANUARY	Meaning-definition-scope-objectives-function-meritsand demerits of Cost and Management Accounting-distinction between cost, management and financial accounting - Elements of cost- cost concepts and costs classification.
FABRAURY	Preparation of cost sheet-stores control- ECQ-maximum, minimum, reordering levels-pricing of materials issues-FIFO,LIFO,AVERAGE COST,STANDARD PRICE-methods -labour cost- remuneration and incentives.
MARCH	(Problems only) Financial statement Analysis - preparation of comparative and common size statements -analysis and interpretation. Ratio analysis - classification of ratios-liquidity, profitability, solvency – inter firm comparison.
APRIL	Fund flow analysis-cash flow analysis (problems only)
MAY	Standard costing-variance analysis-material and labour variances Marginal Costing-cost volume profit analysis. Budgeting and preparation of various budgets.

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I SEMESTER

1.3 FUNDAMENTALS OF ACCOUNTING

MONTH	SYLLABUS
JUNE	Introduction – Meaning and Definition – Objectives of Accounting – Functions of Accounting – Users of Accounting Information – Limitations of Accounting – Accounting Principles – Accounting Concepts and Accounting Conventions. Accounting Standards –List of Indian Accounting Standards.
JULY	Introduction – Meaning and Definition – Objectives of Accounting – Functions of Accounting – Users of Accounting Information – Limitations of Accounting – Accounting Principles – Accounting Concepts and Accounting Conventions. Accounting Standards –List of Indian Accounting Standards.
AUGUST	Meaning – Significance – Types of Subsidiary Books – Purchases Book – Sales Book – Purchase Returns Book – Sales Return Book – Bills Receivable Book – Bills Payable Book – Cash Book (Simple Cash Book, Double Column Cash Book, Three Column Cash Book and Petty Cash Book) and Journal proper. Bank Reconciliation Statement – Preparation of Bank Reconciliation Statement.
SEMPTEMBER	Preparation of Profit& Loss Account and Balance Sheet(Vertical form). Meaning – Features – Types – Merits – Demerits – Differences between single entry and double entry systems
OCTOBER	Preparation of Opening Statement of Affairs, Closing Statement of Affairs, Computation of Profit/Loss and Revised Statement of Affairs. Conversion of single entry to double entry system.

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I SEMESTER
1.4 BUSINESS ORGANISATION AND ENVIRONMENT

MONTH	SYLLABUS
JUNE	Meaning of Business – Classification of Business Activities – Industry – Types of Industry – Commerce – Trade – Aids to Trade –Meaning – Advantages and Disadvantages.
JULY	Sole Proprietorship – Meaning – Characteristics – Advantages and Disadvantages. Partnership – Meaning – Characteristics – Advantages and Disadvantages - Types of Partners. Co-operative Society - Meaning – Characteristics – Types – Advantages and Disadvantages.
AUGUST	Meaning – Definition – Features – Types of Companies – Formation of a Company.
SEMPTEMBER	Meaning and Importance. Dimensions of Business Environment – Political, Economic, Social, Legal, Natural and Technological Environment.
OCTOBER	Meaning and Importance. Impact of Government policy on business and industry with reference to liberalization, privatization and globalization.

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I SEMESTER
1.5 QUANTITATIVE METHODS FOR BUSINESS – I

MONTH	SYLLABUS
JUNE	Introduction – Natural Numbers - Even Numbers – Odd Numbers – Integers – Prime Numbers – Rational & Irrational numbers, Real Numbers, HCF & LCM (Simple problems.
JULY	Introduction – Meaning – Types of Equations – Simple, Linear and Simultaneous Equations (only two variables) Eliminations and Substitution Method only. Quadratic Equation – Factorization and Formula Method ($ax^2 + bx + c = 0$ form only). Problems on Commercial Application.
AUGUST	Introduction – Arithmetic Progression - Finding the „n^{th} term of an AP and Sum to n^{th} term of AP. Insertion of Arithmetic Means in given terms of AP and representation of 3 terms of AP. Geometric Progression – Finding n^{th} term of GP – Sum to „n"th Term of GP – Insertion of Geometric Means in given Geometric Progression and also representation of 3 terms of GP.
SEMPTEMBER	Introduction, Meaning, types of matrices – operations of addition, subtraction, multiplication of two matrices – problems, transpose of a square matrix. Determinant of a square matrix- minor of an element, co-factor of an element of a determinant. adjoint of a square matrix, singular and non-singular matrices – inverse of a square matrix – Problems on linear equations in two variables using Cramer"s rule.
OCTOBER	Simple interest, Compound interest including half yearly and quarterly calculations, annuities Percentages, bills discounting, concepts of Ratios, duplicate-triplicate and sub-duplicate of a ratio. Proportions, third, fourth and inverse proportion - problems.

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I SEMESTER
1.6 MANAGEMENT PROCESS

MONTH	SYLLABUS
JUNE	Introduction - Meaning, Nature and Characteristics of Management - Scope and functional areas of Management - Management as a Science, Art or Profession - Management & Administration - Principles of management - Social responsibility of Management and Ethics.
JULY	Nature, importance and purpose of planning - Planning process, Objectives - Types of plans (Meaning only) - Decision making – importance & steps.
AUGUST	Nature and purpose of organization, Principles of organization - Types of organization –Departmentation, Committees - Centralization Vs decentralization of authority and responsibility - Span of Control - MBO and MBE(Meaning only) - Nature and importance of staffing.
SEMPTEMBER	Meaning and nature of directing - Motivation theories (Maslow''s, Herzberg, McGregor''s X & Y theory). Leadership – Meaning -Formal and Informal Leadership – Characteristics - Leadership Styles - Autocratic/Dictatorial - Democratic/Participative, Free reign/Laissez faire Leadership Styles
OCTOBER	Communication -Meaning and importance, Barriers to Communication, Types of Communication – Coordination–Meaning, importance and Principles. Meaning and steps in controlling - Essentials of a sound control system - Methods of establishing control (in brief).

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II SEMESTER
2.3 FINANCIAL ACCOUNTING

MONTH	SYLLABUS
JANUARY	Introduction – Need – Policy for Loss of Stock – Steps for ascertaining Fire insurance claim – Treatment of Salvage – Average Clause –Computation of Fire insurance claims.
FABRAURY	Introduction – Meaning – Hire Purchase Act 1972 – Important Definitions – Hire Purchase Agreement – Hire Purchase Price – Cash Price – Hire Purchase Charges – Net Hire Purchase Price – Net Cash Price – Calculation of Interest – Calculation of Cash Price – Journal Entries and Ledger Accounts in the books of Hire Purchaser and Hire Vendor. Installment System – Meaning – Features – Differences between Hire Purchase System and Installment Purchase System (Theory only).
MARCH	Introduction – Meaning – Technical Terms – Royalty – Landlord – Tenant – Minimum Rent – Short Workings – Recoupment of Short Working under Fixed Period – Floating Period – Recoupment within the Life of a Lease – Treatment of Strike and Stoppage of work – Accounting Treatment in the books of Lessee – Preparation of Ledger Accounts – Royalty Account – Landlord Account – Short Workings Account – Minimum Rent Account when Minimum Rent Account is required.
APRIL	Introduction – Need for conversion - Meaning of Purchase Consideration – Mode of Discharge of Purchase Consideration – Method of calculation of Purchase Consideration – Net Payment Method – Net Asset Method – Passing of Journal Entries and Preparation of Ledger Accounts in the books of Vendor – Treatment of certain items – Dissolution Expenses – Unrecorded Assets and Liabilities – Assets and Liabilities not taken over by the Purchasing Company – Contingent liabilities – Non-assumption of trade liabilities – Passing of Incorporation entries in the books of Purchasing Company.
MAY	Meaning of Share, Types of Shares – Preference shares and Equity shares – Issue of Shares at par, at Premium, at Discount, Pro – Rata Allotment – Journal Entries and Bank Accounts – Preparation of Balance Sheet in the Vertical form.

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II SEMESTER
2.4 QUANTITATIVE METHODS FOR BUSINESS - II

MONTH	SYLLABUS
JANUARY	Background and Basic concepts: Introduction – Definition of Statistics – Functions – Scope – Limitations, Classification and Tabulation of Data.
FABRAURY	Introduction – Types of averages – Arithmetic Mean (Simple and Weighted) – Median – Mode – Graphic location of Median and Mode through Ogive Curves and Histogram.
MARCH	Part – 1: Measures of Dispersion : Meaning– Calculation of Absolute and Relative measures of dispersion - Range – Quartile Deviation – Mean Deviation – Standard Deviation and Coefficient of Variation. Part – 2: Measures of Skewness: Meaning of Skewness - Symmetrical &Skewed Distributions- Measures of Skewness - Absolute and Relative Measures of Skewness – Karl Pearson"s Coefficient of Skewness and Bowley"s Coefficient of Skewness.
APRIL	Correlation – Meaning & Definition - Uses – Types – Probable error – Karl Pearson"s & Spearman"s Rank Correlation (Excluding Bi-variate and Multiple correlation). Regression – Meaning and Definition, Regression Equations – Problems.
MAY	Meaning & Definition – Uses – Classification – Construction of Index Numbers – Methods of constructing Index Numbers – Simple Aggregate Method – Simple Average of Price Relative Method – Weighted Index numbers – Fisher"s Ideal Index (including Time and Factor Reversal tests) – Consumer Price Index – Problems

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II SEMESTER
2.5 ORGANISATIONAL BEHAVIOUR

MONTH	SYLLABUS
JANUARY	Organization Behaviour– Definition, Scope and Application in Management - Contributions of other disciplines to OB–Emerging issues in Organizational Behaviour.
FABRAURY	**Personality :**Meaning - Determinants of Personality - Biological factors - Cultural factors - Family and Social Factors - Situational factors -Personality attributes influencing OB, Interactive Behaviour and Interpersonal Conflict. **Perception :**Meaning - Need - Perceptual Process – Perceptual Mechanism - Factors influencing perception. **Attitude:** Meaning of Attitude - Characteristics of Attitude – Components of Attitude - Attitude and Behaviour – Attitude formation, change in attitude and barriers to attitude.
MARCH	Principles of Learning & Reinforcement - Observational Learning - Cognitive Learning - Organizational Behaviour Modification - Steps in Organizational Behaviour Modification process - Organizational Reward Systems
APRIL	Meaning - Types of Groups - Functions of small groups - Group Size Status - Managerial Implications – Group Behaviour - Group Norms - Cohesiveness - Group Think.
MAY	**Organizational Change:** Meaning - Nature of work change - Pressure for change - Change process - Types of change – Factors influencing change - Resistance to change - Overcoming resistance -**Organizational Development–** Meaning and different types of OD interventions

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II SEMESTER
2.6 PRODUCTION AND OPERATIONS MANAGEMENT

MONTH	SYLLABUS
JANUARY	Introduction - Meaning & Definition – Classification - Objectives and Scope of Production and operation Management -Automation: Introduction – Meaning and Definition – Need – Types - Advantages and Disadvantages.
FABRAURY	Introduction – Meaning & Definition - Factors affecting location, theory and practices, cost factor in location - Plant layout principles - space requirement- Different types of facilities, Organization of physical facilities – building, sanitation, lighting, air conditioning and safety.
MARCH	Introduction – Meaning & Definition - Purchasing, Selection of Suppliers, Inventory Management, Material Handling Principles and Practices, Economic Consideration, Criteria for Selection of Materials Handling Equipment, Standardization, Codification, Simplification, Inventory Control, Techniques.
APRIL	Objectives and Concepts, capacity planning, corresponding production planning, controlling, scheduling routing – Quality Control - Statistical Quality Control, Quality Management, Control charts and operating characteristic curves, acceptance sampling procedures, Quality Circle, Meaning of ISO and TQM. Productivity – factors influencing productivity - Concept of Standard Time, Method study, Time and Motion Study, Charts and Diagrams, Work Measurements.
MAY	Introduction – Meaning – Objectives - Types of maintenance, Break down, spares planning and control, preventive routine, relative advantages, maintenance scheduling, equipment reliability and modern scientific maintenance methods - Waste Management - Scrap and surplus disposal, salvage and recovery.

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III SEMESTER
3.2 SOFT SKILLS FOR BUSINESS

MONTH	SYLLABUS
JUNE	Meaning, Importance, Objectives & Principles of Communication, , Process, impediments of effective communication, Strategies for effective communication. Types and forms of communication Nonverbal Communication- Body Language, Gestures, Postures, Facial Expressions, Dress codes, The Cross Cultural Dimensions of Business Communication, Listening & Speaking, Techniques of Eliciting Response, Probing Questions, Observation, Business and social etiquette.
JULY	Importance of Public Speaking and Speech Composition - Principles of Effective Speaking& Presentations. Technical speeches & Non-technical presentations. Speech for introduction of a speaker - Speech for vote of thanks -Occasional speech - Theme speech. Moderating programs - Use of Technology.
AUGUST	Importance of Interviews, Art of conducting and giving interviews, Placement interviews - discipline interviews - Appraisal interviews – Exit interviews.
SEMPTEMBER	Importance of Meetings -Opening and Closing Meetings - Participating and Conducting Group discussions. Brain Storming, e– Meetings, preparing agenda and minutes of the meeting.
OCTOBER	Business Letters: Inquiries, Circulars, Quotations, Orders, Acknowledgments Executions, Complaints, Claims &Adjustments, Collection letter, Banking correspondence, Agency correspondence, Bad news and persuading letters, Sales letters, Job application letters - Bio-data, Covering Letter, Interview Letters, Letter of Reference. Memos, Minutes, Circulars &Notices.

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III SEMESTER
3.3 CORPORATE ACCOUNTING

MONTH	SYLLABUS
JUNE	Statutory Provisions regarding preparation of Company Final Accounts – Treatment of Special Items – Managerial Remuneration – Tax deducted at source – Advance payment of Tax – Provision for Tax – Depreciation – Interest on debentures – Dividends – Rules regarding payment of dividends (Theory only) – Transfer to Reserves – Preparation of Profit and Loss Account and Balance Sheet as per Section 219(1)(b) (IV) and form 23AB. Abridged Profit and Loss Account – Abridged Balance Sheet (Vertical Form).
JULY	Analysis of financial statements – comparative statements, comparative income statement, comparative Balance sheet – common size statements – Common size income statement, common size Balance Sheet – Trend percentages. Reporting to management – Management Decision and Analysis.
AUGUST	Meaning – Circumstances of Valuation of Goodwill – Factors influencing the value of Goodwill – Methods of Valuation of Goodwill - Average Profit Method – Super Profit Method – Capitalization of Super Profit Method – Annuity Method – Capitalization of Profit Method.
SEMPTEMBER	Meaning – Need for Valuation – Factors Affecting Valuation – Methods of Valuation – Asset Backing or Intrinsic Value Method – Yield Method – Earning Capacity Method – Fair Value Method - Rights Issue and Valuation of Rights Issue.
OCTOBER	Introduction – Meaning of Holding Company – Subsidiary Company – Steps – Pre Acquisition Profits – Post Acquisition Profits – Minority Interest – Cost of Control or Capital Reserve – Unrealized Profit – Mutual Indebtedness – Preparation of Consolidated Balance Sheet (As per AS21).

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III SEMESTER
3.4 HUMAN RESOURCE MANAGEMENT

MONTH	SYLLABUS
JUNE	Introduction – Meaning of HRM – Objectives of HRM – Importance of HRM – Functions and Process of HRM – HR Manager - Duties and Responsibilities – Recent trends in HRM.
JULY	Meaning – Importance of Human Resource Planning – Benefits of Human Resource Planning. Recruitment – Meaning – Methods of Recruitment. Selection – Meaning – Steps in Selection Process – Problems Involved in Placement.
AUGUST	Meaning, objective and purpose of Induction: Training- Need for training, benefits of training, identification of training needs and methods of training. Introduction – Meaning and Definition – Objectives – Methods of Performance Appraisal – Uses and Limitations of Performance Appraisal. Compensation – Meaning of Compensation – Objectives of Compensation
SEMPTEMBER	Meaning and Definition of Promotion - Purpose of promotion, basis of promotion, Meaning of transfer, reasons for transfer, types of transfer, right sizing of work force, need for right sizing.
OCTOBER	Meaning of HRD, Role of training in HRD, Knowledge Management, Knowledge Resources, Impact of Globalization on Human Resource Management, Problems in relation to Transnational and Multinationals.

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III SEMESTER
3.5 BUSINESS REGULATIONS

MONTH	SYLLABUS
JUNE	Introduction, Nature of Law, Meaning and Definition of Business Laws, Scope and Sources of Business Law, Fundamental Rights and Directive Principle of State Policies, Principles having economic significance, Overview of Business Laws in India.
JULY	**Indian Contract Act, 1872**: Definition of Contract, essentials of a valid contract (all essentials need to be explained in great detail), classification of contracts, breach of contract and remedies for breach of contract. **Indian Sale of Goods Act, 1930**: Definition of contract of sale, essentials of contract of sale, conditions and warrantees, rights and duties of buyer, rights of an unpaid seller.
AUGUST	**Right to Information Act, 2005**: Objectives of the RTI Act, Scope, SuoMoto disclosure, Method of seeking information, Eligibility to obtain information, Authorities under the Act,. **Right to Education Act**: Objectives of the RTE Act – Salient Features.
EMPTEMBER	**The Competition Act, 2002**: Objectives of Competition Act, the features of Competition Act, components of Competition Act, CCI, CAT, offences and penalties under the Act. **Consumer Protection Act, 1986**: Definition of the terms consumer, consumer dispute, defect, deficiency, unfair trade practices and services. Consumer Protection Act, Consumer Redressal Agencies – District Forum, State Commission, National Commission, any two landmark judgments of the Supreme Court.
OCTOBER	FEMA 1999: Objects of FEMA, definition of important terms – authorized dealer, currency, foreign currency, foreign exchange, foreign security, Directorate of Enforcement, salient features of the FEMA, offences and penalties, **Environment Protection Act, 1986**: Objects of the Act, definitions of important terms – environment, environment pollutant, environment pollution, hazardous substance and occupier, types of pollution, global warming, causes for ozone layer depletion, carbon trade, rules and powers of central government to protect environment in India.

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III SEMESTER
3.6 CORPORATE ENVIRONMENT

MONTH	SYLLABUS
JUNE	**Promotion of Company** – Promotion – Incorporation – Capital Subscription and Certificate of Commencement of Business. **Memorandum of Association** – Definition – Clauses. **Articles of Association** – Definition – Contents – Distinction between Memorandum of Association and Articles of Association – Alteration of Memorandum of Association and Articles of Association. **Prospectus** – Meaning – Contents – Statement in Lieu of Prospectus. Corporate Social Responsibility initiatives under Companies Act 2013 (Section 135)
JULY	Share Capital – Meaning of Shares – Kinds of Shares – Merits and Demerits of Shares. Debentures – Meaning – Features – Types – Merits and Demerits, Listing of Shares.
AUGUST	Meaning and Definition – Types of Meeting – Statutory Meeting – Annual General Meeting – Extraordinary General Meeting – Board Meeting and Resolutions
SEMPTEMBER	Meaning and Definition – Position – Appointment – Rights – Duties – Liabilities – Qualification and Removal of Company Secretary.
OCTOBER	Modes of winding up – commencement of winding up – consequences – official liquidator – powers and duties of liquidator.

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3.7 BUSINESS ETHICS

MONTH	SYLLABUS
JUNE	Introduction – Meaning - Scope – Types of Ethics – Characteristics – Factors influencing Business Ethics – Importance of Business Ethics - Arguments for and against business ethics- Basics of business ethics - Corporate Social Responsibility – Issues of Management – Crisis Management
JULY	Introduction – Meaning – Emotional Honesty – Virtue of humility – Promote happiness – karma yoga – proactive – flexibility and purity of mind.
AUGUST	Introduction – Ethics in HRM – Marketing Ethics – Ethical aspects of Financial Management – Technology Ethics and Professional ethics.
SEMPTEMBER	Meaning – Functions – Impact of corporate culture – cross cultural issues in ethics.
OCTOBER	Meaning, scope, composition of BODs, Cadbury Committee, various committees, reports on corporate governance, scope of Corporate Governance, Benefits and Limitations of Corporate Governance with living examples.

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4.2 BUSINESS RESEARCH METHODS

MONTH	SYLLABUS
JANUARY	Meaning – Objectives – Types of Research – Scope of Research – Research Approaches – Research Process – Research Design – Research Methods Vs Research Methodology - Steps in Research – Problem Formulation – Statement of Research Objective – Exploratory – Descriptive – Experimental Research.
FABRAURY	Observational and Survey Methods – Field Work Plan - Administration of surveys - Training field investigators - Sampling methods - Sample size.
MARCH	Questionnaire Design; Attitude measurement techniques – Motivational Research Techniques – Selection of Appropriate Statistical Techniques.
APRIL	Tabulation of data - Analysis of data –Testing of Hypothesis, Advanced techniques – ANOVA, Chi-Square - Discriminant Analysis - Factor analysis, Conjoint analysis - Multidimensional Scaling - Cluster Analysis (Concepts Only).
MAY	Types of Reports, Business, Technical and Academic Report writing – Methodology Procedure – Contents – Bibliography

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IV SEMESTER

4.3 MARKETING MANAGEMENT

MONTH	SYLLABUS
JANUARY	Meaning & Definition – Goals – Concepts of Marketing – Approaches to Marketing – Functions of Marketing. **Recent trends in Marketing** - Introduction, E-business – Tele-marketing – M-Business – Green Marketing – Relationship Marketing – Retailing – Concept Marketing and Virtual Marketing (Meaning Only).
FABRAURY	Meaning – Demographic – Economic – Natural – Technological - Political – Legal – Socio - Cultural Environment
MARCH	Meaning – Elements – Product – Product Mix – Product Line – Product Lifecycle – Product Planning – New Product Development – Failure of New Product – Branding – Packing and Packaging. Pricing – Objectives – Factors influencing Pricing Policy and Methods of Pricing. Physical Distribution – Meaning – Factors affecting Channel Selection – Types of Marketing Channels. Promotion – Meaning and Significance of Promotion – Personal Selling & Advertising (Meaning Only).
APRIL	Meaning & Definition - Bases of Market Segmentation – Requisites of Sound Market Segmentation. Consumer Behaviour – Factors influencing Consumer Behaviour and Buying Decision Process.
MAY	Meaning and Definition – Role of CRM – Advantages and Disadvantages.

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4.4 FINANCIAL MANAGEMENT

MONTH	SYLLABUS
JANUARY	Introduction – Meaning of Finance – Business Finance – Finance Function – Aims of Finance Function – Organization structure of finance - Financial Management – Goals of Financial Management – Financial Decisions – Role of a Financial Manager – Financial Planning – Steps in Financial Planning – Principles of a Sound Financial Planning.
FABRAURY	Introduction – Meaning & Definition – Need – Future Value (Single Flow – Uneven Flow &Annuity) – Present Value (Single Flow – Uneven Flow & Annuity)– Doubling Period – Concept of Valuation – Valuation of Bonds & Debentures – Preference Shares – Equity Shares – Simple Problems.
MARCH	**Financing Decisions:** Introduction – Meaning of Capital Structure – Factors influencing Capital Structure – Optimum Capital Structure – EBIT – EBT – EPS – Analysis – Leverages – Types of Leverages – Simple Problems. **Investment Decisions:** Introduction – Meaning and Definition of Capital Budgeting – Features – Significance – Process – Techniques – Payback Period – Accounting Rate of Return – Net Present Value – Internal Rate of Return – Profitability Index - Simple Problems.
APRIL	Introduction – Meaning and Definition – Determinants of Dividend Policy – Types of Dividends – Provisions under Campiness Act in relation to dividends.
MAY	Introduction – Concept of Working Capital – Significance of Adequate Working Capital – Evils of Excess or Inadequate Working Capital – Determinants of Working Capital – Sources of Working Capital –Cash Management – Receivables Management – Inventory Management.

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4.5 SERVICES MANAGEMENT

MONTH	SYLLABUS
JANUARY	Meaning of Services – Concepts - Characteristics of Services – Classification of Services – Growth of Service Sector.
FABRAURY	Meaning – Differences between Products and Services – Importance of Services Marketing – Marketing Mix for Services – 7 P's (in detail) Managing Demand and Supply in Service Industry. Service Delivery Process: Role of Customer in Service delivery process- Quality issues in Services – GAP Model, Managing moments of Truth
MARCH	Introduction – Evolution of Tourism Industry – Concept and Nature of Tourism – Significance of Tourism Industry- Market segmentation in tourism- Marketing mix of Tourism - Recent Trends in Tourism. Hospitality Services: Types of Hotels –Types of Accommodation – Departments in Hotels – Customer care in Hospitality Industry.
APRIL	**Banking** - Introduction – Traditional Services – Modern Services – Recent Trends in Banking Services. **Insurance** - Introduction – Meaning and Definition of Insurance – Types of Insurance – Life Insurance – Products of Life Insurance – General Insurance – Types of General Insurance – Insurance Agents and other Intermediaries.
MAY	Hospitals – Evolution of Hospital Industry – Nature of Service – Risk involved in Healthcare Services – marketing of medical services – Hospital extension services – Pharmacy, nursing – Medical Transcription. ITES: Introduction – Growth, Types, Job opportunities in ITES.

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IV SEMESTER
4.6 BANKING REGULATIONS &OPERATIONS

MONTH	SYLLABUS
JANUARY	Introduction – Role of Commercial Banks – Functions of Commercial Banks – Primary Functions and Secondary Functions – Credit Creation of Commercial Banks – Investment Policy of Commercial Banks – Profitability of Commercial Banks. Regulation and Control of Commercial Banks by RBI.
FABRAURY	**Banker and Customer:** Meaning of Banker and Customer – Banking Company – General and Special Relationships between Banker and Customer. **Types of Customers and Account holders:** Procedure and Practice in opening and conducting the accounts of customers particularly individuals including minors - Joint Account Holders. Partnership Firms - Joint Stock companies with limited liability-Executors and Trustees-Clubs and Associations-Joint Hindu Family.
MARCH	Introduction – Meaning & Definition – Features – Kinds of Negotiable Instruments (Meanings only) – Cheques – Meaning & Definition – Features - Parties – Crossing of cheques – types of crossing. Endorsements – Meaning – Essentials – Kinds of Endorsement.
APRIL	**Paying Banker** – Meaning – Precautions – Statutory Protection to the Paying Banker – Dishonor of Cheques – Grounds of Dishonor – Consequences of wrongful dishonor of Cheque. **Collecting Banker** – Meaning – Duties & Responsibilities of Collecting Banker –Statutory Protection to Collecting Banker.
MAY	Different kinds of borrowing facilities granted by banks - Loans, Cash Credit, Overdraft, Bills Purchased, Bills Discounted, Letters of Credit - Types of Securities – NPA (Meaning only).Sound principles of Bank Lending.

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IV SEMESTER
4.7 COST ACCOUNTING

| MONTH	SYLLABUS
JANUARY	Introduction – Meaning & Definition of Cost, Costing and Cost Accounting – Objectives of Costing - Comparison between Financial Accounting and Cost Accounting – Application of Cost Accounting – Designing and Installing a Cost Accounting System – Cost Concepts - Classification of Costs – Cost Unit – Cost Center – Elements of Cost – Preparation of Cost Sheet – Tenders and Quotations.
FABRAURY	Meaning – Types – Direct Material – Indirect Material - Material Control – Purchasing Procedure – Store Keeping – Techniques of Inventory Control – Setting of Stock Levels – EOQ – ABC Analysis – VED Analysis – Just In-Time – Perpetual Inventory System – Documents used in Material Accounting - Methods of Pricing Material Issues – FIFO – LIFO – Weighted Average Price Method and Simple Average Price Method.
MARCH	Meaning – Types – Direct Labour – Indirect Labour – Timekeeping – Time booking – Idle Time – Overtime – Labour Turn Over. Methods of Labour Remuneration - Time Rate System – Piece Rate System – Incentive Systems – Halsey plan – Rowan Plan – Taylor"s differential Piece Rate System and Merrick"s Differential Piece Rate System – Problems.
APRIL	Meaning and Definition – Classification of Overheads – Procedure for Accounting and Control of Overheads – Allocation of Overheads – Apportionment of Overheads – Primary Overhead Distribution Summary – Secondary Overhead Distribution Summary – Repeated Distribution Method and Simultaneous Equations Method – Absorption of Factory Overheads – Methods of Absorption – Machine Hour Rate – Problems.
MAY	Need for Reconciliation – Reasons for differences in Profit or Loss shown by Cost Accounts and Profit or Loss shown by Financial Accounts – Preparation of Reconciliation Statement and Memorandum Reconciliation Account.

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V SEMESTER
5.1 ENTREPRENEURIAL MANAGEMENT

| MONTH	SYLLABUS
JUNE	Introduction – Meaning & Definition of Entrepreneurship, Entrepreneur & Enterprise – Differences between Entrepreneurship, Entrepreneur & Enterprise – Functions of Entrepreneur – Role of Entrepreneur for Economic Development - Factors influencing Entrepreneurship - Pros and Cons of being an Entrepreneur – Differences between Manager and Entrepreneur – Qualities of an Entrepreneur – Types of Entrepreneurs. Entrepreneurship Development- Need – Problems – National and State Level Institutions.
JULY	Small Scale Industries - Tiny Industries - Ancillary Industries - Cottage Industries – Definition – Meaning - Product Range - Capital Investment - Ownership Patterns - Importance and Role played by SSI in the development of the Indian Economy - Problems faced by SSI"s and the steps taken to solve the problems - Policies Governing SSI"s.
AUGUST	Concept of Business opportunity, scanning the environment for opportunities, evaluation of alternatives and selection based on personal competencies. - An overview of the steps involved in starting a business venture – Location, Clearances and Permits required, Formalities, Licensing and Registration Procedures - Assessment of the market for the proposed project - Importance of financial, technical and social feasibility of the project.
SEMPTEMBER	Business Plan, Importance of BP, Preparation of BP, Typical BP format - Financial aspects of the BP - Marketing aspects of the BP - Human Resource aspects of the BP - Technical aspects of the BP - Social aspects of the BP - Preparation of BP - Common pitfalls to be avoided in preparation of a BP.
OCTOBER	Financial assistance through SFC"s, SIDBI, Commercial Banks, KSIDC, KSSIC, IFCI, - Non-financial assistance from DIC, SISI, EDI, SIDO, AWAKE, TCO, TECKSOK, KVIC - Financial incentives for SSI"s and Tax Concessions - Assistance for obtaining Raw Material, Machinery, Land and Building and Technical Assistance - Industrial Estates – Role and Types. Sickness: Meaning and definition of a sick industry - Causes of Industrial Sickness - Preventive and Remedial Measures for Sick Industries.
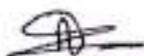
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V SEMESTER
5.2 COMPUTER APPLICATION IN BUSINESS

MONTH	SYLLABUS
JUNE	Meaning and definition of system, information and information system – business information system – Features of Information system – Uses of Business Information Systems, Users of Information Systems – Components of Business Information Systems.
JULY	Management Support Systems (MSS), Management Information systems, , Transaction Processing systems, Decision Support Systems (DSS), Group Decision Support System (GDSS), Office Automation system, Process Control systems, Executive Information systems, Levels of management and Information systems.
AUGUST	MS Word – editing a document- Formatting – Spell Checking – Page setup, Using tabs, Tables and other features Mail Merge, MS Excel – building work sheet- data entry in work sheets, auto fill – working with simple problems- formula – statistical analysis, sort, charts, MS Power point – Design, Side Show – Presentation.
SEMPTEMBER	Introduction- Purpose of Database Systems, Views of data, Data Models, Database language, Transaction Management, Storage Management, Database Administrator, Database Users, Overall System Structure, Different types of Database Systems.
OCTOBER	Introduction to Tally, Opening new company, Safety of Accounts or Password, Characteristics, Making Ledger Accounts, writing voucher, voucher entry, making different types of voucher, correcting sundry debtors an sundry creditors accounts, preparation of Trail Balance, Accounts books, Cash Book, Bank Books, Ledger Accounts, Group Summary, Sales Register and Purchase Register, Journal Register, Statement of Accounts, & Balance Sheet.
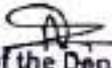
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V SEMESTER
5.3 INVESTMENT MANAGEMENT

MONTH	SYLLABUS
JUNE	Investment management, nature and scope, investment avenues, types of financial assets and real assets, Security return and risk – Systematic and unsystematic risk - sources of risk, Measurement of risk and return, sources of investment information, Fixed income – securities – bonds, preference shares – sources of risk, valuation, duration of bonds – theory of interest rates – yield curve, Bond innovations and their valuation.
JULY	Analysis of variable income securities, fundamental analysis – analysis of economy, industry analysis, company analysis – financial and non – financial, Equity valuation models, Options, futures, forwards, warrants, and their valuations, Technical analysis – Dow's theory, charts – Efficient market hypothesis and its implications, Tax aspects of investment, Securities Trading procedureA Critical Survey of software packages for security analysis.
AUGUST	Meaning of portfolio management, portfolio analysis, why portfolios? Portfolio objectives, portfolio management process, selection of securities. Portfolio theory, Markowitz Model, Sharpe's single index model. Efficient frontier with Lending and borrowing, optimal portfolio capital Asset pricing model, Arbitrage pricing theory two factor and multi factor models.
SEMPTEMBER	Bond Portfolio Management strategies, Equity portfolio management strategies, strategies using derivatives, hedging. Portfolio revision – rebalancing plans, portfolio evaluation, Sharpe's index, Treynor's measure and Jenson's measure.
OCTOBER	Mutual funds, Investors life cycle, Personal investment, Personal Finance, Portfolio Management of funds in banks, insurance companies, pension funds, International investing, International funds management, emerging opportunities. A brief survey of software packages for Portfolio Management.

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V SEMESTER
### 5.5 ADVANCED FINANCIAL MANAGEMENT

MONTH	SYLLABUS
JUNE	Risk Analysis – Types of Risks – Risk and Uncertainty – Techniques of Measuring Risks – Risk adjusted Discount Rate Approach – Certainty Equivalent Approach – Sensitivity Analysis - Probability Approach - Standard Deviation and Co-efficient of Variation – Decision Tree Analysis –Problems.
JULY	**Part 1:Capital Structure:** Meaning and Significance of Cost of Capital – Types of Capital – Computation of Cost of Capital – Specific Cost – Cost of Debt – Cost of Preference Share Capital – Cost of Equity Share Capital – Weighted Average Cost of Capital – Problems. **Part 2: Capital Structure:** Introduction to Capital Structure – Capital Structure Theories - Net Income Approach - Net Operating Income Approach - Traditional Approach – MM Approach – Problems.
AUGUST	Introduction – Irrelevance Theory – MM Model. Relevance Theories - Walter Model - Gordon Model – Problems on Dividend Theories.
SEMPTEMBER	Concept of Working Capital – Determinants of Working Capital – Estimating Working Capital Needs – Operating Cycle – Cash Management – Motives of Holding Cash – Cash Management Techniques – Preparation of Cash Budget – Receivables Management – Preparation of Ageing Schedule and Debtors Turnover Ratio – Inventory Management Techniques – Problems on EOQ.
OCTOBER	DCF method, relative valuation method, net asset method, value based management. (Only concepts)

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V SEMESTER
5.6 FINANCIAL MARKETS & SERVICES

| MONTH	SYLLABUS
JUNE	Primary Market - Meaning – Features - Players of Primary Market – Instruments in Primary Market (Names) – Procedure for issuing Equity shares and Debentures - SEBI guidelines towards the issue of Equity Shares and Debentures - Merits and Demerits of Primary Markets. Secondary Market – Meaning – Structure – Functions – Trading and Settlement System of Stock Exchange Transactions - Players in the Stock Market – Merits and Demerits of Stock Markets – Reforms in Stock Market – OTCEI and NSE – Origin – Function – Merits – Demerits.
JULY	Investment & Finance Companies - Merchant Banks - Hire Purchase Finance - Lease Finance - Housing Finance - Venture Capital Funds and Factoring.
AUGUST	Objectives of SEBI – Organization - Functions and Functioning of SEBI - Powers of SEBI - Role of SEBI in marketing of Securities and Protection of Investor Interest.
SEMPTEMBER	Concept of Mutual Funds - Growth of Mutual Funds in India - Mutual Fund Schemes – Money Market Mutual Funds – Private Sector Mutual Funds – Evaluation of the performance of Mutual Funds – Functioning of Mutual Funds in India.
OCTOBER	Personalized Banking – ATM – Tele-banking & E-banking - Credit & Debit Card - Customization of Investment Portfolio - Financial Advisors.
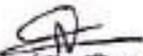
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VI SEMESTER
6.1 INTERNATIONAL BUSINESS

MONTH	SYLLABUS
JANUARY	Meaning and Definition of International Business – Theories of International Trade – Economic Theories – Forms of International Business - Nature of International Business.
FABRAURY	Mode of Entry – Exporting – Licensing – Franchising – Contract Manufacturing – Turn Key Projects – Foreign Direct Investment – Mergers, Acquisitions and Joint Ventures – Comparison of different modes of Entry.
MARCH	Globalization: Meaning - Features – Stages –Production –Investment and Technology, Globalization – Advantages and Disadvantages – Methods and Essential Conditions for Globalization. **MNC's and International Business:** Definitions – Distinction between Indian Companies – MNC – Global Companies and TNC – Organizational Transformations – Merits and Demerits of MNC"s in India.
APRIL	Information required – Source of Information – International Marketing Information System and Marketing Research.
MAY	Export Trade, Procedure, Steps & Documentation, Direction of India"s Trade – Export Financing – Documents related to Export Trade – Export Marketing – Import Trade, Procedure, Steps, Documentations and Problems - EXIM Policy - Balance of Payment – Disequilibrium and Measures for Rectification - Institutions connected with EXIM Trade.
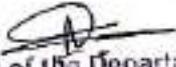
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VI SEMESTER
6.2 E-BUSINESS

MONTH	SYLLABUS
JANUARY	Introduction, E-Commerce – definition, History of E-commerce, types of E-Commerce B to B etc. Comparison of traditional commerce and e-commerce. E-Commerce business models – major B to B, B to C model, Consumer-to-Consumer (C2C), Consumer-to-Business (C2B) model, Peer to-Peer (P2P) model – emerging trends. Advantages/ Disadvantages of e-commerce, web auctions, virtual communities, portals, e-business revenue models.
FABRAURY	Security threats – An area view – implementing E-commerce security – encryption – Decryption, Protecting client computers E-Commerce Communication channels and web servers Encryption, SSL protocol, Firewalls, Cryptography methods, VPNs, protecting, networks, policies and procedures.
MARCH	E-payment systems – An overview. B to C payments, B to B payments. Types of E- payment system – Credit card payment, debit cards, accumulating balance, online stored value payment systems, digital cash, digital (electronic) wallets, agile wallet, smart cards and digital cheques. Secure Electronic Transaction (SET) protocol
APRIL	E-Commerce and marketing B to B and B to C marketing and branding strategies. Web transaction logs, cookies, shopping cart database, DBMS, SQL, data mining, CRM (customer relationship Management) system – permission marketing, affiliate marketing, viral marketing.
MAY	Legal Aspects of E-Business, Internet frauds – Cyber Laws. IT Act 2000 salient features.

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### VI SEMESTER
6.3 INCOME TAX

MONTH	SYLLABUS
JANUARY	**Income Tax:** Brief History - Legal Frame Work – Types of Taxes - Cannons of Taxation – Important Definitions: Assessment – Assessment Year – Previous Year – Exceptions to the general rule of Previous Year - Assessee – Person – Income - Casual Income – Gross Total Income – Total Income – Agricultural Income **Residential Status:** Determination of Residential Status of an individual (simple problems) - Incidence of Tax (Simple Problems on Computation of Gross Total Income). **Exempted Incomes:** Introduction – Exempted Incomes U/S 10 (Restricted to Individual Assessee) – Only theory.
FABRAURY	Meaning & Definition – Basis of Charge – Allowances – Fully Taxable Allowances – Partly Taxable Allowances: House Rent Allowance, Entertainment Allowance, Transport Allowance, Children Education & Hostel Allowances - Fully Exempted Allowances – Perquisites – Tax Free Perquisites – Perquisites Taxable in all Cases: Rent free accommodation - Concessional accommodation, Personal obligations of the employee met by the employer – Perquisites Taxable in Specified Cases : Gardener, Sweeper, Gas, Electricity, Water and Motor car facility (when the motor car is owned or hired by the employer)– Provident Funds – Deductions from Salary U/S 16 – Problems on Income from Salary(excluding retirement benefits).
MARCH	Basis of Charge – Exempted Incomes from House Property – Annual Value – Determination of Annual Value – Loss due to Vacancy – Deductions from Annual Value – Problems on Income from House Property(Excluding Pre-Construction interest).
APRIL	Meaning and Definition of Business & Profession – Expenses & losses Expressly Allowed – Expenses and losses Expressly Disallowed – Expenses Allowed on Payment Basis - Problems on computation of income from Business of Sole Proprietor.
MAY	Income from **Capital Gains** (excluding exemptions - Theory only) - **Income from Other Sources** (Theory only) - Deductions U/S 80 C, D & G. Simple problems on Computation of Total income of an Individual.

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VI SEMESTER
6.4 STRATEGIC MANAGEMENT

MONTH	SYLLABUS
JANUARY	Introduction - Meaning and Definition – Need – Process of Strategic Management – Strategic Decision Making – Business Ethics – Strategic Management.
FABRAURY	The concept of Environment – The Company and its Environment – Scanning the Environment, Technological, Social, Cultural, Demographic, Political, Legal and Other Environments Forces. SWOT Analysis – Competitive Advantage – Value Chain Analysis.
MARCH	Strategic Planning Process – Strategic Plans during recession, recovery, boom and depression – Stability Strategy – Expansion Strategy – Merger Strategy – Retrenchment Strategy – Restructure Strategy – Levels of Strategy – Corporate Level Strategy – Business Level Strategy and Functional Level Strategy – Competitive Analysis – Porter''s Five Forces Model.
APRIL	Aspects of Strategy Implementation – Project Manipulation – Procedural Implementation – Structural Implementation – Structural Considerations – Organizational Design and Change – Organizational Systems. Behavioral Implementation – Leadership Implementation – Corporate Culture – Corporate Policies and Use of Power. Functional and Operational Implementation – Functional Strategies – Functional Plans and Policies. Financial – Marketing – OPERATIONAL and Personnel dimensions of Functional Plan and Policies – Integration of Functional Plans and Policies.
MAY	Strategy Evaluation and Control - Operational Control - Overview of Management Control – Focus on Key Result Areas.
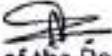
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VI SEMESTER
6.5 INTERNATIONAL FINANCE

MONTH	SYLLABUS
JANUARY	Issues involved in International Business and Finance, methods of payment, International Monetary system – Fundamental terms and concepts – Home currency – foreign currency – direct quote – indirect quote – bid and ask, spot and forward rate - appreciation and depreciation – cross currency rates.
FABRAURY	Forex Market & Its Intermediaries, ADR, Foreign Exchange Rate, Theories of Foreign Exchange Rate Determination. Components of Balance of Payments – Disequilibrium in the balance of payments- methods of correction of disequilibrium.
MARCH	Meaning-Definition-International Financial Markets-Globalization of Capital markets, Innovation in foreign securities and International Portfolio Management.
APRIL	Exchange risks – Hedging, Forward, Future, Swaps Options, -Valuation of future and swaps- valuation of options and efficiency of the exchange market.
MAY	The IMF, International liquidity and SDR's (special drawing rights) – International bank for reconstruction and development (World Bank), International development association, International investment guarantee agency.

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VI SEMESTER
### 6.6 STOCK AND COMMODITY MARKETS

MONTH	SYLLABUS
JANUARY	Primary Market, Secondary Market (Stock Market), Depositories, Private placements of shares / Buy back of shares, Issue mechanism. Meaning of commodity and Commodity markets, Difference between Stock Market and Commodity Market.
FABRAURY	History, Membership, Organization, Governing body, Functions of stock Exchange, on line trading, role of SEBI, Recognized Stock Exchanges in India (brief discussion of NSE BSE and Nifty). Derivatives on stocks: meaning, types (in brief).
MARCH	Patterns of Trading & Settlement – Speculations – Types of Speculations – Activities of Brokers – Broker Charges – Settlement Procedure, National Securities Depository Ltd.(NSDL) Central Securities Depository Ltd.(CSDL) (in brief).
APRIL	Evolution, Commodity derivatives, Commodity exchanges-Regional & National and International, Functions, role, objectives and types- Types of transactions in Commodity market – Spot, Future and Forward options markets.
MAY	Patterns of Trading & Settlement, Price discover, Efficiency of Commodity Markets - Size of Commodity Markets in India - Benefits of Commodity Markets.

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I SEMESTER
1.3– FINANCIAL ACCOUNTING

MONTH	SYLLABUS
JUNE	Introduction – Meaning and Definition – Objectives of Accounting – Functions of Accounting – Users of Accounting Information – Limitations of Accounting – Accounting Principles – Accounting Concepts and Accounting Conventions- Accounting Standards: List of Indian Accounting Standards.
JULY	Single entry system- Meaning – Features – Merits – Demerits – Types. Conversion into Double Entry system – Need for Conversion – Preparation of Statement of Affairs – Cashbook – Memorandum Trading Account – Total Debtors Account – Total Creditors Account – Bills Receivable Account – Bills Payable Account – Trading and Profit & Loss Account and Balance Sheet.
AUGUST	Meaning of Hire Purchase and Installment Purchase System- difference between Hire Purchase and Installment Purchase – Important Definitions – Hire Purchase Agreement – Hire Purchase Price – Cash Price – Hire Purchase Charges – Net Hire Purchase Price – Net Cash Price – Calculation of Interest – Calculation of Cash Price – Journal Entries and Ledger Accounts in the books of Hire Purchaser and Hire Vendor (Asset Accrual Method only).
SEMPTEMBER	Meaning and definition – Technical Terms – Royalty – Landlord – Tenant – Minimum Rent – Short Workings – Recoupment of Short Working under (Fixed Period) restrictive and non-restrictive (Floating Period) Recoupment within the Life of the Lease – Treatment of Strike and Stoppage of work – Accounting Treatment in the books of Lessee and lessor – journal entries and Ledger Accounts including minimum rent account.
OCTOBER	Meaning – Need for conversion - Purchase Consideration – Mode of Discharge of Purchase Consideration – Methods of calculation of Purchase Consideration – Net Payment Method – Net Assets Method –Journal Entries and Ledger Accounts in the books of Vendor – Treatment of items: Dissolution Expenses, Unrecorded Assets and Liabilities, Assets and Liabilities not taken over by the Purchasing Company, Contingent liabilities, Incorporation entries and preparation of balance sheet of the purchasing company under vertical format.
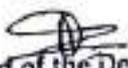
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I SEMESTER
1.4 INDIAN FINANCIAL SYSTEM

MONTH	SYLLABUS
JUNE	Introduction – Meaning – Classification of Financial System. Financial Markets – Functions and Significance of Primary Market, Secondary Market, Capital Market, & Money Market.
JULY	Types of Banking and Non-Banking Financial Institutions. Constitution, objectives & functions of IDBI, SFCs, SIDCs, LIC, EXIM Bank. Mutual Funds – features and types.
AUGUST	Introduction – Role of Commercial Banks – Functions of Commercial Banks – Primary Functions and Secondary Functions – Investment Policy of Commercial Banks. Narasimaham committee report on banking sector reforms.
SEMPTEMBER	Reserve Bank of India (RBI) – Organization – Objectives – Role and Functions. The Securities Exchange Board of India (SEBI) – Organization and Objectives.
OCTOBER	Meaning& Definition – Features – Importance. Types of Financial Services – factoring, leasing, venture capital, Consumer finance - housing & vehicle finance.

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I SEMESTER
1.5 MARKETING AND SERVICES MANAGEMENT

MONTH	SYLLABUS
JUNE	Meaning and definition - Goals – Concepts of Marketing – Approaches to Marketing – Functions of Marketing. Recent Trends in Marketing - e-business – Tele-marketing – M-Business – Green Marketing – Retailing, Relationship Marketing – Customer Relationship Management.
JULY	Meaning – demographic- economic – natural – technological – political – legal – socio cultural environment. Market Segmentation and Consumer Behaviour - Meaning & Definition - Bases of Market Segmentation – Consumer Behaviour – Factors influencing Consumer Behaviour.
AUGUST	Meaning – elements – PRODUCT – product mix, product line – product life cycle – product planning – new product development – branding - packing and packaging. PRICING – factors influencing pricing, methods of pricing (only Meaning), and pricing policy - PHYSICAL DISTRIBUTION, Meaning, factors affecting channels, types of marketing channels, PROMOTION –Meaning and significance of promotion – personal selling and advertising.
SEMPTEMBER	Meaning of services – characteristics of services – classification of services – marketing mix in service industry – growth of service sector in India. Service processes – Designing the service process – service blueprint – back office & front office process.
OCTOBER	Tourism and Travel Services – concept, nature, significance and marketing. Health Care services – concept, nature, significance and marketing. Educational services - concept, nature, significance and marketing.

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I SEMESTER
1.6.(A) CORPORATE ADMINISTRATION

MONTH	SYLLABUS
JUNE	Meaning and Definition – Features – Steps in formation of Joint Stock Company, High Lights of Companies Act 2013 - Kinds of Companies – One Person Company, Private Company, Public Company, Company limited by Guarantee, Company limited by Shares, Holding Company, Subsidiary Company, Government Company, Associate Company, Small Company, Foreign Company, Global Company, Body Corporate, Listed Company.
JULY	Promotion Stage: Meaning of Promoter, Position of Promoter & Functions of Promoter, Incorporation Stage – Meaning & contents of Memorandum of Association & Articles of Association, Distinction between Memorandum of Association and Articles of Association, Certificate of Incorporation, Subscription Stage – Meaning & contents of Prospectus, Statement in lieu of Prospects and Book Building, Commencement Stage – Document to be filed, e-filing, Register of Companies, Certificate of Commencement of Business.
AUGUST	Key Managerial Personnel – Managing Director, Whole time Directors, the Companies Secretary, Chief Financial Officer, Resident Director, Independent Director, Auditors – Appointment – Powers - Duties & Responsibilities. Managing Director – Appointment – Powers – Duties & Responsibilities. Audit Committee, CSR Committee. Company Secretary - Meaning, Types, Qualification, Appointment, Position, Rights, Duties, Liabilities & Removal or dismissal.
SEMPTEMBER	Corporate Meetings - Types of Meetings – Annual General Meeting – Extraordinary General Meetings – Board Meetings and Resolutions - Requisites of a valid meeting
OCTOBER	Meaning – Types –Features – Legal Formalities– Administration.

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II SEMESTER
2.3 ADVANCED FINANCIAL ACCOUNTING

MONTH	SYLLABUS
JANUARY	Introduction – Need – Loss of Stock Policy – Steps for ascertaining Fire insurance claim – Treatment of Salvage – Average Clause – Treatment of Abnormal Items – Computation of Fire insurance claims.
FABRAURY	Introduction – Meaning – Consignor – Consignee – Goods Invoiced at Cost Price – Goods Invoiced at Selling Price – Normal Loss – Abnormal Loss – Valuation of Stock – Stock Reserve – Journal Entries – Ledger Accounts in the books of Consignor and Consignee.
MARCH	Introduction – Meaning – Objectives – Distinction between joint venture and consignment – Distinction between joint venture and partnership – maintenance of accounts in the books of coventurers – maintaining separate books for joint venture – preparation of memorandum joint venture - problems.
APRIL	Introduction – Meaning – Objectives – Types of Branches - Dependent Branches – Features – Supply of Goods at Cost Price - Invoice Price – Branch Account in the books of Head Office (Debtors System Only).
MAY	Meaning, Objectives, basis of allocation of expenses, Trading and Profit and Loss Account in Columnar form – (Excluding Inter Departmental Transfers at invoice price).

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### II SEMESTER
2.4 RETAIL MANAGEMENT

MONTH	SYLLABUS
JANUARY	Definition – functions of retailing - types of retailing – forms of retail business ownership. Retail theories – Wheel of Retailing – Retail life cycle. Retail business in India: Influencing factors – present Indian retail scenario. International perspective in retail business.
FABRAURY	Buying decision process and its implication on retailing – Influence of group and individual factors, Customer shopping behaviour, Customer service and customer satisfaction. Retail planning process: Factors to consider in preparing a business plan – implementation – risk analysis.
MARCH	Factors influencing location of Store - Market area analysis – Trade area analysis – Rating Plan method - Site evaluation. Retail Operations: Stores Layout and visual merchandising, Stores designing, Space planning, Inventory management, Merchandise Management, Category Management
APRIL	Introduction -Product : Decisions related to selection of goods (Merchandise Management revisited) – Decisions related to delivery of service. Pricing : Influencing factors – approaches to pricing – price sensitivity - Value pricing – Markdown pricing. Place : Supply channel – SCM principles – Retail logistics – computerized replenishment system – corporate replenishment policies. Promotion : Setting objectives – communication effects - promotional mix. Human Resource Management in Retailing – Manpower planning – recruitment and training – compensation – performance appraisal Methods.
MAY	Non store retailing (e-retailing) - The impact of Information Technology in retailing - Integrated systems and networking – EDI – Bar coding – Electronic article surveillance – Electronic shelf labels – customer database management system. Legal aspects in retailing, Social issues in retailing, Ethical issues in retailing.

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II SEMESTER
2.5 BANKING LAW AND OPERATIONS

MONTH	SYLLABUS
JANUARY	Introduction – Meaning & Definition – Features – Kinds of Negotiable Instruments: Meaning, Definition & Features of Promissory Notes, Bills of Exchange, Cheques - Crossing of Cheques – Types of Crossing – Endorsements: Meaning, Essentials & Kinds of Endorsement.
FABRAURY	Introduction – Meaning of Banker – Bank - Meaning of Customer – General & Special Relationships. **Collecting Banker:** Meaning – Duties & Responsibilities of Collecting Banker – Holder for Value – Holder in Due Course - Statutory Protection to Collecting Banker .
MARCH	**Paying Banker:** Meaning – Precautions – Statutory Protection to the Paying Banker – Dishonor of Cheques – Grounds of Dishonor – Consequences of wrongful dishonor of Cheques. **Lending Operations:** Principles of Bank Lending – Kinds of lending facilities such as Loans, Cash Credit, Overdraft, Bills Discounting, Letters of Credit – NPA: Meaning, circumstances & impact – regulations of priority lending for commercial banks.
APRIL	Types of Customers and Account Holders - Procedure and Practice in opening and operating accounts of different customers including Minors - Meaning & Operations of Joint Account Holders, Partnership Firms, Joint Stock companies, Executors and Trustees, Clubs and Associations and Joint Hindu Undivided Family.
MAY	New technology in Banking – E-services – Debit and Credit cards. Internet Banking, ATM, Electronic Fund Transfer, MICR, RTGS, NEFT, DEMAT.
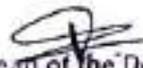
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II SEMESTER
2.6 QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS-I

MONTH	SYLLABUS
JANUARY	Meaning and Definition – Functions – Scope – Limitations. Collection of data - census and sample techniques. Classification of data, preparation of frequency distribution and tabulation of data.
FABRAURY	Meaning and Definition Types of averages – Arithmetic Mean (Simple and Weighted), Median, Mode (excluding missing frequency problems). Graphical representation of median and mode – Ogive– curve, histogram, smoothed frequency curve and frequency polygon.
MARCH	Meaning & Definition -Range, Quartile Deviation, Mean Deviation Standard Deviation and Coefficient of Variation. Skewness: Meaning, uses, and problems on Karl Pearson's' Co-efficient of skewness.
APRIL	Meaning & Definition – Uses – Classification – Construction of Index Numbers – Methods of constructing Index Numbers – Simple Aggregative Method – Simple Average of Price Relative Method
MAY	Weighted index method – Fisher's Ideal method (including TRT & FRT) – Consumer Price Index – Problems.

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III SEMESTER
3.3 CORPORATE ACCOUNTING

MONTH	SYLLABUS
JUNE	Meaning – Underwriting Commission – Underwriter – functions - Advantages of Underwriting, Types of Underwriting – Marked and Unmarked Applications – Problems (Excluding Journal entries).
JULY	Meaning – calculation of sales ratio – time ratio – weighted ratio – treatment of capital and revenue expenditure – Ascertainment of pre-incorporation and post-incorporation profits by preparing Profit and Loss Account and Balance Sheet.
AUGUST	Meaning – Circumstances of Valuation of Goodwill – Factors influencing the value of Goodwill – Methods of Valuation of Goodwill: Average Profit Method, Super Profit Method, Capitalization of average Profit Method, Capitalization of Super Profit Method, and Annuity Method - Problems.
SEMPTEMBER	Meaning – Need for Valuation – Factors Affecting Valuation – Methods of Valuation: Intrinsic Value Method, Yield Method, Earning Capacity Method, Fair Value of shares. Rights Issue and Valuation of Rights Issue - Problems.
OCTOBER	Statutory Provisions regarding preparation of Company Final Accounts – Treatment of Special Items – Tax deducted at source – Advance payment of Tax – Provision for Tax – Depreciation – Interest on debentures – Dividends – Rules regarding payment of dividends – Transfer to Reserves – Preparation of Profit and Loss Account and Balance Sheet in vertical form (As per 2011 revised format)

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III SEMESTER
3.4 FINANCIAL MANAGEMENT

MONTH	SYLLABUS
JUNE	Introduction – Meaning of Finance – Business Finance – Finance Function – Aims of Finance Function – Organization structure of Finance Department - Financial Management – Goals of Financial Management – Financial Decisions – Role of a Financial Manager – Financial Planning – Steps in Financial Planning – Principles of Sound Financial Planning – Factors influencing a sound financial plan.
JULY	Introduction – Meaning& Definition – Need – Future Value (Single Flow – Uneven Flow & Annuity) – Present Value (Single Flow – Uneven Flow & Annuity)– Doubling Period – Concept of Valuation: Valuation of Bonds, Debentures and shares - Simple Problems.
AUGUST	Introduction – Meaning of Capital Structure – Factors influencing Capital Structure – Optimum Capital Structure – Computation & Analysis of EBIT, EBT, EPS – Leverages. Simple Problems.
SEMPTEMBER	Investment Decision: Introduction – Meaning and Definition of Capital Budgeting – Features – Significance – Process – Techniques: Payback Period, Accounting Rate of Return, Net Present Value, Internal Rate of Return and profitability index Simple Problems. Dividend Decision: Introduction – Meaning and Definition – Determinants of Dividend Policy – Types of Dividends – Bonus share.
OCTOBER	Introduction – Concept of Working Capital – Significance of Adequate Working Capital – Evils of Excess or Inadequate Working Capital – Determinants of Working Capital – Sources of Working Capital.

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III SEMESTER
3.5 BUSINESS ETHICS

MONTH	SYLLABUS
JUNE	Introduction – Meaning - Scope – Types of Ethics – Characteristics – Factors influencing Business Ethics – Importance of Business Ethics - Arguments for and against business ethics- Basics of business ethics - Corporate Social Responsibility – Issues of Management – Crisis Management
JULY	Introduction – Meaning – Emotional Honesty – Virtue of humility – Promote happiness – karma yoga – proactive – flexibility and purity of mind.
AUGUST	Introduction – Ethics in HRM – Marketing Ethics – Ethical aspects of Financial Management – Technology Ethics and Professional ethics.
SEMPTEMBER	Meaning – Functions – Impact of corporate culture – cross cultural issues in ethics
OCTOBER	Meaning, scope, composition of BODs, Cadbury Committee, various committees, reports on corporate governance, scope of Corporate Governance, Benefits and Limitations of Corporate Governance with living examples.

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III SEMESTER
3.6 QUANTATIVE ANALYSIS FOR BUSINESS DECISIONS-II

MONTH	SYLLABUS
JUNE	Correlation: Meaning and Definition - Uses – Types – Karl Pearson's coefficient of correlation – probable error - Spearman's Rank Correlation Coefficient. Regression: Meaning, Uses, Regression lines, Regression Equations. Correlation Coefficient through Regression Coefficient.
JULY	Introduction – Meaning – Uses –Components of Time Series – Fitting a straight line trend by the method of least squares and Computation of Trend Values (when $\sum X = 0$) including Graphical presentation of trend values – Problems.
AUGUST	Meaning - Significance – Assumptions - Methods of Interpolation – Binomial expansion (Interpolating method one and two missing values only) - Newton's Advancing Differences Method - Problems.
SEMPTEMBER	Meaning, Objectives and Types : Probability Sampling and Non-Probability Sampling Techniques- Meaning of Population, Parameter and Statistic - Sampling distribution –Meaning and usefulness of Standard Error (Simple Problems on calculation of Sample size).
OCTOBER	Meaning and Importance of Probability- Experiment, Event and types of events, Addition Theory of probability. (Simple Problems on addition theorem only).

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III SEMESTER
3.7 PUBLIC RELATIONS AND CORPORATE COMMUNICATION

MONTH	SYLLABUS
JUNE	Importance of Attitude – Meaning of Positive Thinking and Positive Attitude – Ways to build positive attitude – Effects of negative attitude and measures to overcome them. Significance of interpersonal relationships in personal and professional life - Tips to enhance interpersonal relationships - Emotional Intelligence.
JULY	Meaning of Vision – Doing things for the right purpose – Setting and achieving goals – Importance of goal setting – periodicity in goal setting – short, medium, long-term – methods to achieve set goals. General principles of Stress Management and Time Management.
AUGUST	The creative mind – Importance of Creativity – Elements of Creativity – Influence and Flexibility – Factors influencing creativity – Methods of enhancing creativity – techniques of creativity – Brainstorming, attributes listing.
SEMPTEMBER	Significance – Process of Communication – Forms of Communication - Communication Gap – Listening Skills – Basics of Managerial Speaking Skills – Body Language – How to develop matter for a speech, Presentation aids and effective use of presentation aids. Preparation of Resume & preparation for GD & Interview.
OCTOBER	Career Planning, Awareness of different Careers, Sources of Information, Choosing a Career and Career counseling.

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IV SEMESTER
4.3 ADVANCED CORPORATE ACCOUNTING

MONTH	SYLLABUS
JANUARY	Meaning – legal provisions – treatment regarding premium on redemption – creation of Capital Redemption Reserve Account– Fresh issue of shares – Arranging for cash balance for the purpose of redemption – minimum number of shares to be issued for redemption – issue of bonus shares – preparation of Balance sheet (vertical forms) after redemption.
FABRAURY	Meaning of Amalgamation and Acquisition – Types of Amalgamation – Amalgamation in the nature of Merger – Amalgamation in the nature of Purchase - Methods of Purchase Consideration – Calculation of Purchase Consideration (Ind AS 103) (Old AS14), Net asset Method - Net Payment Method, Accounting for Amalgamation (Problems on both the methods) - Entries and Ledger Accounts in the Books of Transferor Company and Transferee Company – Preparation of new Balance sheet. (Vertical Format) (Excluding External Reconstruction).
MARCH	Meaning – Objective – Procedure – Form of Reduction –Passing of Journal Entries – Preparation of Reconstruction accounts – Preparation of Balance Sheet after Reconstruction. (Vertical Format) Problems.
APRIL	Meaning–Types of Liquidation – Order of Payment - Calculation of Liquidator's Remuneration – Preparation of Liquidators Final Statement of Account.
MAY	Human Resource Accounting – Environmental Accounting – Social Responsibility Accounting – Valuation of Brand. Indian Accounting Standards- Meaning- Need for accounting standards in India- Accounting standards Board (ASB) process of setting accounting standards in India- A brief theoretical study of Indian accounting standards.

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IV SEMESTER
4.4 COST ACCOUNTING

MONTH	SYLLABUS
JANUARY	Introduction – Meaning & Definition of Cost, Costing and Cost Accounting – Objectives of Costing - Comparison between Financial Accounting and Cost Accounting –Designing and Installing a Cost Accounting System – Cost Concepts - Classification of Costs – Cost Unit – Cost Center – Elements of Cost – Preparation of Cost Sheet – Tenders and Quotations.
FABRAURY	Meaning – Types: Direct Material, Indirect Material, Material Control – Purchasing Procedure – Store Keeping – Techniques of Inventory Control –Levels settings– EOQ – ABC Analysis – VED Analysis – Just In-Time – Perpetual Inventory System – Documents used in Material Accounting - Methods of Pricing Material Issues: FIFO, LIFO, Weighted Average Price Method and Simple Average Price Method - Problems.
MARCH	Meaning – Types: Direct Labour, Indirect Labour - Timekeeping – Time booking – Idle Time – Overtime – Labour Turn Over. Methods of Labour Remuneration: Time Rate System, Piece Rate System, Incentive Systems (Halsey plan, Rowan Plan & Taylor's differential Piece Rate System) – Problems.
APRIL	Meaning and Definition – Classification of Overheads – Procedure for Accounting and Control of Overheads – Allocation of Overheads – Apportionment of Overheads – Primary Overhead Distribution Summary – Secondary Overhead Distribution Summary – Repeated Distribution Method and Simultaneous Equations Method – Absorption of Factory Overheads – Methods of Absorption (Theory Only) – Machine Hour Rate – Problems on Machine Hour Rate.
MAY	Need for Reconciliation – Reasons for differences in Profit or Loss shown by Cost Accounts and Profit or Loss shown by Financial Accounts – Preparation of Reconciliation Statement and Memorandum Reconciliation Account.

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4.5 E-BUSINESS AND ACCOUNTING

MONTH	SYLLABUS
JANUARY	Introduction, E-Commerce – Definition, History of E-commerce, Difference between E - Commerce and E - Business. Comparison of traditional commerce and e-commerce Advantages/ Disadvantages of e-commerce,. E-Commerce business models – major B to B, B to C model, Consumer-toConsumer (C2C), Consumer-to-Business (C2B) model, Peer to-Peer (P2P) model – emerging trends. web auctions, virtual communities, portals, e-business revenue models.
FABRAURY	Web server – Internet – World Wide Web - hardware and software for web servers, web hosting choices – shopping cart.
MARCH	Meaning of Tally software – Features – Advantages - Required Hardware, Preparation for installation of tally software - installation. Items on Tally screen: Menu options, creating a New Company, Basic Currency information, Other information, Company features and Inventory features.
APRIL	General Configuration, Numerical symbols, accts/inv info – master configuration - voucher entry configuration. Working in Tally: Groups, Ledgers, writing voucher, different types of voucher, voucher entry Problem on Voucher entry -Trail Balance, Accounts books, Cash Book, Bank Books, Ledger Accounts, Group Summary, Sales Register and Purchase Register, Journal Register, Statement of Accounts, & Balance Sheet.
MAY	Generating Basic Reports in Tally – Financial Statements – Accounting Books and Registers – Inventory Books and Registers – Exception reports – printing reports – Types of Printing Configuration of Options – Printing Format.

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IV SEMESTER
4.6. STOCK AND COMMODITY MARKETS

MONTH	SYLLABUS
JANUARY	Primary Market, Secondary Market (Stock Market), Depositories, Private placements of shares / Buy back of shares, Issue mechanism. Meaning of Commodities and Commodities Market, differences between stock market and commodities market.
FABRAURY	History, Membership, Organization, Governing body, Functions of stock Exchange, on line trading, role of SEBI, Recognized Stock Exchanges in India (brief discussion of NSE and BSE). Derivatives on stocks: Meaning, types (in brief).
MARCH	Patterns of Trading & Settlement – Speculations – Types of Speculations – Activities of Brokers – Broker Charges – Settlement Procedure, National Securities Depository Ltd.(NSDL), Central Securities Depository Ltd.(CSDL) (in brief).
APRIL	History, Membership, Objectives, Functions of commodities exchange, Organization and role of commodity exchange, Governing Body, Types of Transactions to be dealt in Commodity Market – physical market, Futures market – Differences between Physical & Future Market, options on commodities exchanges.
MAY	Patterns of Trading & Settlement, Efficiency of Commodity Markets - Size of volumes of Commodities.

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IV SEMESTER
4.7 PRINCIPLES OF EVENT MANAGEMENT

MONTH	SYLLABUS
JANUARY	Event- Meaning- Why Event Management- Analysis of Event, Scope of Event, Decision Makers- Event Manager Technical Staff- Establishing of Policies & Procedure- Developing Record Keeping Systems.
FABRAURY	Principles for holding an Event, General Details, Permissions- Policies, Government and Local Authorities, - Phonographic Performance License, Utilities- Five Bridge Ambulance Catering, Electricity, Water Taxes Applicable.
MARCH	Preparing a Planning Schedule, Organizing Tables, Assigning Responsibility, Communication and Budget of Event- Checklist, Computer aided Event Management— Roles & Responsibilities of Event Managers for Different Events.
APRIL	Introductions to Public Relations- Concept- Nature- Importance- Limitations- Media- Types of Media- Media Management, Public Relation Strategy & Planning. Brain Storming Sessions- Writings for Public Relations.
MAY	Planning of Corporate Event, Job Responsibility of Corporate Events Organizer, Arrangements, Budgeting, Safety of Guests and Participants, Creating Blue Print, Need for Entertainment in Corporate Events And Reporting.

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V SEMESTER
5.1 ENTREPRENEURSHIP DEVELOPMENT

| MONTH	SYLLABUS
JUNE	Introduction – Meaning& Definition of Entrepreneurship, Entrepreneur & Enterprise –Functions of Entrepreneur - Factors influencing Entrepreneurship - Pros and Cons of being an Entrepreneur – Qualities of an Entrepreneur – Types of Entrepreneur
JULY	Meaning &Definition – Product Range - Capital Investment - Ownership Patterns – Meaning and importance of Tiny Industries, Ancillary Industries, Cottage Industries. Role played by SSI in the development of Indian Economy. Problems faced by SSI's and the steps taken to solve the problems - Policies Governing SSI's.
AUGUST	Business opportunity, scanning the environment for opportunities, evaluation of alternatives and selection based on personal competencies. Steps involved in the formation of a small business venture: location, clearances and permits required, formalities, licensing and registration procedure. Assessment of the market for the proposed project – Financial, Technical, Market and Social feasibility study.
SEMPTEMBER	Meaning – importance – preparation –BP format: Financial aspects of the BP, Marketing aspects of the BP, Human Resource aspects of the BP, Technical aspects of the BP, Social aspects of the BP. Common pitfalls to be avoided in preparation of a BP.
OCTOBER	Financial assistance through SFC's, SIDBI, Commercial Banks, IFCI - Non-financial assistance from DIC, SISI, AWAKE, KVIC - Financial incentives for SSI's and Tax Concessions - Assistance for obtaining Raw Material, Machinery, Land and Building and Technical Assistance - Industrial Estates: Role and Types.

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V SEMESTER
5.2 INTERNATIONAL FINANCIAL REPORTING STANDARDS

MONTH	SYLLABUS
JUNE	Meaning of IFRS - relevance of IFRS to India; merits and limitations of IFRS; process of setting IFRS- Practical challenges in implementing IFRS; a brief theoretical study of International financial reporting standards (IFRS) 1 – 15 - List of International accounting standards issued by IASB.
JULY	Recognition criteria's for Investment properties, Government grants, Borrowing costs, Construction contracts, share based payments, Provisions, Contingent liabilities and Contingent assets, Events occurring after the reporting period (Only Theory). Recognition and measurement for property plant and equipment, Intangible assets, Inventories, Leases and Impairment. Accounting for Income tax, Employee benefits. - **Simple problems**
AUGUST	Outline for the preparation of financial statements - Statement of financial position; Comprehensive income statement; Statement of changes in equity (SOCE), IAS 18 – Revenue. Elements of financial statements as per IFRS – Non-current assets; current assets; equity; non- current liability; current liability; revenue; cost of sales; distribution costs; administrative expenses; financial costs – profits attributable to owners of controlling interest and non-controlling interest – **Practical problems on each element.**
SEMPTEMBER	Concept of group – need for consolidated financial statements - Preparation of consolidated financial statements – Procedure for the preparation of consolidated financial position statement – treatment of pre-acquisition profit; goodwill arising on consolidation; on-controlling interests at fair value – **Practical problems.**
OCTOBER	Related party disclosure, Earnings per share, Interim financial reporting, Insurance contracts, Operating segments. **(Theory Only).**
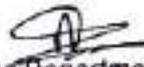
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V SEMESTER
5.3 INCOME TAX - I

MONTH	SYLLABUS
JUNE	Brief History of Indian Income Tax - Legal Frame Work – Types of Taxes - Cannons of Taxation – Important Definitions: Assessment, Assessment Year, Previous Year (including Exceptions), Assessee, Person, Income, Casual Income.
JULY	Gross Total Income, Agricultural Income (including Scheme of Partial Integration – Theory Only) – Scheme of taxation. Meaning and classification of Capital & Revenue. Income tax authorities: Powers & functions of CBDT, CIT &A.O. Introduction – Exempted Incomes U/S 10 - Restricted to Individual Assessee.
AUGUST	Residential Status of an Individual –Determination of Residential Status – Incidence of Tax – Problems. Meaning – Definition - Basis of Charge– Advance Salary – Arrears of Salary – Allowances
SEMPTEMBER	Perquisites– Provident Fund - Profits in Lieu of Salary – Gratuity - Commutation of Pension - Encashment of Earned leave - Compensation for voluntary retirement - Deductions from Salary U/S 16 – Problems on Income from Salary.
OCTOBER	Basis of Charge – Deemed Owners – Exempted Incomes from House Property –Composite Rent - Annual Value – Determination of Annual Value – Treatment of Unrealized Rent – Loss due to Vacancy – Deductions from Annual Value – Problems on Income from House Property.

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5.4 COSTING METHODS

MONTH	SYLLABUS
JUNE	Costing methods – Meaning, Importance and Categories. **Job costing:** Meaning, prerequisites, job costing procedures, Features, objectives, applications, advantages and disadvantages of Job costing.
JULY	**Batch costing:** Meaning, advantages, disadvantages, determination of economic batch quantity. Comparison between Job and Batch Costing – problems.
AUGUST	Introduction, meaning and definition, Features of Process Costing, applications, comparison between Job costing and Process Costing, advantages and disadvantages, treatment of normal loss, abnormal loss and abnormal gain, rejects and rectification - Joint and by-products costing – problems under reverse cost method.
SEMPTEMBER	Meaning, features of contract costing. Applications of contract costing, similarities and dissimilarities between job and contract costing, procedure of contract costing, profit on incomplete contracts, Problems.
OCTOBER	Introduction, Meaning and application of Operating Costing, - Power house costing or boiler house costing, canteen or hotel costing, hospital costing (Theory only) and Transport Costing – Problems on Transport costing.

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V SEMESTER
5.5 INTERNATIONAL FINANCIAL MANAGEMENT

| MONTH	SYLLABUS
JUNE	Financial management and financial objectives - The economic environment for business - Financial markets, money markets and institutions. The nature, elements and importance of working capital - Management of inventories accounts receivable accounts payable and cash determining working capital needs and funding strategies.
JULY	Investment appraisal techniques - Allowing for inflation and Taxation in investment appraisal - Adjusting for risk and uncertainty in investment appraisal - Specific investment decisions (lease or buy; asset replacement, capital rationing).
AUGUST	Sources of, and raising business finance - Estimating the cost of capital - Sources of finance and their relative costs - Capital structure theories and practical considerations
SEMPTEMBER	Nature and purpose of the valuation of business and financial assets - Models for the valuation of shares - The valuation of debt and other financial assets - Efficient market hypothesis (EMH) and practical considerations in the valuation of shares.
OCTOBER	The Nature and types of Risk and approaches to Risk Management- Causes of Exchange Rate differences and Interest rate fluctuations – Hedging techniques for foreign Currency risk – Hedging techniques for Interest rate risk.

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V SEMESTER
5.6 GOODS AND SERVICES TAX

MONTH	SYLLABUS
JUNE	Objectives and basic scheme of GST, Meaning – Salient features of GST – Subsuming of taxes – Benefits of implementing GST – Constitutional amendments - Structure of GST (Dual Model) – Central GST – State / Union Territory GST – Integrated GST - GST Council: Structure, Powers and Functions. Provisions for amendments.
JULY	Salient features of CGST Act, SGST Act (Karnataka State), IGST Act - Meaning and Definition: Aggregate turnover, Adjudicating authority, Agent, Business, Capital goods, Casual taxable person, Composite supply, Mixed supply, Exempt supply, Outward supply, Principal supply, Place of supply, Supplier, Goods, Input service distributor, Job work, Manufacture, Input tax, Input tax credit, Person, Place of business, Reverse charge, Works contract, Casual taxable person, Non-resident person. Export of goods / services, Import of goods / services, Intermediary, Location of supplier of service, Location of recipient of service.
AUGUST	Registration under GST: Procedure for registration, Persons liable for registration, Persons not liable for registration, Compulsory registration, Deemed registration, Special provisions for Casual taxable persons and Non-resident taxable persons. Exempted goods and services - Rates of GST. Procedure relating to Levy: (CGST & SGST): Scope of supply, Tax liability on Mixed and Composite supply, Time of supply of goods and services, Value of taxable supply. Computation of taxable value and tax liability. Procedure relating to Levy: (IGST): Inter-state supply, intra-state supply, Zero rates supply, Value of taxable supply – Computation of taxable value and tax liability.
SEMPTEMBER	Input tax Credit: Eligibility, Apportionment, Inputs on capital goods, Distribution of credit by Input Service Distributor (ISD) – Transfer of Input tax credit - Simple Problems on utilization of input tax credit. Furnishing details of outward supplies and inward supplies, First return, Claim of input tax credit, Matching reversal and reclaim of input tax credit, Annual return and Final return. Problems on Assessment of tax and tax liability.
OCTOBER	GST Network: Structure, Vision and Mission, Powers and Functions. Goods and Service Tax Suvidha Providers (GSP): Concept, Framework and Guidelines and architecture to integrate with GST system. GSP Eco system. (Theory only).
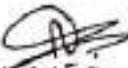
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VI SEMESTER
6.1 BUSINESS REGULATIONS

MONTH	SYLLABUS
JANUARY	Introduction, Nature of Law, Meaning and Definition of Business Laws, Scope and Sources of Business Laws.
FABRAURY	Indian Contract Act, 1872: Definition of Contract, essentials of a valid contract, classification of contracts, remedies for breach of contract. Indian Sale of Goods Act, 1930: Definition of contract of sale, essentials of contract of sale, conditions and warrantees, rights and duties of buyer, rights of an unpaid seller.
MARCH	The Competition Act, 2002: Objectives of Competition Act, Features of Competition Act, CAT, offences and penalties under the Act, Competition Commission of India. Consumer Protection Act, 1986: Definition of the terms consumer, consumer dispute, defect, deficiency, unfair trade practices and services. Rights of the consumer under the Act, Consumer Redressal Agencies – District Forum, State Commission, National Commission.
APRIL	Indian Patent Laws and WTO Patent Rules: Meaning of IPR, Invention and non-invention, procedure to get patent, restoration and surrender of lapsed patent, infringement of patent. FEMA 1999: Objects of FEMA, salient features of FEMA, definition of important terms: authorized person, currency, foreign currency, foreign exchange, foreign security, offences and penalties.
MAY	Environment Protection Act, 1986: Objects of the Act, definitions of important terms: environment, environment pollutant, environment pollution, hazardous substance and occupier, types of pollution, rules and powers of central government to protect environment in India.

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VI SEMESTER
6.2 PRINCIPLES AND PRACTICE OF AUDITING

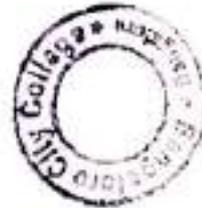| MONTH	SYLLABUS
JANUARY	Introduction – Meaning - Definition – Objectives – Differences between Accountancy and Auditing – Types of Audit - Advantages of Auditing – Preparation before commencement of new Audit – Audit Notebook – Audit Working Papers – Audit Program, Recent Trends in Auditing: Nature & Significance of Tax Audit – Cost Audit - Management Audit.
FABRAURY	Internal Control: Meaning and objectives. Internal Check: Meaning, objectives and fundamental principles. Internal Check as regards: Wage Payments, Cash Sales, Cash Purchases. Internal Audit: Meaning - Advantages and Disadvantages of Internal Audit – Differences between Internal Check and Internal Audit.
MARCH	Meaning - Definition – Importance – Routine Checking and Vouching – Voucher -Types of Vouchers – Vouching of Receipts: Cash Sales, Receipts from debtors, Proceeds of the sale of Investments. Vouching of Payments: Cash Purchases, Payment to Creditors, Deferred Revenue Expenditure.
APRIL	Meaning and Objectives of verification and valuation– Position of an Auditor as regards the Valuation of Assets – Verification and Valuation of different Items: Assets: Land & Building, Plant & Machinery, Goodwill – Investments - Stock in Trade. Liabilities: Bills Payable - Sundry Creditors – Contingent Liabilities.
MAY	Company Auditor – Appointment – Qualification - Powers - Duties and Liabilities – Professional Ethics of an Auditor. Audit of Educational Institutions – Audit of Insurance Companies- Audit of Cooperative societies.

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VI SEMESTER
6.3 INCOME TAX - II

MONTH	SYLLABUS
JANUARY	Meaning and Definition of Business, Profession – Vocation - Expenses Expressly Allowed – Allowable Losses – Expenses Expressly Disallowed – Expenses Allowed on Payment Basis - Problems on Business relating to Sole Trader and Problems on Profession relating to Chartered Accountant, Advocate and Medical Practitioner.
FABRAURY	Basis of Charge – Capital Assets – Transfer of Capital Assets – Computation of Capital Gains – Exemptions U/S 54, 54B, 54D, 54EC, 54F– Problems on Capital Gains.
MARCH	Incomes – Taxable under the head Other Sources – Securities – Kinds of Securities – Rules for Grossing Up – Ex-Interest Securities – Cum-Interest Securities – Bond Washing Transactions – Problems on Income from Other Sources.
APRIL	Deductions u/s: 80 C, 80 CCC, 80 CCD, 80 D, 80 G, 80 GG, 80 GGA, and 80 U. (80 G & 80 GG together should not be given in one problem)
MAY	Meaning –Provision for Set-off & Carry forward of losses (Theory only). Computation of Total Income and Tax Liability of an Individual Assessee (Problems– in case of income from salary & house property-computed income may be given).

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VI SEMESTER
6.4 MANAGEMENT ACCOUNTING

MONTH	SYLLABUS
JANUARY	Management Accounting: Meaning – Definition – Objectives – Nature and Scope– Role of Management Accountant – Relationship between Financial Accounting and Management Accounting, Relationship between Cost Accounting and Management Accounting. Analysis of Financial Statements: Types of Analysis – Methods of Financial Analysis – Problems on Comparative Statement analysis – Common Size Statement analysis and Trend Analysis.
FABRAURY	Meaning and Definition of Ratio, Classification of Ratios, Uses & Limitations – Meaning and types of Ratio Analysis – Calculation of Liquidity ratios, Profitability ratios and Solvency ratios.
MARCH	Meaning and Concept of Fund – Meaning and Definition of Fund Flow Statement – Uses and Limitations of Fund Flow Statement – Differences between Cash Flow Statement and Fund Flow Statement - Procedure for preparation of Fund Flow Statement – Statement of changes in Working Capital – Statement of Funds from Operations – Statement of Sources and Applications of Funds – Problems.
APRIL	Meaning and Definition of Cash Flow Statement – Concept of Cash and Cash Equivalents - Uses of Cash Flow Statement – Limitations of Cash Flow Statement – Provisions of Ind AS-7 (old AS 3) – Procedure for preparation of Cash Flow Statement – Cash Flow from Operating Activities – Cash Flow from Investing Activities and Cash Flow from Financing Activities – Preparation of Cash Flow Statement according to Ind AS-7 (old AS 3) (Indirect Method Only).
MAY	Meaning of Management Reporting – Requisites of a Good Reporting System – Principles of Good Reporting System – Kinds of Reports – Drafting of Reports under different Situations.

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VI SEMESTER
6.5 PERFORMANCE MANAGEMENT

MONTH	SYLLABUS
JANUARY	Activity-based costing - Target costing - Life cycle costing - Throughput accounting - Environmental accounting .
FABRAURY	Relevant cost analysis - Cost volume profit analysis - Limiting Factors Pricing decisions - Make-or- buy and other short-term decisions - Dealing with risk and uncertainty in decision making.
MARCH	Budgetary systems and types of budget - Quantitative analysis in budgeting Standard costing - Material mix and yield variances - Sales mix and quantity variances - Planning and operational variances .
APRIL	Performance management information systems - Sources of management Information - Management reports - Performance analysis in private sector organizations - Divisional performance and transfer pricing.
MAY	Performance analysis in not-for-profit organizations and the public sector - External considerations and behavioral aspects.

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VI SEMESTER
6.6 INTERNATIONAL AUDITING & ASSURANCE

MONTH	SYLLABUS
JANUARY	External audit engagements – Objective and Meaning, types of assurance engagement, Concepts of Accountability, Stewardship and Agency, Elements of an Assurance Engagement, Regulatory environment – external audit, Mechanism to control auditors, Statutory Regulations: Appointment, Rights, Removal and Resignation of Auditors, Limitations of external audit, Corporate Governance – Objective and meaning, Directors responsibilities, Role and structure of Audit Committee, Fundamental principles of Professional Ethics, Audit threats and Safeguards, Role of External and Internal audit, Factors to assess – Internal audit, Limitations of internal audit, Outsourcing – Advantage and Disadvantage of outsourcing internal audit function, Format and Content of Audit Review Reports.
FABRAURY	Preconditions for Audit, Obtaining audit engagement, Engagement Letters - Contents, Quality Control Procedures, Overall objectives of the auditor and the need to conduct an audit, Components of audit risk, Concepts – Materiality and Performance Materiality, Materiality levels, Procedures to obtain initial understanding, Analytical procedures in planning, Compute and interpret key ratios used in analytical procedures, Effect of fraud and misstatements on the Audit Strategy, Responsibilities of internal and external auditors for the prevention and detection of fraud and error, Audit Planning – need and importance, Contents of the overall Audit Strategy and Audit Plan, Difference between an interim and final audit, Audit Documentation – Need, importance and contents, safe custody and retention of Working Papers.
MARCH	Five components of Internal Control, How auditors record internal control systems, Evaluate internal control components including limitations and deficiencies, computer systems controls, Describe control objectives, control procedures, activities and tests of control in relation to: i) The sales system; ii) The purchases system iii) The payroll system iv) The inventory system v) The cash system vi) Non-current assets Requirements and methods of how reporting significant deficiencies in internal control are provided to management.
APRIL	Assertions contained in the financial statements, audit procedures to obtain audit evidence, quality & quantity of audit evidence, problems associated with the audit and review of accounting estimates, control environment of smaller entities, Audit sampling – meaning and need, differences between statistical and non-statistical sampling – Examples and usage, Audit of specific items – Receivables, inventories, payables and accruals, bank and cash, tangible assets, intangible assets, non-current liabilities, provisions and contingencies, Share capital, reserves and directors' emoluments, Computer-assisted audit techniques – Meaning and examples, Work of others – extent of reliance, extent to which reference to the work of others can be made in the independent auditor's report, Audit techniques to not-for profit organisation.
MAY	Subsequent events – Purpose, Indicators and Responsibilities and procedures to be undertaken, Going Concern – Definition and importance, Responsibilities of auditors and management regarding going concern, Written representations – Purpose, Procedure and Reliability, Circumstances when written representation can be obtained, Audit finalisation and review – Procedures and sufficiency of evidence, Dealing with Uncorrected Statements.

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Department Of Computer Science(BCA)

Semester: II Subject: Data Structure

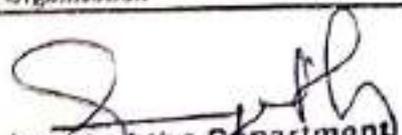| Month	Title of the Chapter
January	Introduction, String, Asymptotic Notations, Arrays
February	Linked List , Sorting and Searching, Arrays , Stack
March	Queue , Tree
April	Graphs, Revision

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Department Of Computer Science(BCA)

Semester: II Subject: Numerical and statistical Methods

Month	Title of the Chapter
January	Floating point Representation and Error Normalised Floating point forms
February	Interpollation and Numerical differentiation
March	System of Linear equations, Basic Concepts and Definition of Statistics
April	Random Variable and Expectation, Probability distribution, Discrete Distribution, Continuous Distribution

Bangalore City College

Department Of Computer Science(BCA)

Semester: II Subject: Database Management System

Month	Title of the Chapter
January	Introduction to DBMS, Database system concepts and architecture
February	Data Modelling using ER Model, Relational database Language, Functional Dependancies
March	Normalization, Relational data model and Relational algebra, PL/SQL
April	Transaction Processing Concepts, Concurrency control techniques, File Organisation

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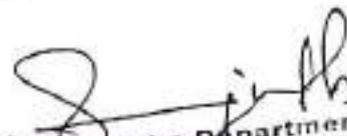Department Of Computer Science(BCA)
Semester: III   Subject:OOPs using C++

Month	Title of the Chapter
July	Introduction to C++, Features Functions ,objects and classes
August	Constructor and destructor, Functions
September	Inheritance, Operator overloading,polymorphism
October	Virtual Functions,Templates, Exception handling,Streams and File Handling

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Department Of Computer Science(BCA)
Semester: III   Subject:Operating System

Month	Title of the Chapter
July	Introduction to OS, Types of OS. Process Management
August	Process synchronization, Deadlocks, Memory Management
September	Virtual Memory Management, File Management, Disk Management
October	Protection and Security Case Study- Windows,Linux

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Semester: III   Subject:Accounting and Financial Management

Month	Title of the Chapter
July	Introduction,Accounting Concepts and Conventions
August	Financial Accounting Process
September	Accounting for Bill of Exchange, preparation of Final Accounts
October	Accounting package Tally

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Semester: IV   Subject:Visual Basic

Month	Title of the Chapter
January	Introduction to VB,Programming in VB, Forms Objects and controls
February	class Module, Files in VB, DAO objects
March	Ado Control, VC++ programming
April	Interfacing with other Application

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Semester: IV   Subject:Unix

Month	Title of the Chapter
January	Unix Inroduction,Architecture, Session, General Purpose commands, Files and directoried
February	Unix File System,Process Management, Secodary storage Management Special Tools and utilities,
March	Shell Programming,Control Structures in Unix
April	System Communication

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Semester: IV   Subject:Operation Research

Month	Title of the Chapter
January	Linear Programming Problems
February	Transportation Problems
March	Assingnment Problem,Network Analysis
April	Theory of Games

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Semester: V   Subject:Assembly Language Programming

Month	Title of the Chapter
July	Microprocessor Architecture and Operations, Memory Interfacing, Instruction set of 8085 Microprocessor
August	I/O device interfacing, Programming techniques with additional instructions, Counter and Delays
September	Stack, Subroutine and Code Conversion,Data Transfer Schemes
October	Interfacing of Peripherals and Applications

Bangalore City College
Department Of Computer Science(BCA)
Semester: V   Subject:CA

Month	Title of the Chapter
July	Digital logic circuits, Digital integrated circuit, Binary Data Representation
August	Basic Computer Organisation, CPU Oraganisation
September	IO Organisation
October	Memory Organisation

Bangalore City College
Department Of Computer Science(BCA)
Semester: V   Subject:Java

Month	Title of the Chapter
July	Introduction to Java, Data Types and Operators, Classes and Objects,Methods
August	Abstract Classes, Inheritance,Applets, MultiThreading
September	Exception Handling, Interfaces, Packages, Arrays, Strings, Vectors
October	Graphics, File I/O

Bangalore City College
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Semester: V   Subject:Software Engineering

Month	Title of the Chapter
July	Introduction to SE, System Engineering, Software Requirement Specification
August	Software Prototyping, Software Design,Object Oriented and Fuction Oriented Design
September	User Interface Design, Reliability and reuseability
October	Testing, Sofware Management
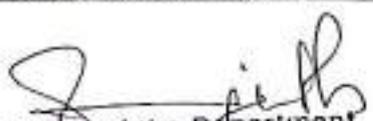
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Bangalore City College
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Semester: V Subject: Data communication and Networking

Month	Title of the Chapter
July	Introduction to DCN, Switching and Network Architecture, Layered Architecture and Application
August	Encoding Transmission Media, Multiplexing and Switching, Error Detection and Correction
September	Peer to peer Protocol, Medium access control protocl
October	Local Area Networks, Packet Switching Networks

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Semester: VI Subject:Theory of Computation

Month	Title of the Chapter
January	Introduction to FA
February	Regular Expression and Context Free Grammar
March	Context Free Grammar, Normal Forms of Context Free Grammar
April	Turing Machine

Bangalore City College
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Semester: VI Subject:Web Programmong

Month	Title of the Chapter
January	Introduction to HTML,XHTML, Advanced XHTML
February	operators and expressions,cascading style sheets,Javascript
March	Javasriptand XHTML documents, Dynamic documents with JavaScript
April	XML, Fundamentals of web

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Semester: VI Subject:Cryptography and Network Security

Month	Title of the Chapter
January	Introduction,Security Goals, Cryptographic Attacks, services and mechanisam, Mathematics of cryptography
February	Traditional Symmetric key ciphers, data encryption standard, Advanced encryption standard
March	Encipherment using modern symmetric key ciphers, Cruptogrphy hash functions
April	Security at application layer

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Semester: VI Subject:System Programming

Month	Title of the Chapter
January	Introduction,Machine Language and Assemble Language
February	Assemblers, Macro Language and Macro Processor
March	Loaders, Compilers
April	Phases of Compilers

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Semester: I Subject: C programming

Month	Title of the Chapter
July	Introduction to Programming Concepts, Overview of C Language
August	Managing Input and output operations, control Structures Functions
September	Arrays, Storage classes, structures and union
October	Pointers,Files

Bangalore City College
Department Of Computer Science(BCA)
Semester: I Subject:Digital Electronics

Month	Title of the Chapter
July	Introduction to Network Theorems and AC Fundamentals
August	Semiconductor Devices,Number Systems
September	Logic Gates, Combinational Logic Circuits
October	Sequential Circuits, Registers

Bangalore City College
Department Of Computer Science(BCA)
Semester: I Subject:Discrete mathematics

Month	Title of the Chapter
July	sets,Relations and Functions, Mathematical Logic
August	Matrices,Solutions of Linear Equations
September	Logrithms, Permutation and Combination
October	Groups, Vectors,Analytical Geometry In two Dimensions

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BANGALORE CITY COLLEGE
Department of Commerce and Management
M.COM (FA) Lesson Plan
I SEMESTER
1.1: Accounting Conventions and Standards

MONTH	SYLLABUS
AUGUST	Accounting standards - meaning and definition- benefits and objectives - need for standards
SEPTEMBER	Standards setting process- difficulties in standards setting - standards setting bodies - types of standards - standards setting across different countries. USA, UK, and India.
OCTOBER	International accounting standards - analysis of various standards issued till date. Comparative study of accounting standards ASB-UK, FASB-USA, ASB-INDIA.
NOVEMBER	Disclosure of accounting policies- depreciation- inventory- research and development- deferred taxation - current cost accounting
DECEMBER	post balance sheet events contingencies - leases and hire purchase - goodwill - mergers and acquisitioins - pension costs - foreign currency translations - change in financial position.

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BANGALORE CITY COLLEGE
Department of Commerce and Management
M.COM (FA) Lesson Plan
I SEMESTER
1.2. Managing People in Organisations

MONTH	SYLLABUS
AUGUST	Nature of management, principles, functions, evolution of management thought. Social responsibility and ethics in management. Organisations – role in, organisational effectiveness, role of people in organisational effectiveness.
SEPTEMBER	Human resource management – nature, scope. Human resource planning, employee hiring, training and development, employee remuneration, performance appraisal, safety and health, employee relations.
OCTOBER	Understanding people – individual behaviour, foundations of individual behaviour, personality, perception, learning, attitudes, values, motivation, work related stress.
NOVEMBER	Group dynamics, teams, leadership, power and politics, conflict and resolution, interpersonal communication.
DECEMBER	Organisational designs, organisational culture and organisational change and development.

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I SEMESTER
1.3 Micro & Macro Economics for Business Decisions

MONTH	SYLLABUS
AUGUST	MICRO ECONOMICS (1)Demand : Determinates of demand &law of demand . Income effect substitution effect. Luxury goods & interior goods . Individual demands & market demand. (2)Production function: Marginal productivity. Variation of output with labour (Law of Diminishing Returns).
SEPTEMBER	(3)Cost functions : Fixed cost variable cost, Marginal cost, Total cost, Break even analysis, Economics of Scale: In production Marketing , Management, Transports &Storage, Diseconomy's of Scale.
OCTOBER	(4) Price determinations: Perfect competition, Monopoly &oligopoly revenue curves (Total Average &marginal) Under perfect competition &monopoly. Profit maximization & price determination under: perfect competition & Monopoly.
NOVEMBER	Macro Economics (1)Fiscal Policy: Basic Economics Indices(National Income ,National Production , National Employment, General prices level). Aggregate Demand (Consumptions ,Government Expenditure & Business investment). Aggregate Supply. Determination of Income (or production). Taxation & Fiscal policy.
DECEMBER	Monetary policy: Types of money Demand of money , Supply of money, Lending by Banks. Interest rate determination. Monetary policy.

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I SEMESTER
1.4 Managerial Finance

MONTH	SYLLABUS
AUGUST	The finance function: Its Nature and importance, goals of financial management-financial environment, changing role of financial management Sources of long term finance: ownership securities, creditor ship securities, convertibles, options & warrants, marketing of securities and SEBI guidelines, Euro issues.
SEPTEMBER	Financing decisions: measures of leverage, effects of leverage, EBIT-EPS analysis, capital structure theories, capital structure planning and factors affecting capital structures decisions, cost of capital, specific cost of capital, overall cost of capital, marginal cost of capital. Dividend decision- relevance and irrelevance, theories -types of dividend policies, behavioural models of dividend policy, signaling theory, clientele effects, factors influencing dividend policy, corporate dividend practices in India.
OCTOBER	Investment decision: capital budgeting and its importance in decision making, estimating cash flows, techniques of investment appraisal - NPV, IRR, problem of multiple IRRs extended yield, discounted payback, measurement of risk, evaluation of risky projects, multi period probabilistic analysis-decision tree analysis, sensitivity analysis.
NOVEMBER	Working capital management, planning, control and policy, management of various Components of cash receivables and inventory financing of working capital.
DECEMBER	Corporate financial policy – Shareholder value creation – Interface of financial policy and strategic management – Financial goals systems.

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I SEMESTER
1.5 Quantitative Techniques for Accounting and Finance

| MONTH	SYLLABUS
AUGUST	Geometric progression, mathematics of finance, Linear programming, problem formulation, graphical method and simplex method of solution, product mix problems, other managerial applications.
SEPTEMBER	Probability- basic rules, random variables, probability distributions, expected value, variance, Normal distribution, risk analysis in capital – budgeting.
OCTOBER	Network analysis, PERT,CPM-drawing the network activity times, event times, critical path, total and free slack-cost time trade off and crashing.
NOVEMBER	Inventory models, EOQ model, sensitivity analysis, model with one price break, inventory control systems in practice.
DECEMBER	Decision making under uncertainty, different decision criteria, decision trees. Simulation, model building, the process, problems with special reference inventory and financial management.
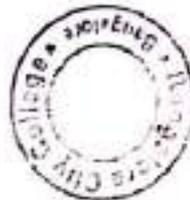
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I SEMESTER
1.6 Financial Markets and Services

MONTH	SYLLABUS
AUGUST	Nature and role of financial system, structure of financial system, equilibrium in financial markets, financial system and economic development, financial intermediation, role and patterns.
SEPTEMBER	Introduction to financial markets, call money market, treasury bill market, market for commercial paper and certification of deposit, government securities market, discount market, discount and finance house of India its role and functions. Industrial securrities market, stock market, OTCEI, NSE, NIFTY, NASDAQ, Markets for futures, options and other derivatives.
OCTOBER	Financial Services: Leasing, Factoring, Credit rating, Hire purchase, Consumer durables financing, Merchant banking agencies, underwriting, Funds transfer, Acceptance, Stock holding, Loan syndication, Custodial service, Depository services, Venture capital finance.
NOVEMBER	Regulatory framework for financial markets and institutions, regulation v/s deregulation, role of reserve bank of India, and its bank rate and open market operations policies, Interest rate structure, various theories, interest rate of India, SEBI.
DECEMBER	Role of Banks in Financial System: Functions of Commercial Banks- Definition of Banking, functions of banking (Primary & Secondary) – Products – Deposits & Advances – Financial Sectro reforms – 1991, 2004 – Income recognition, Asset classification & Provisioning norms (IRAC Norms) – Capital adequacy norms (Basel I,II & III)- Banks exposure norms – Rating of Banks – Camels Rating.
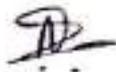
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I SEMESTER
1.7 Business Legal Systems

MONTH	SYLLABUS
AUGUST	Meaning of law, Classification of legal rules, scope of legal system, directives and problems of legal system. The constitution of India with special reference to economic principles enshrined in the constitution – decisions by the supreme court.
SEPTEMBER	Corporate Laws: Industries (Dev and Reg) Act 1951 and Industrial Licensing, Objectives, important provisions, amendments. Infringement, threats and libel MRTP Act: MRTP commission, jurisdiction, power of the commission, control of monopolistic trade practices, control of restrictive trade practices, evaluation of public interest. The Consumer Protection Act – features, issues and court decisions.
OCTOBER	Laws relating to Finance: the Securities and Exchange Board of India (SEBI), need for SEBI, establishment and legal status of SEBI, functions and power of SEBI, power confirmed by the act to SEBI. FEMA – Salient features, directions, major provisions.
NOVEMBER	Intangible aspects of property. The intellectual property Acts in India – Copyright, Trade mark, patents etc., Information Technology Act 2000. International Intellectual Property Organisations – treaties and International Transfer of Intellectual Properties. GATT/WTO and GATS, TRIMS, TRIPS, UR Round. Adjudicating authority and their enforcement.
DECEMBER	Environmental Laws – Water Act 1974, Air Act 1981, The Environmental Protection Act 1986.

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II SEMESTER
2.1 CONTEMPORARY ISSUES IN ACCOUNTING

| MONTH	SYLLABUS
FEBRAURY	Financialreporting - concept - objectives - qualities and benefits. Developments on financial reporting objectives - true blood report - the corporate report (UK) Corporate Reporting in India - segment reporting - interim reporting – Value Added reporting.
MARCH	Corporate social responsibility accounting - social accounting and social auditing - state of art of social accounting - objectives and standards of social reporting - empirical studies of social measurement and reporting - environmental accounting , reporting and audit – CSR in Indian Context.
APRIL	Human resource measurement - need for human resource accounting (HRA) , objectives and importance - factors influencing HRA - approaches to measure HRA - Cost approach - different methods - value approaches different models - Indian practices of HRA.
MAY	Accounting for changing prices - limitations of financial statements - nature of price changes - problems created by price changes in historical cost accounts - methods of accounting for inflation - current purchasing power accounting - current cost accounting - inflation accounting in different countries, UK, USA & India, Sandilands Report.
JUNE	Accounting for intangibles Accounting for leases and reporting by lessors and lessees, accounting for different types of leases. Pension costs accounting - pension schemes - accounting perspective – Brand Accounting – Balanced Scorecard.

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II SEMESTER
2.2 Information Technology for Accounting and Finance

MONTH	SYLLABUS
FEBRAURY	Information Systems and their role in businesses, types of information systems – Operation support system, management support system, TPS, PCS, EIS, MIS, OAS, DSS, GDSS, expert systems, artificial intelligence, Information systems at levels of management, HRIS, Accounting Information system, Marketing information systems, manufacturing and production information system, Developing information systems — systems analysis and design, SDLC – types, introduction to ERP, introduction to cloud computing.
MARCH	IT-GRC (Governance, Risk and Compliance), Information system audit standards – ISO 27001 – Information security and management standard (ISMS), Capability Maturity Model (CMM), Control Objectives for Information and related Technology (COBIT) – IT Governance model, Health Insurance Portability and Accountability Act (HIPAA), Statement on Auditing Standards (SAS) for service organization.
APRIL	Overview of specific section of IT ACT 2008 different sections, electronic contracting, digital signature, cyber offence, certifying authorities, Concepts of Cyber forensics/Cyber Fraud investigation, Overview of Information Security Standards - ISAE 3402/SA 402, ITIL.
MAY	Database definition, types of structures, DBMS software-creating, editing, modifying, searching and sorting databases, creating and printing formatted reports, designing custom screen displays, multiple data files, executing queries and relational algebra.
JUNE	Spread sheet software - range, formulas, types of functions, types of charts, what-if analysisGoal Seek Analysis, data validation, subtotal, Applying Absolute (Fixed), statistical functions – min, max, count, countif, countA, stdev, mean, mode, median, variance, correlation, percentile, quartile, rank, financial functions – PV, NPV, NPER, PMT, RATE, IRR, SLN, SYD, IPMT, DB, logical functions – if, else, and, or, not, multiple if statements, Vlookup, Hlookup, sorting data - types, conditional formatting, page layout - settings, filtering data, data analysis - descriptive statistics, pivot tables.
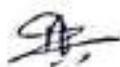
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II SEMESTER
2.3: Direct Taxes Planning

MONTH	SYLLABUS
FEBRAURY	Basic framework of direct taxation - principles of direct taxation - appraisal of annual Finance Act, tax planning and its methods, advance tax rulings.
MARCH	Salient features of company taxation, scheme of taxing business income of companies, deductions / allowances, disallowances and depreciation.
APRIL	Computation of taxable income of companies - set - off and carry forward of losses - deductions under Section 80.
MAY	Tax planning with respect to amalgamation and mergers, multinational companies, double taxation treaties, ventures and foreign collaborations - tax consideration in making or buy, own or lease, retain or replace. Procedure for assessment - deduction of tax at source, advance payment of tax - refunds - appeals and revision.
JUNE	Wealth tax for companies - charging section - exempt wealth , computation of net wealth - wealth tax planning.

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II SEMESTER
2.4 : SECURITIES ANALYSIS AND PORTFOLIO MANAGEMENT

MONTH	SYLLABUS
FEBRAURY	Investment management, nature and scope, investment process, investment planning, ingredients of successful investment strategy, investment avenues, types of financial assets, components of investment risk.
MARCH	Valuation of securities, risk and return, valuation of fixed income securities, market interest rates, valuation of warrants and convertibles, option pricing models, valuation of equity shares, valuation models, earning multipliers, timing of purchase and sale of equity shares.
APRIL	Securities analysis, analysis of variable income securities, fundamental analysis, technical analysis, company analysis, evaluation of industry life cycle theory, security price movements, efficient market hypothesis, Random Walk.
MAY	Portfolio theory, Markowitz's graphical portfolio analysis, portfolio performance evaluation, Sharpe's portfolio performance measure, Treynor's portfolio performance measure, Jensen's investment performance measure, asset pricing theories, portfolio insurance, portfolio management for individual and institutions.
JUNE	Analysis of alternative investments, hedging and arbitrage pricing theories, financial futures, international portfolio management, emerging opportunities.

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II SEMESTER
2.5 : Strategic Cost and Management Accounting

MONTH	SYLLABUS
FEBRAURY	Importance of analyzing and managing costs. Cost Management: areas of cost management, cost management and cost accounting, tools and techniques of cost management, role of cost accounting in strategic planning and management control.
MARCH	Strategic Cost Management issues in different elements of cost: material, labour and overheads; product design, value analysis and value engineering, strategic analysis of cost, Business process re-engineering.
APRIL	Activity based costing: inadequacies of traditional methods of overhead absorption, concept of ABC, Kaplan and Cooper's approach to ABC Cost drivers and cost pools, main activities and its cost drivers, allocation under ABC-Characteristics, steps, implementation and benefits of ABC
MAY	Pricing decisions product profitability decisions and cost management, major influences on pricing, product cost categories, costing and pricing approaches, cost plus pricing, target costing for target pricing, transfer prices and budgeting planning and control, multinational pricing market-based transfer prices, cost based transfer prices.
JUNE	Life Cycle Costing – activities and phrases in product life cycle, short product and extension of product life cycle, Turing point indices in product life cycle; Just in time approach: concept, philosophy of JIT, sources of waste, aims and objectives of JIT methodology in implementation of JIT, Limitations of JIT Costing Value Chain analysis and TQM.

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II SEMESTER
2.6 Asset Liability Management

MONTH	SYLLABUS
FEBRAURY	Introduction: Emerging scenario's in Banking Industry – Significance of asset liability management – ALM guidelines in Indian Banks – ALM practice in Indian Banks. Asset liquidity – gap analysis – duration analysis – time value of money – Study of Bank Balance sheet Items – Bank Balance Sheet analysis through ratio analysis.
MARCH	Types of risk (Anatomy of risk): liquidity of risk – operational risk – credit risk – market risk – interest rate risk – commodity risk – exchange risk.
APRIL	Measuring and Monitoring risk: Risk scenario – interest rate sensitivity analysis – stress test analysis of macroeconomic environment (market conditions) – Behavioral pattern of low cost / term deposits – Forecasting interest rate scenario.
MAY	Relevance and ALM practicality in Indian Banking scenario: Connectivity among R/O/BO/HO – Source of data – accuracy of data – reliability of data – procurement of appropriate software – special skill to Monitor/measure risk.
JUNE	Funds transfer pricing and performance measurement. Central funding unit concept – funds transfer pricing as on ALM tool – removal of interest risk from Business unit – various technique of transfer pricing.

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II SEMESTER
2.7 Business Research Methods

MONTH	SYLLABUS
FEBRAURY	Research: Meaning, Purpose, Scientific method, types of research; scope of business research. Review of literature: need, purpose, notes taking.
MARCH	Selection and formulation of a research problem, formulation of hypothesis, operational definition of concepts, sampling techniques. Research Design: Meaning, nature, process of preparation, components of research design.
APRIL	Data: Sources of data, methods, of collection; observation interviewing, mailing; tools for collection data; interview schedule, interview guide, questionnaire, rating scale, socio-metry, check list; pre-testing of tools, pilot study.
MAY	Processing of data; checking, editing, coding, transcription, tabulation, preparation of tables, graphical representation.
JUNE	Analysis of data; Simple statistical techniques and their uses. Testing of Hypothesis, Research Applications – market survey. Report – Writing: Planning report writing work-target audience, type of report, style of writing synoptical outline of chapters; steps in drafting the report.

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III SEMESTER
3.1 BusinessEthics and Corporate

MONTH	SYLLABUS
AUGUST	**Ethics in Business:** Definition of business ethics – A model of ethics; ethical performance in business; managerial values and attitudes; ethical congruence; managerial philosophy; types of ethics ; code of ethics; importance of ethics in business.
SEPTEMBER	**Ethical Theories and Corporate social responsibility:** Cognitivism and non-cognitivism; consequentialism versus non-consequentialism- Utilitarianism; Religion and ethics; Kantianism versus Utilitarianism; Business and Religion; Ethics and Social responsibility: Corporate social responsibility; changing expectations; diagnostics model of social responsiveness; four faces of social responsibility- ethical climate in companies.
OCTOBER	**Ethics in Marketing**: Ethical dilemmas in marketing- unethical marketing practices- ethical and social issues in advertising- common deceptive marketing practices-role of consumerism. **Ethics in Finance:** Unethical financial practices – creative accounting- hostile takeovers- tax evasion- corporate crimes.
NOVEMBER	**Ethics in Human Resources Management:** Human resource system- psychological expectanc y model- Human resource management practices and ethical implications- Individualism versus collectivism in human resource management practices **Ethics and Information Technology:** Ethical issues relating to computer applications; security threats – computer crime- computer viruses- software piracy- hacking – computer crime prevention – ethical dilemmas and considerations.
DECEMBER	Concept of corporate governance – importance - Corporate governance and agency theory. Benefits of good corporate governance - present scenario in India. Reforming Board of Directors, Birla committee, Naresh Chandra Committee, Narayana Murthy committee, Corporate Governance code future scenario.

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III SEMESTER

3.2 Goods and Service Taxes

| MONTH	SYLLABUS
AUGUST	Introduction : Special features of indirect tax levied, all pervasive nature, contribution to Government Revenues, fiscal preference as instrument of planning and development—role of indirect tax laws.
SEPTEMBER	Central Excise and Salt Act 1944 : Nature of levy of excise duty, classification of excisable goods, price lists and their significance, valuation of excisable goods, central excise licensing – detailed procedure. Clearance of excisable goods – procedure under physical control, compounded levy scheme and self-removal procedures, gate passes, personal ledger account and daily stock accounts. Exemption from excise duty levies – nature and types of exemption notifications. Procedure for clearance of samples, semi-finished goods and return and retention of duty paid goods. CENVAT, CENVAT on Capital goods. Tariff item 68 – significance of the levy, exemption and clearance procedure. Set off of duties – meaning, schemes of set-off and details of procedure. An overview of accounts, records and returns to be maintained/filed under the Act. Adjudication and appeals – detailed procedure before various excise authorities and the appellate tribunal – Transfer pricing
OCTOBER	Customs Act 1962 : Details of procedure in relation to the levy, collection and exemption from customs duties – documents to be prepared and presented to customs authorities, valuation of goods, clearance of imported and exported goods procedure. Detailed procedure in relation to transportation and warehousing – relevant rules and regulations. Drawback of customs duties paid, preparation and submission of drawback claim forms. Adjudication and appeals before the customs authorities and the appellate Tribunal.
NOVEMBER	Central Sales Tax Act 1956 : Constitutional background of CST, Inter-state trade and commerce restriction of powers of taxation on sales by state – liability of sales tax – inter-state sale – occasions movement of goods, sale by transfer of documents, sale under CST – transactions which are not sales – persons liability of sales tax. Persons liable to pay CST – exemptions from CST – sales outside the state – sale in course of import/export – declared goods, forms of declaration. KST – VAT, advantages, disadvantages. Etc.
DECEMBER	G.S.T (GST should be taught after introduction by the Government along with the amendments time to time)

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III SEMESTER
3.3 Forex and Derivatives

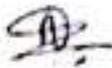| MONTH	SYLLABUS
AUGUST	Foreign exchange market – structure and characteristics, exchange rate, quotation at the foreign exchange market, settlement of transaction, arbitrage – interest arbitrage, arbitrage with and without transaction costs, bid-ask spreads, forward contract and future contract, swaps, swap position, option forwards, interest rate parity theory.
SEPTEMBER	Currency and interest rate future – hedging and speculation, currency option, mechanism of future and option trading, option pricing models, future options, relationship between options and futures, currency option – speculating and hedging.
OCTOBER	Management of foreign exchange risk, types of exposure, tools and techniques of foreign exchange risk management, management of translation exposure, translation methods, managing transaction exposure – forward market hedge, money market hedge, option market hedge, internal hedging strategies, management of economic exposure.
NOVEMBER	Management of interest rate exposure – nature and measurement – Forward Rate Agreement (FRAs), interest rate options, caps, floors and collars, financial swaps – Interest rate swaps in the Indian market, credit derivatives.
DECEMBER	Meaning of Derivatives - Classification of Derivatives -Global - Derivatives Market - Factors Contributing To The Growth of FDS - Environmental Factors - Internal Factors- Derivatives Market – Evolution The Role of Derivatives Markets - Financial Derivatives – The Challenges - Development of Derivatives Market In India.
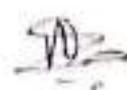
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III SEMESTER

3.4 Insurance and Risk Management

MONTH	SYLLABUS
AUGUST	Risk, Peril, Hazard, Types of Risk - pure and speculative Risks, Other types of Risk – Dynamic, Static, Fundamental and Particular Risks, Risk Management, Techniques, Insurance as tool of Risk Management, Classification of Insurance, Difference between Life and Non Life Insurance.
SEPTEMBER	Principles of Insurance, Indian Contract Act, Utmost Good faith, Insurable Interest, Indemnity, Subrogation, Contribution, Proximate Cause. Study of history of Insurance, PFRDA and Pension Schemes.
OCTOBER	Life Insurance Products, Basic Products, Traditional Products, Endowment, Whole Life, Money Back, Unit linked products. Pension and Annuity – Principles of product development, Group Insurance. Non Life Products, Fire, Marine, Motor, Liability, Personal Accident, Health Insurance, Reinsurance – Government schemes, valuation methods, Life fund – Bonus.
NOVEMBER	Underwriting, Factors Considered – Physical Hazard, occupational Hazard and Moral Hazard, Numerical method of Underwriting, terms of acceptance, documentation. Insurance documents: Principles of risk management, financial support to families and society, Rating – Mortality table - premium calculations, factors considered in rating of Non life products, tariff and non tariff, market agreements. Servicing of policies, claim settlement in insurance, IRDA regulation relating to claim settlement.
DECEMBER	IRDA Journal and Annual reports – its analysis and data interpretation, Micro Insurance products – its awareness, distribution, social insurance. Insurance laws – its amendments and effect on the insurance market, Intermediaries in Insurance – regulation governing them and alternative channels – on line marketing, e-marketing – principles – safety measures. Income tax and Insurance, Customer education.

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III SEMESTER

3.5 Advanced E-Business

MONTH	SYLLABUS
AUGUST	Threats in e-commerce, Encryption overview, Elements of an encryption system, Secret key encryption, Public-key encryption, Digital signatures, Digital Certificates, Types of Cryptographies, Secure Sockets Layer (SSL), Smart Cards and its applications Electronic Data Interchange- Evolution, uses, Benefits, Working of EDI, EDI Standards, EDI Components, EDI Services, ANSI X12 and EDIFACT
SEPTEMBER	Overview of Electronic Payment Systems, Cybercash, Smart Cards, Electronic Banking - types, Electronic Fund Transfers - Digital Token-based Electronic Payment Systems, E-cash, e-Cheque, Payment Systems on internet- Risk of Electronic Payment Systems, Secure Electronic Transactions (SET) Protocol
OCTOBER	M-Commerce - Introduction - Infrastructure Of M-Commerce - Types Of Mobile Commerce Services - Technologies Of Wireless Business - Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non-Internet Applications/services in M-Commerce - Wireless/Wired Commerce Comparisons
NOVEMBER	A Framework For The Study Of Mobile Commerce - NTT Docomo's I-Mode - Wireless Devices For Mobile Commerce - Towards A Classification Framework For Mobile Location Based Services - Wireless Personal And Local Area Networks - The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks, 2G, 3G and 4G technology
DECEMBER	Mobile Banking - Mobile Banking Technologies, Mobile Banking services, Applications, Mobile payments - types of mobile payments - mobile phone based, SIM card based, WAP based, mobile wallet, USSD, SBGMPS, Mobile payment service providers - paypal Here, Square, Google wallet, Isis, M-Pesa, MobiPay, NTT DoCoMo (Osaifu-Keitai), Reliance m-pay, Finance and Accounting Mobile Apps - Mint, Expense Manager, Money Lover, Financius Expense Manager, Toshl Finance Budget & Expense

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IV SEMESTER
4.1 Strategic Management

| MONTH	SYLLABUS
FEBRAURY	Strategic Management – Introduction, elements of a Strategy, Sources of Business Strategies, Factors Shaping Corporate Structure, Strategy and Structure Strategic Management Process, Developing Corporate Vision, Mission, Goals and Objectives.
MARCH	Industry and Competitive Analysis: Component of Internal External Domestic and Global environment, Environmental Scanning Techniques, Analysis of Economic, Legal Competitive Capabilities and driving forces, Identification of Business Opportunities, Building Care Competencies and Competitive advantage. Strategy Analysis and Choice, Strategy formulation framework.
APRIL	Grand Strategies: Generic, Aggressive and Defense Strategies, Competitive Strategies for domestic and Global Business, Modes of Strategy Selection Expansion, Retrenchment, Stability, Conglomerate Strategies and Variants, Mergers, Acquisition Diversification, integration, Disinvestment Turnaround, and Related Contemporary, Neo-generic Strategies, Case work with current examples.
MAY	Strategies for Competing in Global Markets, Growth Oriented Markets, Mature Markets, Saturated Markets, Fragmented Markets, New Business Models, Matrix and Strategies for online Economy, Factors Determining Strategic Choice – Corporate Preference, Managerial Philosophy and Power Relations, Social Responsibility, Corporate Governances and Ethics.
JUNE	Strategy Implementation and Evaluation – Formulating Harmonization of Business Activities, Resource Allocation, Managing Human Resource, Managing Change, Leadership, Strategy Supporting Culture, Communication and Behavioral implementation, Strategic Evaluation - Framework of Evaluation, Essential Features of Strategic Corporate Evaluation Systems, Guidelines for Effective Strategic Management, Contemporary Strategic Control Mechanisms.

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IV SEMESTER

4.2 International Accounting

MONTH	SYLLABUS
FEBRAURY	International accounting meaning its need in the context of increasing complexity and volume of transactions - -major international differences in financial reporting and their classifications.
MARCH	Financial reporting in United States, United Kingdom, Australia, France, Germany, Netherlands and Japan. (The above module is supposed to focus on legal issues, accounting standards, consolidation of accounts, tax systems etc).
APRIL	Special issues in international accounting - consolidation accounting - foreign currency translation – segmental reporting - foreign exchange risk management- transfer pricing.
MAY	International Financial Statement Analysis :Introduction – need for analysis – techniques of analysis – prospective analysis – factors affecting financial analysis – access, reliability, language and terminology barriers,, timeliness of information, foreign currency issues, formats.
JUNE	IFRS an Overview: Structure of IFRS foundation and IASB – Standard setting process – IFR Standards issued till date differences between US GAAP and IFRS and their adoption.
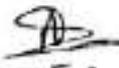
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IV SEMESTER
4.4 Strategic Financial Management

MONTH	SYLLABUS
FEBRAURY	Strategic Decision Making Frame Work – Strategic Financial Management – Dynamics of Strategic Financial Management – Issues in Strategic Financial Management
MARCH	Project Management from financial perspective – Product Life Cycle & Financial impact – Development of project reports – contents thereof – sourcing of funds for a project – traditional and alternative modes - Private Equity – Hedge Funds – Venture Capital – Crowd source funding - Non Financial Institutional Funding – Corporate Finance needs for SME - Foreign Exchange Management
APRIL	Corporate Valuation – Dynamics of valuation – Approaches to Corporate Valuation – Discounted Cash Flow Approach - Adjusted Book Value Approach – Comparable Company Approach – Capitalized Earning Approach - Cost to Create Approach – Excess Earning Approach – Valuing specific intangible approach IPR, Brand, Human Capital – Concept of Economic Value Added – Concept of Realizable Value & Replacement Value
MAY	Mergers & Acquisition and Corporate Restructuring - Rationale for Mergers – Types of Mergers - Merger Decisions – Business & Economic Reasons – Strategy – Terms of the Transaction – Proposed value creation post-merger & Post Merger Analysis –Minority Shareholder Management - Accounting for Mergers & Acquisition – Corporate Restructuring - Symptoms warranting restructuring – Turnaround Strategies
JUNE	Corporate Governance & Risk Management -Fundamentals of Corporate Governance – Governance Model –Roles of Audit Committees, Internal Control, Internal Audit & External Auditor – Linkages between Governance, risk management & audit – Case Study.

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I SEMESTER
1.1 MONETARY SYSTEM

MONTH	SYLLABUS
AUGUST	Money: Meaning, definition, functions. Role of money, value of money, theories of Value of money, quantitative theory, Friedman's restatement of the quantitative theory – Keynes theory of money.
SEPTEMBER	Monetary system: The Gold standard – paper currency standard – principles of note issue; systems of note issue – essentials of a sound currency system – paper gold or SDR
OCTOBER	International monetary system – Evaluation of International monetary system, Bi – metallion – classical gold standard – interwar period Bretton woods system – The flexible exchange rate – current exchange rate regime – fixed VS flexible exchange rates.
NOVEMBER	International financial system: Introduction – role of financial markets - participants – elements – forex market – Euro currency market – Euro bond market – forward and future markets for foreign exchange.
DECEMBER	Balance of payment – Balance of Trade, Equilibrium in BOP – Devaluation and Depreciation; Current and Capital account convertibility – Recent development in foreign capital flows.

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I SEMESTER
1.2 INTERNATIONAL BUSINESS

MONTH	SYLLABUS
AUGUST	Nature of International Business (IB). Drivers of IB. IB and domestic business compared. Routes of globalisation, players in International Business. Evolution of IB. Theories of IB. Mercantilisms, Theory of Absolute Advantage. Theory of Comparative Advantage. National Competitive Advantage. Environment of IB. Political, legal, technological, cultural, economic factors.
SEPTEMBER	International Strategic Management – nature, process – scanning global environment – formulation of strategies – implementation of strategies – evaluation and control. Organisational designs for IB. Factors affecting designs. Global product design. Global area design. Global functional design. International division structure.
OCTOBER	International Human Resource Management (IHRM). IHRM and domestice HRM compared. Scope of IHRM. HR planning. Selection of expatriates. Expat training. Expat remuneration. Expat failures and ways of avoiding. Repatriation. Employee relations. International operations Management. Nature - operations management and competitive advantages. Strategic issues – sourcing v/s vertical integration, facilities location, strategic role of foreign plants, international logistics, managing service operations, managing technology transfers. International Financial Management – Nature - compared with domestic financial management. Scope – current assets management, managing foreign exchange risks, international taxation, international financing decision, international financial markets, international financial investment decisions.
NOVEMBER	International financial accounting – national differences in accounting, attempts to harmonise differences. Financing foreign trade – India's foreign trade, balance of trade and balance of payments, financing export trade and import trade. International Marketing – nature compared with domestic marketing. Benefits from international marketing. Major activities – market assessment, product decisions, promotion decisions, pricing decisions, distribution decisions.
DECEMBER	Integration between countries. Levels of integration. Impact of Integration. Regional trading blocks – EU, NAFTA, Mercosur, APEC, ASEAN, SAARC, Commodity agreements. GATT, WTO – functions, structure, agreements, implications for India. International Strategic Alliances – Nature - Benefits. Pitfalls, scope, managing alliances.

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I SEMESTER
1.3 MACROECONOMICS FOR BUSINESS DECISIONS

MONTH	SYLLABUS
AUGUST	Introduction to economics, macro economics, and its interface with business and industry. Resources and goals of an economic systems, free market and mixed economy.
SEPTEMBER	National income and product concept, computation of national income and related aggregates, problems in computation of national income.
OCTOBER	Consumption, Savings, investment, marginal propensity to consume, marginal propensity to save, multiplier, paradox of thrift, income and employment determination.
NOVEMBER	Money, monetary system, role of credit, financial inter-mediaries, level and structure of interest rates - interest and macroeconomic equilibrium, central bank, monetary management and policy. Fiscal policy – Objectives, tools, fiscal variables and the public debt, co-ordination of monetary and fiscal policies.
DECEMBER	Economic growth, factors determining economic growth, growth models, capital output ratio, problems of growth. Policies towards economic stability, business cycle, inflation and deflation, control measures, conflicts between growth and stability.

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I SEMESTER
1.4 INFORMATION SYSTEMS AND COMPUTERS

MONTH	SYLLABUS
AUGUST	Information Systems and their role in businesses, types of information systems – Operation support system, management support system, TPS, PCS, EIS, MIS, OAS, DSS, GDSS, expert systems, artificial intelligence, Information systems at levels of management, HRIS, Accounting Information system, Marketing information systems, manufacturing and production information system, Developing information systems – systems analysis and design, SDLC – types, introduction to ERP, introduction to cloud computing.
SEPTEMBER	IT-GRC (Governance, Risk and Compliance), Information system audit standards – ISO 27001 – Information security and management standard (ISMS) , Capability Maturity Model (CMM), Control Objectives for Information and related Technology (COBIT) – IT Governance model, Health Insurance Portability and Accountability Act (HIPAA), Statement on Auditing Standards (SAS) for service organization
OCTOBER	Overview of specific section of IT ACT 2008 different sections, electronic contracting, digital signature, cyber offence, certifying authorities, Concepts of Cyber forensics/Cyber Fraud investigation, Overview of Information Security Standards - ISAE 3402/SA 402, ITIL. Database definition, types of structures, DBMS software-creating, editing, modifying, searching and sorting databases
NOVEMBER	Creating and printing formatted reports, designing custom screen displays, multiple data files, executing queries and relational algebra. Spread sheet software - range, formulas, types of functions, types of charts, what-if analysis-Goal Seek Analysis, data validation, subtotal, Applying Absolute (Fixed), statistical functions – min, max, count, countif, countA, stdev, mean, mode, median, variance, correlation, percentile.
DECEMBER	Quartile, rank, financial functions - PV, NPV, NPER, PMT, RATE, IRR, SLN, SYD, IPMT, DB, logical functions – if, else, and, or, not, multiple if statements, Vlookup, Hlookup, sorting data - types, conditional formatting, page layout - settings, filtering data, data analysis - descriptive statistics, pivot tables.

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I SEMESTER
1.5 ADVANCED FINANCIAL MANAGEMENT

| MONTH	SYLLABUS
AUGUST	Introduction – Finance Functions – Financing decisions – Capital structure theories – net income approach, Net operating income approach – The Traditional approach – Modighani – Miller hypothesis – capital structure planning and policy – elements of capital structure EBIT – EPS approach, Valuation approach, cash flow approach.
SEPTEMBER	Investment Decisions – Capital Budgeting decisions – Nature – type – Evaluation criteria – DCF – NPV –IRR – Reinvestment assumption and modified IRR – Varying opportunity cost of capital – Investment decision under inflation – Investment Analysis under inflation. Complex investment decisions – projects unit, different project lives, investment timing and duration – Replacement of an existing asst – Investment decisions under capital rationing.
OCTOBER	Risk Analysis in Capital Budgeting – Nature of Risk/statistical techniques for Risk analysis – Risk analysis in practice – sensitively analysis – Scenario analysis simulation analysis - Decision trees for sequential investment decisions – utility theory and capital budgeting.
NOVEMBER	Corporate Restructuring – Mergers and Acquisitions, Corporate Restructuring – Valuation under M&A: DCF approach Financing a merger – significance of PE Ratio and EPS analysis – Accounting for M&As – Leveraged buyouts.
DECEMBER	Derivatives for managing financial risk, Introduction – Derivatives & Risk hedging – Hedging instruments – Options, Futures, forwards & swaps – use of derivatives. A Survey of software packages for Financial Decisions making.

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I SEMESTER
1.6 HUMAN RESOURCE MANAGEMENT

MONTH	SYLLABUS
AUGUST	Nature and scope of Human Resource Management (HRM) objectives of HRM, HRM functions, organization of HRM department, qualities of HR Manager, personnel policies and principles, new challenges of HRM, HRM model.
SEPTEMBER	Human Resource planning, factors affecting planning, planning objective, planning process, evaluation of planning. Job analysis and design- need for and process of job analysis and design. Employee hiring: recruitment, importance, nature and international recruiting, selection, importance, process, recruitment and selection practices in India. Training and development- nature, importance. Training, inputs, training process, recent trends in training, training practices in India.
OCTOBER	Job evaluation, nature, objectives, process of evaluation, Performance and appraisal: nature, importance, process of evaluation, challenges. employee compensation, wage concepts and principles, factors affecting compensation plans, incentives- group and individual plans, wage and salary policies in India.
NOVEMBER	Employee safety and health – reasons for accidents and ways of avoiding accidents, need for safety, safety policy: Health – physical, mental, noice control, work stress, AIDS, alcoholism and drug abuse, violence at work place, workplace harassment. Participative management, scope and ways of participation, labour welfare – approaches and types. Industrial relation – causes for disputes and ways of resolving disputes. Trade union– relevance of unions.
DECEMBER	Human resource audit, audit of corporate strategy, audit of human resource function, audit of managerial compliance, audit of employee satisfaction. Ethical issues in HRM –HR ethical issues, managing ethics.
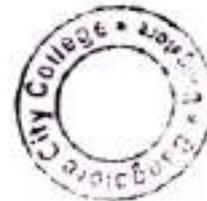
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I SEMESTER
1.7 COMMUNICATION SKILLS

MONTH	SYLLABUS
AUGUST	Importance of Communication, Forms of Communication, Communication Network of the Organisation; Process of Communication: Different stages, Difference between oral and written communication. Fundamentals, Barriers and Gateways, Public Speaking, Effective Power point presentations, body language, non-verbal, facial expression, voice modulation, eye contact, audience research.
SEPTEMBER	Questions from the audience, Communication and emotional intelligence, Creativity in oral communication, Communication through telephonic, Video and Skype, Group Discussion. Writing an effective Report: Stages of writing, Style and Tone; Five Ws and one H of Report writing, Divisions, Numbering and use of visual aids, Creativity in written Communication, Use of Picture.
OCTOBER	Diagram in written communication, Writing Commercial letters, E-mail Messages, Maintaining a Diary, Job application and Resume writing. Importance and need, Types, Active and Empathic listening, Listening and Judgment, Developing skills, listening and understanding, Anatomy of Poor Listening, Features of good listener.
NOVEMBER	Advantages and disadvantages of utilizing the team work; Characteristic features of successful teams; stages of the development of a team; team roles; challenges in team working, forms of non-team behaviour.
DECEMBER	Conditions of negotiating; strategies of negotiating (Win-win, win-loss); participative negotiations; negotiating tactics; cognition and emotions in negotiating; negotiating and ethics. Types and sources of conflicts; the influence of various ultures on the solving of conflicts.

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II SEMESTER
2.1 INDIAN BANKING

MONTH	SYLLABUS
FEBRAURY	Evolution of Banking Institutions in India-Role of Joint stock banks in India, Presidency banks, Imperial Banks, State Bank of India, Commercial Banks, and Nationalized Lead Banks, Regional Rural Banks (RRBs), Local Area Banks, Banking reforms after 1990. Private banks and Foreign Banks- Salient Features, Objectives, Functions.
MARCH	RBI and its Role, monetary and credit policy, CRR,SLR in Banks, Banking system and Banks in India, Banking Regulation Act 1949.
APRIL	Monitoring and Follow-up, IRAC Norms (i.e, Income Recognition and Asset Classification norms), Non-performing Assets, Securitization Act. E-Banking, Payment system, settlement system, Business and profit planning
MAY	BASEL I, II and III, CRAR and RBI Prudential norms on New capital Adequacy and framework.
JUNE	Banking Innovations-New Technology in banking, E-Services, debit and credit cards, Internet Banking, ATM, Electronic Fund Transfer, MICR, RTGC, DEMAT

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II SEMESTER
2.2 RISK MANAGEMENT

MONTH	SYLLABUS
FEBRAURY	Definition of Risk and uncertainty- Classification of Risk, Sources of Risk-external and internal. Risk Management-nature, risk analysis, planning, control and transfer of risk, Administration of properties of an enterprise, provision of adequate security arrangements. Interface between Risk and Insurance- Risk identification, evaluation and management techniques, Risk avoidance, Retention and transfer, Selecti9on and implementation of Techniques. Various terminology, perils, clauses and risk covers.
MARCH	Introduction to Risk Management, Types of Risk, Evolution of Risks, Steps in risk management, RBI guidelines. Credit Risks Credit Risk Management models - Introduction, Motivation, Funtionality of good credit.
APRIL	Risk Management models- Review of Markowitz's Portfolio selection theory –Credit Risk Pricing Model – Capital and Rgulation. Risk management of Credit Derivatives. Market Risk (includes asset liability management) Yield Curve Risk Factor-Domestic and global contexts-handling multiple risk factor-principal component analysis value at Risk (VAR) – implementation of a VAR system- Additional Risk in fixed income markets-Stress testing- Bank testing.
MAY	Operational Risk - Introduction-typology of operational risk- measuring operational risk -Who manages operational risk- key to implementing bank-wide operational risk management- why invest in operational risk management. Technology Risk- Best practice –operational risk systems/Solutions.
JUNE	Tools for Risk Management Derivatives Futures, Options, Swaps, ECGS

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II SEMESTER
2.3 ADVANCED E-COMMERCE AND MOBILE COMMERCE

MONTH	SYLLABUS
FEBRAURY	Threats in e-commerce, Encryption overview, Elements of an encryption system, Secret key encryption, Public-key encryption, Digital signatures, Digital Certificates, Types of Cryptographies, Secure Sockets Layer (SSL), Smart Cards and its applications. Electronic Data Interchange- Evolution, uses, Benefits, Working of EDI, EDI Standards, EDI Components, EDI Services, ANSI X12 and EDIFACT
MARCH	Overview of Electronic Payment Systems, Cybercash, Smart Cards, Electronic Banking – types. Electronic Fund Transfers - Digital Token-based Electronic Payment Systems, E-cash, e-Cheque, Payment Systems on internet- Risk of Electronic Payment Systems. Secure Electronic Transactions (SET) Protocol
APRIL	M-Commerce - Introduction – Infrastructure Of M–Commerce – Types Of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non – Internet Applications/services in M–Commerce – Wireless/Wired Commerce Comparisons
MAY	A Framework For The Study Of Mobile Commerce – NTT Docomo's I – Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks – The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks, 2G, 3G and 4G technology
JUNE	The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portals – Factors Influencing The Adoption Of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – M–Commerce In The Automotive Industry – Location – Based Services: Criteria For Adoption And Solution Deployment – The Role Of Mobile Advertising In Building A Brand – M–Commerce Business Models

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II SEMESTER
2.4 BUSINESS RESEARCH METHODS

MONTH	SYLLABUS
FEBRAURY	Research: Meaning, Purpose, Scientific method, types of research; scope of business research. Review of literature: need, purpose, notes taking.
MARCH	Selection and formulation of a research problem, formulation of hypothesis, operational definition of concepts, sampling techniques. Research Design: Meaning, nature, process of preparation, components of research design.
APRIL	Data: Sources of data, methods, of collection; observation interviewing, mailing; tools for collection data; interview schedule, interview guide, questionnaire, rating scale, socio-metry, check list; pre-testing of tools, pilot study. Processing of data; checking, editing, coding, transcription, tabulation, preparation of tables, graphical representation.
MAY	Analysis of data; Simple statistical techniques and their uses. Testing of Hypothesis, Research Applications – market survey.
JUNE	Report – Writing: Planning report writing work-target audience, type of report, style of writing synoptical outline of chapters; steps in drafting the report.

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II SEMESTER
2.5 OPERATIONS RESEARCH & QUANTITATIVE TECHNIQUES

MONTH	SYLLABUS
FEBRAURY	Linear programming, problem formulation, graphical method and simplex method of solution, description of software packages for solving LLP, product mix problems, other managerial applications. Transportation Models, Assignment models.
MARCH	Probability- basic rules, random variables, probability distributions, expected value, variance, Normal distribution, risk analysis in capital – budgeting.
APRIL	Network analysis, PERT,CPM-drawing the network activity times, event times, critical path
MAY	Total and free slack-cost time trade off and crashing. Software packages (Description only). Inventory models, EOQ model, sensitivity analysis, model with one, price break inventory control systems in practice.
JUNE	Decision making under uncertainity, different decision criteria, decision trees. Simulation, model building, the process, problems with special reference inventory and financial managements. Critical evaluation of software.

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II SEMESTER
2.6 BUSINESS MARKETING

MONTH	SYLLABUS
FEBRAURY	**Nature of Business Marketing** What is Industrial/Business Marketing; Differences between Business and Consumer Marketing; Nature of Demand in Industrial Markets. **Organisational Buying and Buying Behaviour** Organisational Buying Decision Process; Buying Situations; Buy grid Frame Work; Buying Centre Roles; Key Members of Buying Centre. Models of organizational Buying Behaviour; The Webster and Wind Model; The Sheth Model.
MARCH	**Buyer – Seller Relationship** Buyer and Sales representative Interaction; Relationship Marketing; Sales Presentation; Negotiation; Reciprocity; Dealing with Customers' Customer; Customer Service; Management of Major and National Accounts. Relationship marketing, Managing Buyer Seller relationship, Customer Relationship Management. Defining E-Commerce, Key Elements Supporting E-Commerce, Internal Strategy implementation. **Supply Chain Management** Concept of Supply Chain Management, Strategic Role of Logistics, Business to Business Logistical Management.
APRIL	**Marketing Research and Marketing Intelligence** Nature and Scope of Industrial Marketing Research; Marketing Research Process; Industrial Marketing, Intelligence System. **Strategic Planning, Implementing and Controlling in Industrial Marketing** Role of Marketing in Strategic Planning; Strategic Planning at Corporate Level; Strategic Planning Process at Business Unit Level; Developing Industrial Marketing Plan; Implementing and Controlling Marketing Plans; Industrial Market Segmentation, Target Marketing, and Positioning.
MAY	**Product, Pricing Strategies and New Product Development** Meaning of Industrial Product; Changes in Product Strategy; Strategies for Existing Products; Product life Cycle and Strategies, Pricing Strategies Impact of Technology; High Tech Marketing; New product Classification, Development Process and Strategy. **Distribution Channels and Marketing Logistics** Alternative structures of Industrial Channels; Types of Business Intermediaries; Channel Design; Managing Channel Members. Business Logistics System; Tasks of physical Distribution; Total Distribution Cost and Customer Service.
UNE	**Business Communication** Developing Business Communication Programme; Functions performed by Industrial Advertising; Media used for Industrial Advertising. Promotion – Trade shows, Seminars, Demonstrating; Role of Indirect Marketing – On-line marketing, Telemarketing, Direct Mail; Publicity and Public Relations. Business – To – Business Selling; Team Selling Approach; Solution – Oriented effort; Entrepreneurial Philosophy. Selling Structure: Direct sales force; sales coverage through Manufacturer's representative and Distributors. Sustaining customer relationship.

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II SEMESTER
2.7MICRO FINANCE

MONTH	SYLLABUS
FEBRAURY	Meaning & definition of Finance -- Who, where, what, how & when of financial Arrangements -- Types of Financial or credit arrangements. Financial institutions – establishments -- objectives & functions -- NABARD, IFCI, SIDBI, ICICI, SFC & GRAMEEN BANKS
MARCH	Role of Commercial Banks and Rural Credit-Objectives and functions of commercial Banks-The Progress of Commercial Banks-Types of Rural Credit- Short term and long term credit-Terms and Conditions of finance-Repayment conditions-Lead Banks Scheme and Rural Credit Institutional Linkages Need for Readjustment of Rural Development Strategies Need for Sustainable Rural Development.
APRIL	Micro finance: Concept, Elements, Importance and Brief History-Sustainable community Bankingrole of Micro finance in Poverty Reduction. Meaning & Definition of Micro Credit – Micro Finance -- Features – Models – Channels – Micro Finance Institution – Introduction – establishment – objectives – their operations – pros & cons of MFI's.
MAY	Meaning of SHG's – Pattern of their functions – Funding Agencies of these SHG's – Activities of SHGs: Savings, Credit, Marketing and Insurance – Role of SHG's in Financial & Social Inclusion. Self-help, Self-help Groups and Self-help Promotion: concepts, Elements, Stages and Significances - Structure of Self-help groups - Precautions to be taken while forming the SHGs.
JUNE	Various Models of SHGs existing in India -- their features, objectives, functions – Govt. schemes – NGO Activeness – Present state - Role of NGOs in Rural Development Interface between NGOs and GOs : Need and Strategies of Non Governmental Organizations :Concept - Structure – Funding.

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III SEMESTER
3.1 BUSINESS ETHICS AND CORPORATE GOVERNANCE

MONTH	SYLLABUS
AUGUST	**Ethics in Business:** Definition of business ethics – A model of ethics; ethical performance in business; managerial values and attitudes; ethical congruence; managerial philosophy; types of ethics ; code of ethics; importance of ethics in business.
SEPTEMBER	**Ethical Theories and Corporate social responsibility:** Cognitivism and noncognitivism; consequentialism versus non-consequentialism- Utilitarianism; Religion and ethics; Kantianism versus Utilitarianism; Business and Religion; Ethics and Social responsibility: Corporate social responsibility; changing expectations; diagnostics model of social responsiveness; four faces of social responsibility- ethical climate in companies.
OCTOBER	**Ethics in Marketing:** Ethical dilemmas in marketing- unethical marketing practices- ethical and social issues in advertising- common deceptive marketing practices-role of consumerism. **Ethics in Finance:** Unethical financial practices – creative accounting- hostile takeovers- tax evasion- corporate crimes.
NOVEMBER	**Ethics in Human Resources Management:** Human resource system- psychological expectancy model- Human resource management practices and ethical implications- Individualism versus collectivism in human resource management practices **Ethics and Information Technology:** Ethical issues relating to computer applications; security threats – computer crime- computer viruses- software piracy- hacking – computer crime prevention – ethical dilemmas and considerations.
DECEMBER	Concept of corporate governance – importance - Corporate governance and agency theory. Benefits of good corporate governance - present scenario in India. Reforming Board of Directors, Birla committee, Naresh Chandra Committee, Narayana Murthy committee, Corporate Governance code future scenario. Changes is corporate governance issues as per new Companies Act 2013.

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III SEMESTER
3.2 CORPORATE FINANCIAL REPORTING

MONTH	SYLLABUS
AUGUST	**Accounting Standards:** Accounting Standards, Interpretations and guidance notes on various aspects issued by the ICAI and their applications. Overview of International Accounting Standards (IAS).
SEPTEMBER	**International Financial Reporting Standards (IFRS):** Interpretations by International Financial Reporting Committee (IFRIC), Significance vis-à-vis Indian Accounting Standards. US GAAP, Application of IFRS and US GAAP.
OCTOBER	**Corporate Financial Reporting:** Issues and problems with special reference to published financial statements; **Sustainability Reporting:** Concept of Triple Bottom Line Reporting, Global Reporting Initiative (GRI), and International Federation of Accountants (IFAC).
NOVEMBER	**Accounting and Reporting of Financial Instruments:** Meaning, recognition, de-recognition and offset, compound financial instruments, measurement of financial instruments, Hedge accounting, Disclosures; Financial Reporting by Nonbanking finance companies, Merchant Bankers, stock and commodity market intermediaries.
DECEMBER	**Developments in Financial Reporting:** Value Added Statement, Economic Value Added, Market Value Added, Shareholders' Value added, Human Resource Reporting, and Inflation Accounting.

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III SEMESTER
3.3 ACCOUNTING FOR MANAGERIAL DECISIONS

| MONTH	SYLLABUS
AUGUST	Decision making process, Database for decision-making, Cost-based Decisionmaking. Marginal Costing and Short term Decisions and pricing, Application of short term decision models: key factors, diversification of products, profit planning, Product mix decision.
SEPTEMBER	Contribution analysis, make or buy decisions, discontinuation of product, diversification of product line, accept or reject special order, break-even analysis, cost-volume profit analysis. Responsibility accounting: meaning and definition, process in implementation, responsibility reporting, centres for control, benefits of responsibility accounting, difficulties in the implementation of responsibility accounting, methods for measuring divisional performance, divisional performance reporting.
OCTOBER	Steps in Preparation of master budget, zero based budgeting (ZBB): meaning, requisites for implementation, features, ZBB vs Traditional budgeting, benefits, criticism. Planning, programming budgeting system (PPBS): meaning, definition, PPBS vs conventional budgeting.
NOVEMBER	stages in PPBS, advantages. Performance budgeting: meaning, reasons of performance budget, requisites, and steps in implementation. Monitoring results and control variances: planning and operational variances, interpretation of variances. (Theory only).
DECEMBER	Meaning, objectives, requisites for the installation of Uniform costing, uniform costing manual, advantages and disadvantages. Inter-firm comparison: meaning, requisites, Procedure involved under inter-firm comparison, advantages and disadvantages.

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III SEMESTER
3.4 STRATEGIC COST MANAGEMENT – I

MONTH	SYLLABUS
AUGUST	Influence of different cost elements on business enterprise, Importance of analyzing cost elements, cost control and cost reduction: meaning, process, methods and techniques of cost control and cost reduction, cost management: areas of cost management, difference between cost management and cost accounting, role of cost accounting in strategic planning and management control.
SEPTEMBER	Integration of strategic cost management with performance evaluation, Strategic cost management issues in different elements of cost; material, labour and overheads; product design, value analysis and value engineering, strategic analysis of cost, business process re-engineering, benchmarking.
OCTOBER	Introduction to traditional methods of overhead absorption, problems of overhead absorption system under Traditional System, introduction to ABC, Kaplan and Coopers approach to ABC, cost drivers and cost activities, allocation of overheads under ABC, Characteristics of ABC, benefits from adaptation of ABC System, problems on comparison between traditional system and ABC system.
NOVEMBER	Meaning of LCC, factors affecting Life cycle costing, phases in product life cycle, characteristics, product life cycle and cost control. Experience curve in product life cycle costing. Project life cycle costing: Meaning, categories of project life cycle costs, optimization of project life cycle costs.
DECEMBER	JIT – features, methodology in implementation of JIT, Benefits of JIT. Kaizen Costing: concept, procedure for implementation, evaluation, benefits of Kaizen costing. Lean Cost Management:Meaning, definition, factors, applications, procedure to implementation, comparison with traditional management system, Modern production management techniques, benefits and drawbacks of Lean Cost Management.
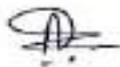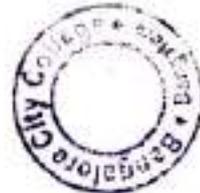
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III SEMESTER
3.5 DIRECT TAX PLANNING

MONTH	SYLLABUS
AUGUST	Basic frame work of direct taxation, principles of direct taxation appraisal of annual Finance Act, tax planning and its methods, advance tax rulings.
SEPTEMBER	Sailent features of company taxation, scheme of taxing business income of companies, business deductions/allowances, disallowances and depreciation.
OCTOBER	Computation of taxable income of companies set off and carry forward of losses, deductions under section 80G/801A-801B-801C.
NOVEMBER	Tax planning with respect to amalgamation and mergers, multinational companies, double taxation treaties, joint ventures and foreign collaborations, tax consideration in make or buy, own or lease, retain or replace, Transfer pricing.
DECEMBER	Procedure for assessment, deduction of tax at source, advance payment of tax, refunds, appeals and revision. Wealth tax for companies, charging section, exempted wealth computation of net wealth, wealth tax planning.

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IV SEMESTER
4.1 COMMODITY MARKETS

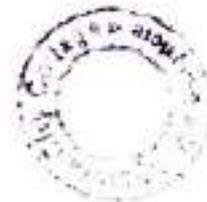| MONTH	SYLLABUS
FEBRAURY	Growth of Global and Domestic Commodities Derivatives Markets, Agricultural Commodities Market and Non-Agricultural Commodities Markets. Commodity Exchanges: Exchanges around the World and its Importance, Commodity Exchanges in India. National Exchanges and Regional Exchanges, platform – Structure, Exchange memebership, Capital requirements, commodities traded on National exchanges, instruments available for trading and Electronic Spot Exchanges.
MARCH	Quality Assurance, Concepts of Quality in Commodities, Methods of Quality Assurance GRanding and Standardization: Meaning of grading and Standardization, purpose of grading, advantages of grading, inspection and quality control, Indian standards.
APRIL	Commodity Derivatives: Evolution of Commodity, Derivatives, Evolution of Commodity, Derivatives in India, Types of Derivatives, Other Classifications of Derivatives, Pricing Derivatives, Derivative Markets and Participants, Economic Importance of Commodity Derivatives Markets. Warehousing and Warehouse Receipts, Storage, practice s in India, Risks in Storage, Structures, Essentials of storage structures, cost of storage/carry, returns of storage cost, warehousing, types of warehouses, Central warehousing corporation(CWC) FCI, functioning, growth, capacity and utilization.
MAY	Trading on 'Commodity Exchanges: the Exchange platform, Exchange Membership, Commodity Brokerage, trading systems, participants in Commodity Markets, Role of speculators, Trading mechanism – Margin Trading, Mark to Market, Conflict Management; Arbitration and International Legal provisions, Market Positions, Order Types, Access to Commodity Exchanges, Volume and Open Interest. Clearing and Settlement on Commodity Exchanges, Clearing House Operations and Risk Management, procedures, Delivery related issues like delivery centers, Deliverable varieties, Issues related to monitoring and surveillance by exchanges and regulator, Margining Method and the settlement process.
JUNE	FCR Act 1952, FMC and Regulatory structure of commodities Derivatives markets in India (Objective, Functions, Power and responsibilities, Scope of Regulation), Essential Commodities Act and role of central and state Governments, Intermediaries, Investor Grievances and arbitration, Commodities Board in India – Coffee Board of India, Tea Board of India, Spice Board of India, Rubber Board of India, Tobacco Board of India.

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IV SEMESTER
4.2 CORPORATE REPORTING PRACTICES AND IND AS

MONTH	SYLLABUS
FEBRAURY	GAAP in India and Hierarchy of GAAP in India, International Financial Reporting Standards, First time adoption (IFRS 1) – Convergence with IFRS – Stage-wise Approach, Advantages of converting to IFRS, Significant Criticisms of IFRS, Key Business issues that will need to be addressed for successful implementation of IFRS, challenges and opportunities faced by India in the implementation of IFRS - An overview of IND ASs: list of converged Indian Accounting Standards notified by Ministry of Corporate Affairs (MCA) - Comparison of IFRS with Ind AS.
MARCH	Relevant Terms, Types of merger, methods of accounting, treatment of Goodwill arising on merger, purchase consideration and settlement; Accounting in books of vendor/transferor company, Accounting for investment in subsidiary, Accounting for holding companies (including chain holdings, multiple holdings), Corporate Financial Restructuring (including intercompany holdings), Reconstruction schemes, De-merger.
APRIL	Consolidation of foreign-Holding company, Subsidiary Company and Associate Company including multiple subsidiaries, Concept of a group, Purposes of consolidated financial statements, consolidation procedures-Minority interest, Goodwill, Treatment pre-acquisition profit and concept of Fair value at the time of acquisition.
MAY	Balance Sheet and cash Flow Statements for Group companies, Impact of group financial statements at the point of acquisition, Treatment of investment in associates in consolidated financial statements, compare and contrast acquisition and equity methods of accounting, Treatment of investment in Joint ventures in consolidated financial statements.
JUNE	Agriculture –Insurance contracts-Exploration for and Evaluation of Mineral Resources-Regulatory Deferral Accounts.

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IV SEMESTER
4.3 STRATEGIC COST MANAGEMENT – II

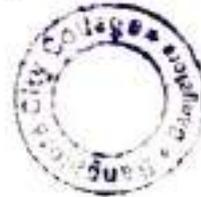| MONTH	SYLLABUS
FEBRAURY	Pricing strategies: Pricing policy, process, Role and methods: cost plus pricing, Marginal cost pricing, pricing for target rate of return, added value method of pricing, differential cost pricing going rate pricing, opportunity cost pricing, standard cost pricing, customary pricing, pricing strategy for Export oriented products, methods of export pricing, pricing strategies for new products, management accountant role in product pricing.
MARCH	Transfer Pricing – meaning, necessity, Objectives, applications, Methods (Cost Based, Market Price Based and Negotiated Pricing), Advantages and Disadvantages, Criteria for setting Transfer Prices, Guiding Principles in the fixation of transfer prices, Transfer Price in different situations. International transfer pricing: meaning, factors affecting international transfer pricing.
APRIL	Introduction, meaning and definition of learning curve, phases in learning curve, applications of learning curve, factors affecting learning curve, comparison between learning curve and experience curve.
MAY	Definition, classification of quality costs, cost of Conformance, Prevention costs, appraisal costs, cost of Non-conformance, optimization of quality cost, TQM Core concepts of TQM, Benefits of TQM. TQM –basics, stages, principles, control, corrective actions, PRAISE- steps, problems, implementation Cost of quality report Continuous process improvement.
JUNE	BSC: Introduction, drawback of traditional financial measures, attributes to good performance measurement system, concept of balanced score card, perspectives of B.SC and implementation of Balanced score Card, case studies on BSC. Benchmarking – Concepts, Benchmarking process, Impact on Indian Industry, Types of Benchmarking.

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IV SEMESTER
4.4 GOODS AND SERVICE TAXES

MONTH	SYLLABUS
FEBRAURY	Introduction : Special features of indirect tax levied, all pervasive nature, contribution to Government Revenues, fiscal preference as instrument of planning and development—role of indirect tax laws.
MARCH	Central Excise and Salt Act 1944 : Nature of levy of excise duty, classification of excisable goods, price lists and their significance, valuation of excisable goods, central excise licensing – detailed procedure. Clearance of excisable goods – procedure under physical control, compounded levy scheme and self-removal procedures, gate passes, personal ledger account and daily stock accounts. Exemption from excise duty levies – nature and types of exemption notifications. Procedure for clearance of samples, semi-finished goods and return and retention of duty paid goods. CENVAT, CENVAT on Capital goods.
APRIL	Tariff item 68 – significance of the levy, exemption and clearance procedure. Set off of duties – meaning, schemes of set-off and details of procedure. An overview of accounts, records and returns to be maintained/filed under the Act. Adjudication and appeals – detailed procedure before various excise authorities and the appellate tribunal – Transfer pricing. Customs Act 1962 : Details of procedure in relation to the levy, collection and exemption from customs duties – documents to be prepared and presented to customs authorities, valuation of goods, clearance of imported and exported goods procedure.
MAY	Detailed procedure in relation to transportation and warehousing – relevant rules and regulations. Drawback of customs duties paid, preparation and submission of drawback claim forms. Adjudication and appeals before the customs authorities and the appellate Tribunal. Central Sales Tax Act 1956 : Constitutional background of CST, Inter-state trade and commerce restriction of powers of taxation on sales by state – liability of sales tax – inter-state sale – occasions movement of goods, sale by transfer of documents.
JUNE	sale under CST – transactions which are not sales – persons liability of sales tax. Persons liable to pay CST – exemptions from CST – sales outside the state – sale in course of import/export – declared goods, forms of declaration. KST – VAT, advantages, disadvantages. G.S.T (GST should be taught after introduction by the Government along with the amendments time to time)

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MSc. COMPUTER SCIENCE

1ST SEM : Advanced Computer Architecture

MONTH	SYLLABUS
AUGUST	Fundamentals of Computer design: Instruction set principles and examples- classifying instruction set - memory addressing- type and size of operands - addressing modes for signal processing-operations in the instruction set- instructions for control flow- encoding an instruction set. Overview of Parallel Processing and Pipelining Processing Necessity of high performance, Constraints of conventional architecture, Parallelism in uniprocessor system, Evolution of parallel processors, Architectural Classification, Applications of parallel processing
SEPTEMBER	Parallel Computer methods: Multiprocessor and multi computers – Shared-Memory multiprocessors, Distributed-Memory Multiprocessors, Multi-vector and SIMD computers. PRAM and VLSI models - Architectural development tracks - Multiple Processor Tracks, Multi-vector and SIMD Tracks, Multi-threaded and Dataflow Tracks. Program and Network properties: Conditions of parallelism - Program partitioning and scheduling - Program flow mechanism - System interconnect architecture. Principles of Scalable Performance: Performance metrics and measures - Speedup performance laws - Scalability analysis and approaches.
OCTOBER	Processors and Memory Hierarchy: Advanced processor technology - Super scalar and vector processors - Memory hierarchy technology - Virtual memory technology. Bus, Cache and Shared Memory: Bus System-Cache memory organizations-Shared memory organization-Sequential and weak consistency models.
NOVEMBER	Instruction level Parallelism & Data Parallel Architectures: Instruction level parallelism (ILP)- over coming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP - ILP software approach- compiler techniques- static branch protection- VLIW approach- H.W support for more ILP at compile time- H.W verses S.W solutions - SIMD Architectures – Associative and Neural Architectures – Data-Parallel Pipelined and Systolic Architectures – Vector Architectures
DECEMBER	Multiprocessors and Thread level parallelism: Multi-threaded Architectures, Distributed Memory MIMD Architectures, Shared Memory Architectures. Architecture of Multithreaded processors, Latency hiding techniques, Principles of multithreading. Issues and solutions. Synchronization and Multiprocessing modes – Shared-Variable program structures, Message Passing program development, Mapping programs onto Multicomputers.

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1ST SEM: TOC

MONTH	SYLLABUS
AUGUST	Review of Mathematical Terms and Theory: Basic Mathematical Notations and Set Theory-Logic Functions and Relations-Language Definitions-Mathematical Inductions and Recursive Definitions-Finite Automata: Deterministic and Non Deterministic Finite Automata-U-Transitions-Conversion from NFA to DGA-Kleene's Theorem-Regular and Non Regular Languages.
SEPTEMBER	Context Free Grammar: Introduction to CFG-CFG and Known Languages-Unions-Concatenations and *'s Notations and CFL-Derivatives of Trees and Ambiguity and Unambiguous CFG and Algebraic Expressions-Normal Forms and Simplified Forms-Pushdown Automata-CFL and NFL: Introduction to PDA-Definition-DPDA-PDA Corresponding to CFG-CFG Corresponding to PDA-Introduction to CFL-Intersections and Complements of CFL- Decisions Problems and CFL.
OCTOBER	Turing Machines, Recursive Language: Model of Computation and Church Turning Thesis-Definitions of Turing Machine-TM and Language Acceptors-Variations of TM-Non Deterministic TM-Universal TM-Enumerable and Language-Recursive and Non Recursive Enumerable
NOVEMBER	Computation Functions, Measuring, Classifications And Complexity: Primitive Recursive Functions-Halting Problem-Recursive Predicates and Some Bounded Operations-Unbounded Minimizations and μ-Recursive Functions-Godel Numbering, Computable Functions and μ-Recursive-Numerical Functions.
DECEMBER	Tractable and Intractable Problems: Growth Rate and Functions, Time and Speed Complexity-Complexity Classes, Tractable and Possibly Intractable Problems-P and Np Completeness-Reduction of Time-Cook's Theorem-Np-Complete Problems.

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MSc. COMPUTER SCIENCE

1ST SEM : FILE STRUCTRES

MONTH	SYLLABUS
AUGUST	Introduction: File Structures-The Heart of the file structure Design-Fundamental File Operations-The Unix Directory Structure-Physical devices and Logical Files-File-related Header Files-UNIX file System Commands-Buffer Management, Input /Output in UNIX-Field and Record Organization-Using Classes to Manipulate Buffers-Using Inheritance for Record Buffer Classes-Managing Fixed Length, Fixed Field Buffers, An Object-Oriented Class for Record Files-Record Access-File Access and File Organization.
SEPTEMBER	Organization of Files for Performance-Indexing-Indexes that are too large to hold in Memory-Indexing to provide access by Multiple keys, Retrieval Using Combinations of Secondary Keys-Consequential Processing and The Sorting of Large Files: A Model for Implementing Consequential Processes-Application of the Model to a General Ledger Program-Extension of the Model to include Multi-way Merging-A Second Look at Sorting in Memory-Merging as a Way of Sorting Large Files on Disk.
OCTOBER	Multilevel indexing and B-Trees-The invention of B-Tree-Statement of the problem-Indexing with Binary Search Trees-Multi-Level Indexing-B-Trees-Example of Creating a B-Tree-An Object-Oriented Representation of B-Trees-B-Tree Methods-Nomenclature-Formal Definition of B-Tree Properties-Worst-case Search Depth-Deletion-Merging and Redistribution-Redistribution during insertion-B+ Trees.
NOVEMBER	Indexed Sequential File access and Prefix B+ Trees-Indexed Sequential Access-Maintaining a Sequence Set-Adding a Simple Index to the Sequence Set-The Content of the Index-Separators Instead of Keys-The Simple Prefix B+ Tree and its maintenance-Index Set Block Size, Internal Structure of Index Set Blocks: A Variable-order B- Tree-Loading a Simple Prefix B+ Trees-B-Trees-B+ Trees and Simple Prefix B+ Trees in Perspective.
DECEMBER	HASHING: Introduction-A Simple Hashing Algorithm-Hashing Functions and Record Distribution-Collision resolution by progressive overflow-Buckets-How Extendible Hashing Works-Implementation-Deletion-Extendible Hashing Performance-Alternative Approaches.

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IST sem   Msc(CS) Sub:AD DBMS

MONTH	SYALLABUS
AUGUST	Database Concepts: Characteristics of Database Approach – Data Models – Schemas- Three Schema Architecture and Data Independence; Database Design: ER Modelling – ER diagrams; Normalization; Relational Model and Query Processing
SEPTEMBER	TRANSACTION PROCESSING AND CONCURRENCY CONTROL: Definition of Transaction and ACID properties: Concurrency Control Techniques: Lock based Concurrency control -Optimistic Concurrency Control – Timestamp based Concurrency Control, Deadlocks: Database Security: Security Issues – Control Measures- Discretionary, mandatory and role based access control; Database Recovery Techniques: Recovery Concepts- Deferred Update and Immediate Update techniques – Shadow Paging
OCTOBER	OBJECT ORIENTED, PARALLEL AND DISTRIBUTED DATABASES: Concept of Object Database: Object Definition Language ODL- Object Query Language; Object Database conceptual Design: Difference between ODB and RDB
NOVEMBER	Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems; Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing.
DECEMBER	EMERGING DATABASE TECHNOLOGIES

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2ND SEM : ADVANCED JAVA PROGRAMMING

MONTH	SYLLABUS
FEBRUARY	Introduction: Data Types, Operators, Classes, Inheritance, Packages and Interfaces. Exception Handling, Concurrency and Multithreaded programming, Enumerations, Autoboxing, Annotations, I/O, Generics, String handling
MARCH	JVM: Java Class file, Class Loader, Linking model, Garbage collection, Type conversion, Floating Point Arithmetic, Method Invocation and Return, Thread synchronization. Java I/O: Closeable, Flushable Interfaces, The Stream classes, Bytes Streams, Character Streams, Console Class, Serialization. Java Networking - Networking Classes and Interfaces, TCP/IP Sockets, Datagrams
APRIL	Event Handling: Event Classes, Event Listener Interfaces, Adaptor Classes, Inner Classes. Comparable and Comparator. Java Sandbox security model, Applets. Server side programming - Java Servlets, JSP. Java XML library - JAXP, XML Parsing - DOM, SAX, Stax. Java Web Services - RESTful Web Services, SOAP Web Services
MAY	Java Design patterns: Singleton, Observer, Adaptor, Proxy, Decorator, Factory, AbstractFactory, Fascade, Command, Template Method patterns, MVC .
JUNE	Spring and Hibernate framework, Spring Flow, Hibernate Flow,

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II sem   Msc(CS)   Sub:OOAD

MONTH	SYALLABUS
MARCH	Introduction: An overview - Object basics - Object state and properties, Behavior, Methods, Messages. Object Oriented system development life cycle, Benefits of OO Methodology. Overview of Prominent OO Methodologies: The Rumbaugh OMT, The Booch methodology, Jacobson's OOSE methodologies, Unified Process, Introduction
APRIL	Static structural view (Models): Classes, values and attributes, operations and methods, responsibilities for classes, abstract classes, access specification (visibility of attributes and operations). Relationships among classes: Associations, Dependencies. Inheritance - Generalizations, Aggregation. Adornments on Association: association names,
MAY	Class Modeling and Design Approaches: Three approaches for identifying classes - using Noun phrases, Abstraction, Use Case Diagram - Comparison of approaches - Using combination of approaches - Flexibility guidelines for class diagram
JUNE	Interaction diagrams: Sequence diagram - Sequence diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, Activations in sequence diagram - Collaboration diagram - Collaboration diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links

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2ND SEM : ARTIFICIAL INTELLIGENCE

MONTH	SYLLABUS
FEBRUARY	Introduction to Artificial Intelligence: Definition-AI Applications-AI representation. Properties of internal Representation-Heuristic search techniques:Best first search-mean and end analysis-A* and AO* Algorithm-Minimize search procedure-Alpha beta cutoffs-waiting for Quiscence-Secondary search.
MARCH	Knowledge representation using predicate logic: predicate calculus-Predicate and arguments-ISA hierarchy-frame notation-resolution-Natural deduction. Knowledge representation using non monotonic logic: TMS (Truth maintenance system)-statistical and probabilistic reasoning-fuzzy logic-structure knowledge representation-semantic net-Frames-ScripT-Conceptual dependency.
APRIL	Planning: block world, strips-Implementation using goal stack-Non linear planning with goal stacks-Hierarchical planning-list commitment strategy. Perception: Action-Robot Architecture-Vision, Texture and images-representing and recognizing scenes-waltz algorithm-Constraint determination-Trihedral and non trihedral figures labeling.
MAY	Learning: Learning as induction matching algorithms-Failure driver learning-learning in general problem solving concept learning. Neural Networks: Introduction to neural networks and perception-qualitative Analysis only-neural net architecture and applications.
JUNE	Natural language processing and understanding and pragmatic, syntactic, semantic. analysis-RTN-ATN-understanding sentences. Expert system: Utilization and functionality-architecture of expert system-knowledge representation-two case studies on expert systems.

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3RD SEM : CRYPTOGRAPHY AND NETWORK SECURITY

MONTH	SYLLABUS
AUGUST	Introduction to Information Security: Introduction: security-Critical characteristics of information-NSTISSC security model-Approaches to information security implementation-The Security System Development Life Cycle-Information Security Terminology-Planning for Security: Introduction-Information Security Policy, Standards, and Practices-The Information Security Blue Print.
SEPTEMBER	Security Technology: Firewalls and VPNs: Introduction-Physical design-Firewalls-Protecting Remote Connections-Intrusion Detection-Access control and Other Security Tools: Introduction-Intrusion Detection Systems (IDS)-Honey Pots, Honey Nets, and Padded cell systems-Scanning and Analysis Tools-Access Control Devices. Information Security maintenance: Introduction-Security Management Models-The Maintenance Model.
OCTOBER	Introduction to Network Security: Attacks, Services, and Mechanisms-Security Attacks-Security Services-A model for Internetwork Security-Internet Standards and RFCs. Cryptography: Conventional Encryption Principles and Algorithms-Cipher Block Modes of Operation-Location of encryption devices-Key distribution-Approaches to message authentication-Secure Hash functions and HMAC-Public Key Cryptography Principles and Algorithms-Digital Signatures-Key management.
NOVEMBER	Authentication Applications: Kerberos-X.509 Directory Authentication Service. Electronic Mail Security: Pretty Good Privacy (PGP)-S/MIME. IP Security: IP Security Overview-IP Security Architecture-Authentication Header-Encapsulating Security Payload-Combining Security Associations-Key Management.
DECEMBER	Web Security: Web security requirements. Secure Socket layer (SSL) and Transport layer Security (TLS)-Secure Electronic Transaction (SET). Network Management Security: Basic concepts of SNMP-SNMPv1 community facility-SNMPv3.

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3rd SEM MSC CS SUB-AD.WP

MONTH	SYALLABUS
AUGUST	Perl, CGI Programming: Origins and uses of Perl; Scalars and their operations; Assignment statements and simple input and output; Control statements; Fundamentals of arrays; Hashes; References; Functions
SEPTEMBER	Servlets and Java Server Pages: Overview of Servlets; Servlet details; A survey example; Storing information on Clients; Java Server Pages. PHP: Origins and uses of PHP; Overview of PHP; General syntactic
OCTOBER	Database Access through the Web: Relational Databases; An introduction to SQL; Architectures for Database access; The MySQL Database system; Database access with PERL and MySQL; Database access with PHP and MySQL
NOVEMBER	Introduction to Ruby, Rails: Origins and uses of Ruby; Scalar types and their operations; Simple input and output; Control statements; Fundamentals of arrays; Hashes; Methods; Classes; Code blocks and
DECEMBER	Introduction to Ajax:

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3RD SEM MSC CS   SUB-DATAMINING

MONTH	SYALLABUS
FEB	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse,
MARCH	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP
APRIL	Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation. Data Reduction
MAY	Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisions, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining
JUNE	Classification and Predictions:

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IIIrd SEM: Advanced Algorithm

MONTH	SYLLABUS
AUGUST	Design Paradigms: Overview: Overview of Divide and Conquer, Greedy and Dynamic Programming strategies. Basic search and traversal techniques for graphs. Backtracking. Branch and Bound. Max Flow Problem.
SEPTEMBER	String Matching : Introduction to string-matching problem. Naïve algorithm. Rabin Karp, Knuth Morris Pratt, Boyer- Moore algorithms and complexity analysis. Theory of NP- Hard and NP-Complete Problems: P, NP and NP-Complete complexity classes; A few NP-Completeness proofs; Other complexity classes.
OCTOBER	Approximation Algorithms Introduction. Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.
NOVEMBER	Parallel Algorithms: Introduction, Models, speedup and efficiency. Some basic techniques, Examples from graph theory, sorting, Parallel sorting networks. Parallel algorithms and their parallel time and processors complexity.
DECEMBER	Probabilistic Algorithms & Randomized Algorithms: Numerical probabilistic algorithms, Las Vegas and Monte Carlo algorithms. Game-theoretic techniques, Applications on graph problems

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4TH SEM : Research Methodology

SYLLABUS

MONTH	SYLLABUS
FEBRUARY	Introduction: Definition and objectives of Research – Types of research, Various Steps in Research process, Mathematical tools for analysis, Developing a research questionChoice of a problem Literature review, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation. Research Purposes, Ethics in research – APA Ethics code.
MARCH	Quantitative Methods for problem solving: Statistical Modeling and Analysis, Time Series Analysis Probability Distributions, Fundamentals of Statistical Analysis and Inference. Multivariate methods, Concepts of Correlation and Regression, Fundamentals of Time Series Analysis and Spectral Analysis, Error Analysis, Applications of Spectral Analysis.
APRIL	Tabular and graphical description of data: Tables and graphs of frequency data of one variable, Tables and graphs that show the relationship between two variables , Relation between frequency distributions and other graphs, preparing data for analysis
MAY	Soft Computing: Computer and its role in research. Use of statistical software SPSS, GRETL etc in research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.
JUNE	Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing.

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