B.Sc Semester V Chemistry Paper I P C 5004

Inorganic Chemistry

Scheme of examination: *MM: 23*

1 *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

Hard and Soft Acids and Bases (HSAB) : Classification of acids and bases as hard and soft. Pearson's HSAB concept acid-base strength and hardness and softness. Symbiosis, theoretical basis of hardness and softness, electronegativity and hardness and softness.

Unit-II

Metal-Ligand Bonding in Transition Metal complexes: Limitations of valence bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

UNIT – III

Thermodynamic and Kinetic Aspects of Metal Complexes: A brief outline of thermo- dynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

UNIT - IV

Organometallic Chemistry-I: Definition, nomenclature and classification of organometallic compounds. Preparation, properties, bonding and applications of alkyl and aryls of Li, Al, Hg, Sn and Ti.

UNIT – V

Bioinorganic Chemistry I: Essential and trace elements to Biological processes, Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+}.

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B.Sc Semester V Chemistry Paper II P C 5005

Organic Chemistry

Scheme of examination: *MM: 23*

1 *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

Organometallic and Organosulphur Compounds: Organometallic Compounds: the Grignard reagents-formation, structure and chemical reactions. Organozinc Compounds: Formation and chemical reactions. Organolithium compounds: Formation and chemical reactions. **Organosulphur compounds:** Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine.

Unit-II

Heterocylic Compounds-I: Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions, with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.

Unit-III

Carbohydrates: Classification and nomenclature monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters. Determination of ring size of monosaccharides. Cyclic structure of D(+) - structures of glucose. Mechanism of mutarotation. Structure of

ribose and deoxyribose. An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving strcture determination.

Unit-IV

Amino Acids: Classification, structure and stereochemistry of amino acids. Acid-base behaviour, isoelectric point and electrophoresis. Preparation and reactions of α-amino acids.

Unit-V

Synthetic Polymers: Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers.

Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes.

Natural and synthetic rubbers.

B.Sc Semester V Chemistry Paper III P C 5006

Physical Chemistry

Scheme of examination: *MM: 24*

1 *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

Elementray quantum Mechanics-I: Black-body, radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects. Compton effect.
De Broglie hypothesis Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator.

UNIT - II

Elementary quantum Mechanics-II: Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.
Schrodinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.

Unit-III

(a)Spectroscopy: Introduction: Electromagnetic radiation, of the spectrum, basic features of different spectrometers, statement of the Born-Openheimer approximation, degrees of freedom.
(b)Electronic Spectrum: Concept of Potential Energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Frank Condon principle.
Qualitative description of σ, π and n M.O. their energy levels and the respective transitions.

UNIT – IV

Solutions, Dilute Solutions and Colligative Properties-I: Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient.

Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Experimental methods for determining osmotic pressure.

UNIT - V

Solutions, Dilute Solutions and Colligative Properties-II: Elevation of boiling point and depression in freezing point. Thermodynamic derivation of relation between molecular weight and elevation of boiling point and depression in freezing point. Experimental methods for determining elevation of boiling point and depression in freezing point. Abnormal molar mass, degree of dissociation and association of solutes.

Inorganic Chemistry

Scheme of examination: *MM: 23*

1 *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

Magnetic Properties of Transition Metal Complexes: Types of magnetic behavior, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of μ_s values and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

UNIT II

Electron Spectra of Transition Metal Complexes: Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series, Orgel-energy level diagram for d^1 and d^9 states, discussion of the electronic spectrum of $[Ti(H_2O)_6)]^{3+}$ complex ion.

UNIT III

Organometallic Chemistry-II: A brief account of metal ethylenic complexes and homogeneous hydrogenation, mononuclear carbonyls and the nature of bonding in metal carbonyls.

UNIT IV

Bioinorganic Chemistry-II: Metalloporphyrins with special reference to haemoglobin and myoglobin. Nitrogen fixation.

UNIT V

Silicones and Phosphazenes: Silicones and phosphazenes as example of inorganic polymers, nature of bonding in triphosphazenes.

Organic Chemistry

Scheme of examination: *MM: 23*

1 *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

NMR Spectroscopy: Nuclear magnetic resonance (NMR) spectroscopy. Proton Magnetic Resonance (H-NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constant,
areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromoethane, ethyl acetate, toluene
and acetophenone. Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques.

UNIT II

Heterocylic Compounds-II: Introduction to condensed five and six-membered heterocyles. Preparation and reactions of indole, quainoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of indole, quinoline and isoquionoline.

UNIT III

Organic Synthesis via Enolates: Acidity of α-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate : the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation of 1,3-dithianes. Alkylation and acylation of examines.

UNIT IV

Peptides, Proteins and Nucleic Acids: Structures and nomenclature of peptides and proteins.Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid phase peptide synthesis. Structures of peptides and proteins. Levels of protein structure. Protein denaturation / renaturation.

Nucleic acids: Introduction. Constituents of nucleic acids. Ribonucleosides and ribonucleotides. The double helical structure of DNA.

UNIT V

Fats, Oils and Detergents: Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils. Saponification value, iodine value, acid value, Soaps, synthetic detergents, alkyl and aryl sulphonates.

Synthetic Dyes: Colour and constitution (electronic concept). Classification of dyes. Chemistry and synthesis of Methyl orange. Congo red. Malachite green. Crystal violet, Phenolphthalein. Fluorescein. Alizarin and Indigo.

Physical Chemistry

Scheme of examination: *MM: 24*

1 *In Semester End Examination there will be 10 questions in all, 2 from each unit. Candidate has to answer any 5 questions, taking one from each unit.*

UNIT – I

Molecular orbital theory, basic ideas-criteria for forming M.O. from A.O. construction of M.O's by LCAO - H_2^+ ion, calculation of energy levels from wave functions, Hybrid orbitals - sp, sp^2, sp^3 calculation of coefficients of A. O.'s used in these hybrid orbitals. Introduction to valence bond model of H_2, comparison of M.O. and V.B. models.

UNIT II

Rotational Spectrum: Diatomic molecules, Energy levels of a rigid rotator (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotator, isotope effect.

UNIT III

Vibrational Spectrum: Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups. Raman Spectrum concept of polarizability, pure rotational and pure vibrational Raman Spectra of diatomic molecules, selection rules.

UNIT IV

Photochemistry: Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grothus-

Drapper law, Stark -Einstein law, Jablosnski diagram depicting various processes occurring in the exited sate, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simplex examples).

UNIT V

Physical Properties and Molecular Structure: Optical activity, polarization - (Calusius-Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment temperature method and refractivity method, dipole moment and structure of molecules, magnetic properties - paramagnetism, diamagnetism and ferromagnetism.

MATHEMATICAL PHYSICS - I

Scheme of examination: *MM: 23*

1. *In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT-I

Orthogonal curvilinear coordinate system:

Orthogonal curvilinear coordinate system, scale factors, expression for gradient, divergence, curl and their application to cartesian, circular cylindrical and spherical polar coordinate.

UNIT-II

Tensors:

Coordinate transformation and Jacobian, transformation of covariant, contra variant and mixed tensor, Addition, subtraction, multiplication and contraction of tensors, Metric tensor and its use in transformation of tensors. Dirac delta function and its properties.

UNIT-III

Four Vectors

Four vector formulation, energy momentum four vector, relativistic equation of motion, invariance of rest mass and orthogonality of four force and four velocity, Lorentz force as an example of four force, transformation of four frequency vector, longitudinal and transverse Doppler's effect.

UNIT-IV

Relativistic Dynamics:

Transformation between laboratory and center of mass system. four momentum conservation. kinematics of decay products of unstable particles and reaction thresholds: Pair production, inelastic collision of two particles, Compton effect. Lorentz transformation and rotation in space-time, time like and space like vectors, world line, macro-causality.

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ELEMENTARY QUANTUM MECHANICS AND SPECTROSCOPY - I

Scheme of examination: *MM: 23*

1. *In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT-I

Development of quantum Mechanics:

Historical development and experimental evidence for quantum theory. black body radiation. Planck's radiation law, photoelectric Effect, Compton effect. De-Broglie relation, Davisson- Germer Experiment; Uncertainty principle, its application such as (i) Non-existence of electrons in nucleus, (ii) Ground State energy of H - atom. (iii) Ground state energy of harmonic oscillator, (iv) Natural width of spectral lines.

UNIT-II

Schrodinger equation:

Its need and justification. time dependent and time independent forms. physical significance of the wave function and its interpretation. Probability, current density, Wave packet, group and phase velocities, principles of superposition, diffraction at a single slit.

UNIT-III

Operators in quantum mechanics:

definition of an operator, Algebra of operator linear and commutator operators, Eigen values and Eigen functions, Operators for momentum, K.E, Hamiltonian, total energy and angular momentum, fundamental postulates of quantum mechanics, Hermitian operator, orthogonality,

Degeneracy and commutation relations, Ehrenfest's theorm, Bohr's principle of complimentarily, principle of superposition.

UNIT-IV

Applications of Quantum theory to atomic spectra:

Quantum features of spectra of one electron atoms; Frank Hertz experiment and discreet energy states, Schrodinger's equation for a spherically symmetric potential. Schrodinger's equation for one electron atom in spherical coordinates, Separation of variables.

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NUCLEAR AND PARTICLE PHYSICS

Scheme of examination: *MM: 24*

1. ***In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.***

UNIT-I

Nuclear structure and properties:

Constituents of nucleus, properties of nuclear forces, binding, energy, semi empirical mass formula, mass defect and packing fraction, saturation characteristics; Magnetic dipole moment and electric quadruple moment, angular momentum and parity; Variation of size of nucleus with mass number; Stable nucleus and conditions for stability (e.g. beta emissions for different isobars).

UNIT-II

Nuclear Fission and Fusion:

Energy released in fission, Theory of nuclear fission and liquid drop model, Barrier penetration – Theory of spontaneous fission, Nuclear chain reaction, condition of controlled chain reaction, Principle of nuclear reactors, classification of reactors. Energy released in fusion, fusion reactions in stars. carbon and pp cycle.

UNIT-III

Accelerators and Detectors:

Need for accelerators, Ion sources, Drift tube, linear accelerator, cyclotron, synchrocyclotron, Betatron, electron synchrotron, **proton synchrotron.**

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Ionization chamber, Proportional Counter, Geiger Muller Counter, Scintillation counter.

UNIT-IV

Elementary Particle:

Properties of particles. Classification into leptons, mesons and baryons, Matter and antimatter, Conservation laws: (Qualitative discussion) of isospins, strangeness, charge conjugation and parity, Fundamental quark structure of particles.

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MATHEMATICAL PHYSICS - II

Scheme of examination: *MM: 23*

1. *In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT-I

Relativistic Electrodynamics:

Law of conservation of charge and equation of continuity. Lorenz transformation of charge and current densities, Lorenz transformation of four potentials, Lorenz transformation of an electric field and magnetic field. Description of Maxwell's equation in tensor form.

UNIT-II

Differential equations of second order and special functions – I:

Linear differential equation with variable coefficient and singular points, series solution method and its application to the Legendre's differential equations, Rodrique's formula, Integral properties of Legendre's polynomials, generating functions of $P_n(x)$, Recurrence relations of $P_n(x)$, Associated Legendre's polynomials graphical representations.

UNIT-III

Differential equations of second order and special functions – II:

Hermite differential equation, generating functions of Hn(x), Recurrence relations of Hn(x), Orthogonality relation for Hermite equation, Laguerre differential equation, generating functions of Laguerre polynomials, Recurrence relations of $L_n(x)$, Rodrique's formula for $L_n(x)$, Orthogonality relation for Laguerre polynomials. Associated Laguerre equations.

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UNIT-IV

Boundary value problems:

Techniques of separation of variables and its application to the following boundary value problems (i) Laplace's equation in three dimensional Cartesian coordinate system – line charge between two earthed parallel plates, (ii) Helmholtz equation in circular cylindrical coordinates-Cylindrical resonant cavity, (iii) Wave equation in spherical polar coordinates-the vibration of a circular membrane, (iv) Diffusion equation in two dimensional Cartesian coordinate system-heat conduction in a thin rectangular plate, (v) Laplace's equation in spherical coordinate system-electric potential around a spherical surface.

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ELEMENTARY QUANTUM MECHANICS AND SPECTROSCOPY - II

Scheme of examination: *MM: 23*

1. *In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.*

UNIT-I

Simple solution of Schrodinger's equation:

Time independent Schrodinger equation and stationary state solution, boundary and continuity conditions, particle in one dimensional box, eigen function and eigen values, discrete energy levels, generalisation to three dimensions and degeneracy of levels.

UNIT-II

Boundary Value Problems:

Potential steps and rectangular potential barrier, calculation of reflection and transmission coefficients, qualitative discussion of application to alpha-decay; Square well potential problem, reflection and transmission coefficient, and resonant scattering; Particle in one dimensional infinite potential well and finite potential well, energy eigen values and eigen functions, transcendental equation and its solution.

UNIT-III

Simple harmonic oscillator:

Simple harmonic oscillator (one dimensional case) Schrodinger equation and its solution, eigen function, energy eigen values, zero point energy; Parity-symmetric and anti-symmetric wave functions with graphical representation; Expectation values of x, x^2, Px, P^2x and T for one

dimensional SHO in ground state. Orthogonality of Eigen functions for one dimensional SHO.

UNIT-IV

Orbital Angular Momentum and Spin:

Orbital angular momentum and quantisation, spherical harmonics, energy levels of H-atom, shapes of n=l, and n=2 wave functions, average value of radius of H-atom, comparison with Bohr model and Bohr correspondence principle, Stern-Gerlach experiment, spin and magnetic moment, spin orbit coupling and qualitative explanation of the fine structure; Atoms in a magnetic field, Zeeman splitting.

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B.Sc Semester VI Physics Paper III P C 6013

SOLID STATE PHYSICS

Scheme of examination: *MM: 24*

1. ***In all five questions are to be answered. There shall be two questions from each unit. A student has to answer one question from each unit. Fifth question will be compulsory and will cover the entire syllabus.***

UNIT-I

Crystal structure and Crystal Differection:

Various types of binding; Cohesive energy and compressibility of ionic crystals; lattice basis, lattice translation vector, Miller indices, simple crystal structures-SC, FCC, BCC and HCP, packing fraction, volume of unit cell. Bragg's Law, X – ray and neutron differection Rotating crystal method, Laue method and powder method.

UNIT-II

Electrical properties:

Equilibrium state of electron gas in a conductor in the absence of electric field, electron drift in an electric field, relaxation time and mean free path; Electrical conductivity of electron gas, Wiedemann- Franz-Lorentz law, temperature dependent electrical conductivity of metals, mobility and drift motion.

UNIT-III

Magnetic Properties:

Classification of magnetic materials, diamagnetism, paramagnetism due to free ions and conduction electrons, Curie law. Ferromagnetism, nature and origin of Wiess molecular field, Domains, Hysteresis loop, Outline of antiferromagnetism and ferrimagnetism, ferrites.

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UNIT-IV

Thermal Properties and Superconductivity:

Normal modes spectrum of a lattice, spectral distribution function, concept of phonons, Debye model for the heat capacity of solids, contribution from electron gas in metals, Zero resistivity, critical temperature, critical magnetic field, Meissonier effect. Type-I and Type-II superconductors, BCS theory (Basic idea). High Tc superconductors .

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B.Sc (Hons.) Semester V Maths Paper I P C 5020

ABSTRACT ALGEBRA

Scheme of examination: MM: 70

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit. All questions will carry equal marks.

UNIT – I

Definition and simple properties of Groups and Subgroups. Cyclic group.

UNIT – II

Permutation Groups. Cosets, Lagrange's theorem on the order of subgroups of a finit order group.

UNIT – III

Morphism of groups, Cayley's theorem. Normal subgroups and Quotient groups. Fundamental theorems of Isomorphism.

UNIT – IV

Definition and simple properties of Rings. Integral domain and field, Characteristics of a Ring and Field.

COMPLEX ANALYSIS - I

Scheme of examination: MM: 70

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit. All questions will carry equal marks.

UNIT – I

Complex plane, connected and Compact sets. Curves and Regions in complex plane. Jordan curve Theorem (Statement only). Extended complex plane. Stereographic projection.

UNIT – II

Complex valued function - Limits, Continuity and Differentiability. Analytic function, Cauchy- Riemann equations (cartesian and polar form). Harmonic functions, Construction of an analytic function.

UNIT – III

Complex integration, Complex line integrals, Cauchy integral theorem, Indefinite integral, Fundamental theorem of integral calculus for complex functions. Power series - Absolute convergence, Abel's theorem, Cauchy-Hadamard theorem, Circle and Radius of convergence, Analyticity of the sum function of a power series.

UNIT – IV

Cauchy integral formula, Analyticity of the derivative of an analytic function, Morera's theorem, Poisson integral formula Liouville' theorem. Taylor's theorem. Laurent's theorem. Maximum modulus theorem.

B.Sc (Hons.) Semester V Maths Paper III P C 11-5022

DYNAMICS AND COMPUTER PROGRAMMING IN 'C'

Scheme of examination: MM: 70

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit. All questions will carry equal marks.

UNIT – I

Velocity and Acceleration – along radial and transverse directions, along tangential and normal directions.

UNIT – II

S.H.M. Hooke's law motion along horizontal and vertical elastic strings.

UNIT – III

Motion in resisting medium-Resistance varies as velocity and square of velocity.

UNIT – IV

Programming languages and problems solving on computers, Algorithm, Flow chart, Programming in C-constants, Variables, Arithmetic and logical expressions, input-output conditional statements, Implementing loops in Programs, Defining and manipulation arrays and functions.

STATISTICS - I

Scheme of examination: MM: 70

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit. All questions will carry equal marks.

UNIT – I

Frequency distributions and measures of central tendency - A.M., G.M. H.M., Median, Mode.

UNIT – II

Measures of dispersion-mean deviation, root mean square deviation, variance, standard deviation. Skewness and Kurtosis, Moments of frequency distributions.

UNIT – III

Theory of probability - Events, probability, addition and multiplication theorem, conditional probability, Bayes theorem.

UNIT – IV

Random variable, probability distribution, moments, Mathematical expectation of sum and product of two random variates, co-variance of a variate, Moment generating and cumulant generating functions.

B.Sc (Hons.) Semester VI Maths Paper I P C 6020

LINEAR ALGEBRA

Scheme of examination: MM: 70

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit. All questions will carry equal marks.

UNIT – I

Subrings. Morphism of rings. Ideals and Quotient Ring. Maximal ideal and Prime ideal. Principal Ideal domain. Field of quotients of an integral domain. Prime fields.

UNIT II

Definition, Examples and Simple properties of Vector spaces and Subspaces.

UNIT III

Linear combination, Linear dependence and Linear independence of vectors. Linear span, Direct sum and Complement of subspaces. Generation of subspaces, sum of subspaces.

UNIT IV

Basis and Dimension. Quotient space and its dimension.

COMPLEX ANALYSIS - II

Scheme of examination: MM: 70

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit. All questions will carry equal marks.

UNIT – I

Singularities of an analytic function, Branch point, Meromorphic and Entire functions, Riemann's theorem, Casorati-Weierstrass theorem.

UNIT II

Residue at a singularity, Cauchy's residue theorem. Argument principle. Rouche's theorem. Fundamental theorem of Algebra.

UNIT III

Conformal mapping. Bilinear transformation and its properties. Elementary mappings: $w(z)=1/z,(z+1/z)$, z^2, e^z, sinz, cosz, and logz.

UNIT IV

Evaluation of a real definite integral by contour integration. Analytic continuation. Power series method of analytic continuation.

B.Sc (Hons.) Semester VI Maths Paper III P C 11-6022

ADVANCED DYNAMICS

Scheme of examination: MM: 70

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit. All questions will carry equal marks.

UNIT – I

Work and energy; Cyclodial Motion

UNIT – II

Motion on a smooth curve in a vertical plane. Motion on the inside and outside of a smooth vertical circles

UNIT – III

Central orbits p-r equations. Apses. Time in an orbit. Kepler's laws of planetary motion.

UNIT – IV

Moments of inertia- M.I. of rods . circular rings, circular disks, solid and hollow sphares, Rectangular lamina, Ellipse and Triangle, Theorem of pareallel axis, Product of inertia.

STATISTICS - II

Scheme of examination: MM: 70

Note: In all five questions are to be answered. First question will be short answer type, compulsory and will cover the entire syllabus. There shall be two questions from each unit. A student has to answer at least one question from each unit. All questions will carry equal marks.

UNIT – I

Discrete probability distributions (Binomial, Poisson, Geometric and Hypergeometric).

UNIT II

Continuous probability distributions (Rectangular and Normal distributions).

UNIT III

Methods of least squares and curve fitting.

UNIT IV

Correlation and Regression, Multiple and partial correlation.