MATHEMATICS

There shall be three compulsory papers. Each paper of 50 marks is divided into five units and each unit carry equal marks.

B.Sc. Part-II
Paper-I
ADVANCED CALCULUS

UNIT-I   Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests, Cauchy's integral test, Ratio tests, Raabe's, Logarithmic, De Morgan and Bertrand's tests. Alternating series, Leibnitz's theorem. Absolute and conditional convergence.

UNIT-II   Continuity, Sequential continuity, Properties of continuous functions, Uniform continuity, Chain rule of differentiability, Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives, Taylor's theorem with various forms of remainders.

UNIT-III   Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians.

UNIT-IV   Envelopes, evolutes. Maxima, minima and saddle points of functions of two variables. Lagrange's multiplier method.

UNIT-V   Beta and Gamma functions, Double and triple integrals, Dirichlet's integrals, Change of order of integration in double integrals.

REFERENCES :
1.   Gabriel Klaumber, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
2.   T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3.   R.R. Goldberg, Real Analysis, Oxford & I.B.H. Publishing Co., New Delhi, 1970.
4.   D. Soma Sundaram and B. Choudhary, A First Course in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
5.   P.K. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi, 2000.
6.   Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd., Allahabad.
7.   Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Co., New York.
8.   Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd., Allahabad.
9.   S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd., New Delhi.
10.   O.E. Stanaitis, An Introduction to Sequences, Series and Improper Integrals, Holden-Dey, Inc., San Francisco, California.
11.   Earl D. Rainville, Infinite Series, The Macmillan Company, New York.
12.   Chandrika Prasad, Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd., Allahabad.
13.   N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow.
14.   Shanti Narayan, A Course of Mathematical Analysis, S.Chand and Company, New Delhi.

B.Sc. Part-II
Paper-II
DIFFERENTIAL EQUATIONS

UNIT-I   Series solutions of differential equations- Power series method, Bessel and Legendre functions and their properties-convergence, recurrence and generating relations, Orthogonality of functions, Sturm-Liouville problem, Orthogonality of eigen-functions, Reality of eigen values, Orthogonality of Bessel functions and Legendre polynomials.

UNIT-II   Laplace Transformation- Linearity of the Laplace transformation, Existence theorem for Laplace transforms, Laplace transforms of derivatives and integrals, Shifting theorems. Differentiation and integration of transforms. Convolution theorem. Solution of integral equations and systems of differential equations using the Laplace transformation.

UNIT-III   Partial differential equations of the first order. Lagrange's solution, Some special types of equations which can be solved easily by methods other than the general method, Charpit's general method of solution.

UNIT-IV   Partial differential equations of second and higher orders, Classification of linear partial differential equations of second order, Homogeneous and non-homogeneous equations with constant coefficients, Partial differential equations reducible to equations with constant coefficients, Monge's methods.

UNIT-V   Calculus of Variations- Variational problems with fixed boundaries- Euler's equation for functionals containing first order derivative and one independent variable, Extemals, Functionals dependent on higher order derivatives, Functionals dependent on more than one independent variable, Variational problems in parametric form, invariance of Euler's equation under coordinates transformation.

Variational Problems with Moving Boundaries- Functionals dependent on one and two functions, One sided variations.

Sufficient conditions for an Extremum- Jacobi and Legendre conditions, Second Variation. Variational principle of least action.

REFERENCES :
1.   Erwin Kreysizig, Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999.
2.   D.A. Murray, Introductory Course on Differential Equations, Orient Longman, (India), 1967.
3.   A.R. Forsyth, A Treatise on Differential Equations, Macmillan and Co. Ltd., London.
4.   Lan N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill Book Company, 1988.
5.   Francis B. Hilderbrand, Advanced Calculus for Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 1977.
6.   Jane Cronin, Differential equations, Marcel Dekkar, 1994.
7.   Frank Ayres, Theory and Problems of Differential Equations, McGraw-Hill Book Company, 1972.
8.   Richard Bronson, Theory and Problems of Differential Equations, McGraw-Hill, Inc., 1973.
9.   A.S. Gupta, Calculus of variations with-Applications, Prentice-Hall of India, 1997.
10.   R. Courant and D. Hilbert, Methods of Mathematical Physics, Vots. I & II, Wiley-Interscience, 1953.
11.   I.M. Gelfand and S.V. Fomin, Calculus of Variations, Prentice-Hill, Englewood Cliffs (New Jersey), 1963.
12.   A.M. Arthurs, Complementary Variational Principles, Clarendon Press, Oxford, 1970.
13.   V. Kornkov, Variational Principles of Continuum Mechanics with Engineering Applications, Vol. I, Reidel Publ. : Dordrecht, Holland, 1985.
14.   T. Oden and J.N. Reddy, Variational Methods in Theoretical Mechanics, Springer-Verlag, 1976.

B.Sc. Part-II
Paper-III
MECHANICS

STATICS

UNIT-I   Analytical conditions of Equilibrium, Stable and unstable equilibrium. Virtual work, Catenary.

UNIT-II   Forces in three dimensions, Poinsot's central axis, Null lines and planes.

DYNAMICS

UNIT-III Simple harmonic motion. Elastic strings. Velocities and accelerations along radial and transverse directions, Projectile, Central orbits.

UNIT-IV   Kepler's laws of motion, velocities and acceleration in tangential and normal directions, motion on smooth and rough plane curves.

UNIT-V   Motion in a resisting medium, motion of particles of varying mass, motion of a particle in three dimensions, acceleration in terms of different co-ordinate systems.

REFERENCES :
1.   S.L. Loney, Statics, Macmillan and Company, London.
2.   R.S. Verma, A Text Book on Statics, Pothishala Pvt. Ltd., Allahabad.
3.   S.L. Loney, An Elementary Treatise on the Dynamics of a particle and of rigid bodies, Cambridge University Press, 1956.

B.Sc. Part-II
Paper-I
THERMODYNAMICS, KINETIC THEORY AND STATISTICAL PHYSICS

Unit-1 The laws of thermodynamics : The Zeroth law, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, Carnot's cycle, carnot theorem, second law of thermodynamics. Claussius theorem inequality. Entropy, Change of entropy in simple cases (i) Isothermal expansion of an ideal gas (ii) Reversible isochoric process (iii) Free adiabatic expansion of an ideal gas. Concept of entropy, Entropy of the universe. Entropy change in reversible and irreversible processes, Entropy of Ideal gas, Entropy as a thermodynamic variable, S-T diagram, Principle of increase of entropy. The thermodynamic scale of temperature, Third law of thermodynamics, Concept of negative temperature.

Unit-2 Thermodynamic functions, Internal energy, Enthalpy, Helmholtz function and Gibb's free energy, Maxwell's thermodynamical equations and their applications, TdS equations, Energy and heat capacity equations Application of Maxwell's equation in Joule-Thomson cooling, adiabatic cooling of a system, Van der Waals gas, Clausius-Clapeyron heat equation. Blackbody spectrum, Stefan-Boltzmann law, Wien's displacement law, Rayleigh-Jean's law, Planck's quantum theory of radiation.

Unit-3 Maxwellian distribution of speeds in an ideal gas: Distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines. Transport phenomena in gases: Molecular collisions mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure.
Behaviour of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO_2 Gas. Critical Constants.

Unit-4 The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a priori probabilities, statistical postulates. Concept of Gibb's ensemble, accessible and inaccessible states. Concept of phase space, γ phase space and μ phase space. Equilibrium before two systems in thermal contact, probability and entropy, Boltzmann entropy relation. Boltzmann canonical distribution law and its applications, law of equipartition of energy.

Transition to quantum statistics: 'h' as a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator.

Unit-5 Indistinguishability of particles and its consequences, Bose-Einstein & Fermi-Dirac conditions, Concept of partition function, Derivation of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics, Limits of B-E and F-D statistics to M-B statistics. Application of B-E statistics to black body radiation, Application of F-D statistics to free electrons in a metal.

TEXT AND REFERENCE BOOKS:
1. B.B. Laud, "Introduction to Statistical Mechanics" (Mcmillan 1981)
2. F. Reif : "Statistical Physics" (Mcgraw-Hill, 1998).
3. K, Haung : "Statatistical Physics" (Wiley Eastern, 1988).
4. Thermal and statistical Physics: R.K. Singh, Y.M. Gupta and S. Sivraman.
5. Statistical Physics: Berkeley Physics Course, Vol. 5
6. Physics (Part-2): Editor, Prof. B.P. Chandra, M.P. Hindi Granth Academy.
7. Heat and Thermodynamics: K.W. Zeemansky.
8. Thermal Physics: B.K. Agarwal.
9. Heat and Thermodynamics: Brij Lal and N. Subramanyam.
10. Heat and Thermodynamics: Dayal, Verma and Pandey.
11. A Treatise on Heat: M.N. Saha and B.N. Srivastava.

Paper-II
WAVES, ACOUSTICS AND OPTICS

Unit-1 Waves in media: Speed of transverse waves on uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves. Waves over liquid surface: gravity waves and ripples. Group velocity and phase velocity and relationship between them. Production and detection of ultrasonic and infrasonic waves and applications.

Reflection, refraction and diffraction of sound : Acoustic impedance of a medium, percentage reflection & refraction at a boundary, impedance matching for transducers, diffraction of sound, principle of a sonar system, sound ranging.

Unit-2 Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications. Cardinal points of an optical system, thick lens and lens combinations. Lagrange equation of magnification, telescopic combinations, telephoto lenses. Monochromatic aberrations and their reductions; aspherical mirrors and Schmidt corrector plates, aplanatic points, oil immersion objectives, meniscus lens.

Optical instruments: Entrance and exit pupils, need for a multiple lens eyepiece, common types of eyepieces. (Ramsdon and Hygen's eyepieces).

Unit-3 Interference of light: The principle of superpositions, two slit interference, coherence requirement for the sources, optical path retardations, Conditions for sustained interference, Theory of interference, Thin films. Newton's rings and Michelson interferometer and their applications its application for precision determinations of wavelength, wavelength difference and the width of spectral lines. Multiple beam interference in parallel film and Fabry-Perot interferometer. Rayleigh refractometer, Twyman-Green interferometer and its uses.

Unit-4 Diffraction, Types of Diffraction, Fresnel's diffraction, half-period zones, phasor diagram and integral calculus methods, the intensity distribution, Zone plates, diffraction due to straight edge, Fraunhofer diffraction due to a single slit and double slit, Diffraction at N-Parallel slit, Plane Diffraction grating, Rayleigh criterion, resolving power of grating, Prism, telescope.

Polarized light and its mathematical representation, Production of polarized light by reflection, refraction and scattering. Polarization by double refraction and Huygen's theory, Nicol prism, Retardation plates, Production and analysis of circularly and elliptically polarized light. Optical activity and Fresnel's theory, Biquartz polarimeter.

Unit-5 Laser system: Basic properties of Lasers, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion, Types of Laser : Ruby and, He-Ne laser and. Applications of laser : Application in communication, Holography and Basics of non linear optics and Generation of Harmonic.

TEXT AND REFERENCE BOOKS:
1. A.K. Ghatak, 'Physical Optics'
2. D.P. Khandelwal, Optical and Atomic Physics' (Himalaya Publishing House, Bombay, 1988)
3. K.D. Moltev; 'Optics' (Oxford University Press)
4. Sears: 'Optics'
5. Jenkins and White: 'Fundamental of Optics' (McGraw-Hill)
6. B.B. Laud: Lasers and Non-linear Optics (Wiley Eastern 1985)
7. Smith and Thomson: 'Optics' (John Wiley and Sons)
8. Berkely Physics Courses: Vol.-III, 'Waves and Oscillations'
9. I.G. Main, 'Vibrations and Waves' (Cambridge University Press)
10. H.J. Pain: 'The Physics of Vibrations and Waves' (MacMillan 1975)
11. Text Book of Optics: B.K. Mathur
12. B.Sc. (Part III) Physics: Editor: B.P. Chandra, M.P. Hindi Granth Academy.
13. F. Smith and J.H. Thomson, Manchester Physics series: optics (John wiley, 1971)
14. Born and Wolf : 'Optics'.
15. Physical Optics: B. K. Mathur and T. P. Pandya.
16. A textbook of Optics: N. Subrahmanyam, Brijlal and M. N. Avadhanulu.
17. Geometrical and Physical Optics: Longhurst.
18. Introduction to Modern Optics: G. R. Fowels.
19. Optics: P. K. Srivastav.

PRACTICALS
Minimum 16 (Eight from each group)
Experiments out of the following or similar experiments of equal standard

1. Study of Brownian motion.
2. Study of adiabatic expansion of a gas.
3. Study of conversion of mechanical energy into heat.
4. Heating efficiency of electrical kettle with varying voltage.
5. Study of temperature dependence of total radiation.
6. Study of temperature dependence of spectral density of radiation.
7. Resistance thermometry.
8. Thermo emf thermometry.
9. Conduction of heat through poor conductors of different geometries.
10. Experimental study of probability distribution for a two-option system using a coloured dice.
11. Study of statistical distribution on nuclear disintegration data (GM counter used as a black box).
12. Speed of waves on a stretched strings.
13. Studies on torsional waves in a lumped system.
14. Study of interference with two coherent source of sound.
15. Chlandi's figures with varying excitation and loading points.
16. Measurements of sound intensities with different situations.
17. Characteristics of a microphone-loudspeakers system
18. Designing an optical viewing system.
19. Study of monochromatic defects of images.
20. Determining the principle point of a combination of lenses.
21. Study of interference of light (biprism or wedge film).
22. Study of diffraction at a straight edge or a single slit.
23. Study of F-P etalon fringes.
24. Study of diffraction grating and its resolving power.
25. Resolving power of telescope system.
26. Polarization of light by reflection; also cos-squared law.
27. Study of optical rotation for any system.
28. Study of laser as a monochromatic coherent source.
29. Study of a divergence of laser beam.
30. Calculation of days between two dates of a year.
31. To check if triangle exists and the type of a triangles.
32. To find the sum of the sine and cosines series and print out the curve.

33. To solve simultaneous equation by elimination method.
34. To prepare a mark-list of polynomials.
35. Fitting a straight line or a simple curve
36. Convert a given integer into binary and octal systems and vice versa .
37. Inverse of a matrix.
38. Spiral array.

TEXT AND REFERENCE BOOKS

1. D.P. Khandelwal, Optics and Atomic physics (Himalaya Publishing house, Bombay 1988).
2. D.P. Khandelwal, A Laboratory Manual for Undergraduate Classes (Vani Publishing House, New Delhi).
3. S. Lipschutz and a Poe, Schaum's outline of theory and Problems of Programming with Fortran(McGraw-hill Book Company 1986).
4. C Dixon, Numerical Analysis .

NEW CURRICULUM OF B.Sc. PART II

CHEMISTRY

The new curriculum will comprise of three papers of 33, 33 and 34 marks each and practical work of 50 marks. The Curriculum is to be completed in 180 working days as per UGC norms and conforming to the directives of Govt. of Chhattisgarh. The theory papers are of 60 hrs. each duration and practical work of 180 hrs duration.

Paper – I
INORGANIC CHEMISTRY   60 Hrs., Max Marks 33

UNIT-I

CHEMISTRY OF TRANSITION SERIES ELEMENTS

Transition Elements: Position in periodic table, electronic configuration, General Characteristics, *viz*., atomic and ionic radii, variable oxidation states, ability to form complexes, formation of coloured ions, magnetic moment μ_{so} (spin only) and μ_{eff} and catalytic behaviour. General comparative treatment of 4d and 5d elements with their 3d analogues with respect to ionic radii, oxidation states and magnetic properties.

UNIT-II

A. Oxidation and Reduction: Redox potential, electrochemical series and its applications, Principles involved in extraction of the elements.

B. COORDINATION COMPOUNDS: Werner's theory and its experimental verification, IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelates, polynuclear complexes.

UNIT-III

COORDINATION CHEMISTRY

Valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding. Crystal field theory, Crystal field splitting and stabilization energy, measurement of 10 Dq (Δ_o), CFSE in weak and strong fields, pairing energies, factors affecting the magnitude of 10 Dq (Δ_o, Δ_t). Octahedral vs. tetrahedral coordination.

UNIT-IV

A. CHEMISTRY OF LANTHANIDE ELEMENTS

Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

B. CHEMISTRY OF ACTINIDES

General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from uranium, similarities between the later actinides and the later lanthanides

UNIT-V

A. ACIDS BASES : Arrhenius, Bronsted-Lowry, conjugate acids and bases, relative strengths of acids and bases, the Lux-flood, solvent system and Lewis concepts of acids and bases.

B. NON-AQUEOUS SOLVENTS

.Physical properties of a solvent, types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid ammonia and liquid sulphur dioxide, HF, H_2SO_4 , Ionic liquids.

REFERENCE BOOKS

1. Basic Inorganic Chemistry, F. A. Cotton, G. Wilkinson and P. L. Gaus, Wiley
2. Concise Inorganic Chemistry, J. D. Lee, ELBS
3. Concepts of Models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.
4. Inorganic Chemistry, D. E. Shriver, P. W. Atkins and C. H. Langford, Oxford.
5. Inorganic Chemistry, W. W. Porterfield, Addison – Wiley.
6. Inorganic Chemistry, A. G. Sharp, ELBS.
7. Inorganic Chemistry, G. L. Miessler and D. A. Tarr, Prentice Hall.
8. Advanced Inorganic Chemistry, Satya Prakash.
9. Advanced Inorganic Chemistry, Agarwal and Agarwal
10. Advanced Inorganic Chemistry, Puri, Sharma, S. Naginchand
11. Inorganic Chemistry, Madan, S. Chand
12. Aadhunik Akarbanic Rasayan, A. K. Shrivastav & P. C. Jain, Goel Pub
13. Uchchattar Akarbanic Rasayan, satya Prakash & G. D. Tuli, Shyamal Prakashan
14. Uchchattar Akarbanic Rasayan, Puri & Sharma
15. Selected topic in Inorganic Chemistry by Madan Malik & Tuli, S. Chand.

UNIT-I

CHEMISTRY OF ORGANIC HALIDES
Alkyl halides: Methods of preparation, nucleophilic substitution reactions – S_N1, S_N2 and S_N^i mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution, elimination reactions.

Aryl halides: Preparation, including preparation from diazonium salts, Nucleophilic Aromatic Substitution; SNAr, Benzyne mechanism. Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

UNIT-II

ALCOHOLS
A. Alcohols: Nomenclature, preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-Blanc Reduction for the preparation of alcohols, Dihydric alcohols – methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement.

B. Trihydric alcohols - Nomenclature, methods of formation, chemical reactions of glycerol.

 PHENOLS
A. Structure and bonding in phenols, physical properties and acidic character, Comparative acidic strength of alcohols and phenols, acylation and carboxylation.

B. Mechanism of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesh reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

UNIT-III

ALDEHYDES AND KETONES
A. Nomenclature, structure and reactivity of carbonyl group. General methods of preparation of aldehydes and ketones.
Mechanism of nucleophilic addition to carbonyl groups: Benzoin, Aldol, Perkin and Knoevenagel condensation. Condensation with ammonia and its derivatives, Wittig reaction, Mannich reaction, Beckmann and Benzil- Benzilic rearrangement.

B. Use of acetate as protecting group, Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen reduction, Wolf-Kishner reaction, $LiAlH_4$ and $NaBH_4$ reduction. Halogenation of enolizable ketones, An introduction to α,β-unsaturated aldehydes and

ketones.

UNIT-IV

A. CARBOXYLIC ACIDS

Preparation, Structure and bonding, Physical and chemical properties including, acidity of carboxylic acids, effects of substituents on acid strength, Hell-Volhard Zeilinsky reaction. Reduction of carboxylic groups, Mechanism of decarboxylation.

Di carboxylic acids: Methods of formation and effect of heat and dehydrating agents, Hydroxyacids.

B. CARBOXYLIC ACID DERIVATIVES

Structure of acid chlorides, esters, amides and acid anhydrides, Relative stability of acyl derivatives.

Physical properties, inter-conversion of acid derivatives by nucleophilic acyl substitution.

Mechanism of acid and base catalyzed esterification and hydrolysis.

UNIT-V

ORGANIC COMPOUNDS OF NITROGEN

A. Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline medium.

B. Reactivity, structure and nomenclature of amines, physical properties. Stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds and nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-Phthalimide reaction, Hofmann-Bromamide reaction, Reactions of amines, electrophilic aromatic substitution of aryl amines, Reaction of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, Azo coupling.

REFERENCE BOOKS

1. Organic Chemistry, Morrison and Boyd, Prentice-Hall.
2. Organic Chemistry, L. G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomons, John Wiley.
4. Organic Chemistry, Vol I, II, III S. M. Mukherjee, S. P. Singh and R. P. Kapoor, Wiley Easters (New Age).
5. Organic Chemistry, F. A. Carey, McGraw Hill.
6. Introduction to Organic Chemistry, Struiweisser, Heathcock and Kosover, Macmillan.
7. Organic Chemistry, P. L. Soni.

8. Organic Chemistry, Bahl and Bahl.

9. Organic Chemistry, Joginder Singh.

10. Carbanic Rasayan, Bahl and Bahl.

11. Carbanic Rasayan, R. N. Singh, S. M. I. Gupta, M. M. Bakidia & S. K. Wadhwa.

12. Carbanic Rasayan, Joginder Singh.

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Paper – III
PHYSICAL CHEMISTRY   60 Hrs., Max Marks 34

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UNIT-I

A. THERMODYNAMICS-I

Intensive and extensive variables; state and path functions; isolated, closed and open systems; Zeroth law of thermodynamics. First law: Concept of heat, work, internal energy and statement of first law; enthalpy, Relation between heat capacities, calculations of q, w, U and H for reversible, irreversible and free expansion of gases under isothermal and adiabatic conditions. Joule-Thompson expansion, inversion temperature of gases, expansion of ideal gases under isothermal and adiabatic condition

B. THERMO CHEMISTRY

Thermochemistry, Laws of Thermochemistry, Heats of reactions, standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions, Adiabatic flame temperature, explosion temperature.

UNIT-II

A. THERMODYNAMICS-II

Second Law of Thermodynamics: Spontaneous process, Second law, Statement of Carnot cycle and efficiency of heat engine, Carnot's theorem, thermodynamic state of temperature. Concept of entropy: Entropy change in a reversible and irreversible process, entropy change in isothermal reversible expansion of an ideal gas, entropy change in isothermal mixing of ideal gases, physical signification of entropy, Molecular and statistical interpretation of entropy.

B. Gibbs and Helmholtz free energy, variation of G and A with pressure, volume, temperature, Gibbs-Helmholtz equation, Maxwell relations, Elementary idea of Third law of Thermodynamics, concept of residual entropy, calculation of absolute entropy of molecule.

UNIT III

A   CHEMICAL EQUILIBRIUM

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases. Concept of Fugacity, Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Coupling of exergonic and endergonic reactions. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Thermodynamic derivation of relations between the various equilibrium constants K_p, K_c and K_x. Le Chatelier principle (quantitative treatment). Equilibrium between ideal gas and a pure condensed phase.

B   IONIC EQUILIBRIA

Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono protic acids (exact treatment). Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

UNIT-IV

PHASE EQUILIBRIUM

A. Phase rule, Phase, component and degree of freedom, derivation of Gibbs phase rule, Clausius-Claperon equation and its applications to Solid-Liquid, Liquid-Vapor and solid-Vapor, limitation of phase rule, applications of phase rule to one component system: Water system and sulphur system.

Application of phase rule to two component system: Pb-Ag system, desilverization of lead, Zn-Mg system Ferric chloride-water system, congruent and incongruent, melting point and eutectic point.

Three component system: Solid solution liquid pairs.

B. Nernst distribution law, Henry's law, application, solvent extraction

UNIT V

PHOTOCHEMISTRY

Characteristics of electromagnetic radiation, Interaction of radiation with matter, difference between thermal and photochemical processes, Lambert-Beer's law and its limitations, physical significance of absorption coefficients. Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law, quantum yield, actinometry, examples of low and high quantum yields, Photochemical equilibrium and the differential rate of photochemical reactions, Quenching, Role of photochemical reaction in biochemical process.

Jablonski diagram depicting various process occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem

crossing), photosensitized reactions, energy transfer processes {simple examples), photostationary states, Chemiluminescence.

REFERENCE BOOKS

1. Physical Chemistry, G. M. Barrow, International student edition, McGraw Hill.
2. University General Chemistry, C. N. R. Rao, Macmillan.
3. Physical Chemistry, R. A. Alberty, Wiley Eastern.
4. The elements of physical chemistry, Wiley Eastern.
5. Physical Chemistry through problems, S. K. Dogra & S. Dogra, Wiley Eastern.
6. Physical Chemistry, B. D. Khosla,.
7. Physical Chemistry, Puri & Sharma.
8. Bhautik Rasayan, Puri, Sharma and Pathania, Vishal Publishing Company.
9. Bhautik Rasayan, P. L. Soni.
10. Bhautik Rasayan, Bahl and Tuli.
11. Physical Chemistry, R. L. Kapoor, Vol I-IV .
12. Chemical kinetics, K. J. Laidler, Pearson Educations, New Delhi (2004).

Paper –IV

LABORATORY COURSE

INORGANIC CHEMISTRY
Qualitative semimicro analysis of mixtures containing 5 radicals. Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested:

CO_3^{2-}, NO_2^- , S^{2-}, SO_3^{2-},$S_2O_3^{2-}$, CH_3COO^-, F^- ,Cl^- , Br^- , I^- , NO_3^- , BO_3^{3-}, $C_2O_4^{2-}$, PO_4^{3-}, NH_4^+ , K^+, Pb^{2+}, Cu^{2+}, Cd^{2+}, Bi^{3+}, Sn^{2+}, Sb^{3+}, Fe^{3+}, Al^{3+}, Cr^{3+}, Zn^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}.

Mixtures should preferably contain one interfering anion, or insoluble component ($BaSO_4$, $SrSO_4$, $PbSO_4$, CaF_2 or Al_2O_3) or combination of anions e.g. CO_3^{2-} and SO_3^{2-}, NO_2^- and NO_3^-, Cl^-, Br^-, and I^-.

Volumetric analysis

    (a)   Determination of acetic acid in commercial vinegar using NaOH.

    (b)   Determination of alkali content-antacid tablet using HCl.

    (c)   Estimation of calcium content in chalk as calcium oxalate by permanganometry.

    (d)   Estimation of hardness of water by EDTA.

    (e)   Estimation of ferrous & ferric by dichromate method.

    (f)   Estimation of copper using thiosulphate.

- Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions: i. Ni (II) and Co (II) ii. Fe (III) and Al (III)

ORGANIC CHEMISTRY

- Detection of elements (X, N, S).
- Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols, nitro, amine, amide, and carbonyl compounds, carbohydrates)
- Preparation of Organic Compounds:
  (i) m-dinitrobenzene, (ii) Acetanilide, (iii) Bromo/Nitro-acetanilide, (iv) Oxidation of primary alcohols-Benzoic acid from benzylacohol, (v) azo dye.

PHYSICAL CHEMISTRY

Transition Temperature

- Determination of the transition temperature of the given substance by thermometric/ dialometric method (e.g. $MnCl_2.4H_2O/SrBr_2.2H_2O$).

Thermochemistry

- Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).

- Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.

- To determine the solubility of benzoic acid at different temperature and to determine ΔH of the dissolution process.

- To determine the enthalpy of neutralization of a weak acid/ weak base versus strong base/ strong acid and determine the enthalpy of ionization of the weak acid/ weak base.

- To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

Phase Equilibrium

- To study the effect of a solute (e.g. NaCl, Succinic acid) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system) and to determine the concentration of that solute in the given phenol-water system.

- To construct the phase diagram of two component system (e.g. diphenylamine–benzophenone) by cooling curve method.

- Distribution of acetic/ benzoic acid between water and cyclohexane.

- Study the equilibrium of at least one of the following reactions by the distribution method:

    (i) $I_2(aq) + I^- \rightarrow I^-_3 (aq)^{2+}$

    (ii) $Cu^{2+}(aq) + nNH_3 \rightarrow Cu(NH_3)n$
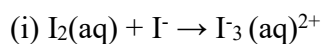
Molecular Weight Determination

Determination of molecular weight by Rast Camphor and Landsburger method.

Note: **Experiments may be added/ deleted subject to availability of time and facilities.**

Reference Books

1. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
2. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. & Tatchell, A.R. Practical Organic Chemistry, 5th Ed. Pearson (2012)
3. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000). 22
4. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).
5. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011). Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
6. Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York

Hrs.5   PRACTICAL EXAMINATION   M.M.50

Three Experiments are to be performed.

1. Inorganic – Qualitative semimicro analysis of mixtures.   **12 marks**

<div align="center">OR</div>

One experiment from synthesis and analysis by preparing the standard solution.

2. (a) Identification of the given organic compound & determine its M.Pt./B.Pt.

           6 marks

 (b) Determination of Rf value and identification of organic compounds by paper chromatography.   **6 marks**

3. Any one physical experiment that can be completed in two hours including calculations.

           12 marks

4. Viva   **10 marks**

5. Sessional   **04 marks**

In case of Ex-Students one marks will be added to each of the experiment.

MICROBIOLOGY
BSc-2ⁿᵈ

Paper- I: Molecular Biology and Genetic Engineering

UNIT-1: FUNDAMENTALS OF MOLECULAR BIOLOGY
History and scope of molecular biology, concept and mechanism of heredity. DNA as genetic material- experimental evidences. DNA replication- mechanism, process and enzymes/proteins involved in replication.

UNIT-2: CENTRAL DOGMA OF PROTEIN SYNTHESIS
Transcription- initiation, elongation, termination, RNA polymerases and sigma factor. Transcription inhibitors (antibiotics, drugs). Translation- initiation, elongation and termination. Factors involved in translation. Genetic code.

UNIT-3: MUTATION AND DNA REPAIR MECHANISM
Introduction and Types of Gene mutations- Base substitution, frame shift mutation (insertion, deletion, miss-sense, nonsense mutation.) mutagens – physical and chemical. Reverse mutation in bacteria. DNA repair mechanism (mismatch repair, photo-reactivation, excision and SOS repair). Beneficial and harmful effect of mutation.

UNIT-4: GENE REGULATION
Concept of gene- Cistron, Recon, Muton. Operon Concept- lac Operon, tryptophan Operon, His Operon. Activator, Co-activator and Repressor. Introduction to Bioinformatics- Elementary genome Database.

UNIT-5: GENETIC ENGINEERING
Basic concept of Genetic Engineering, DNA modifying enzymes Restriction endonuclease, DNA ligase, terminal transferase. Vectors-pBR322, pUC19, BAC and YAC. Phage based vectors, expression of vector. Transformation – physical and chemical method. Bacterial Host. Screening of recombinant vector Blue white Screening, Colony Hybridization.

Text Books Recommended:

1. Gene Cloning by T.A. Brown.
2. General Microbiology by Power and Daganiwala.
3. Zinssers Microbiology by KJ Wolfgang, McGraw- HJill Company.
4. Microbial Genetics by RM Stanley, F David and EC John.
5. Bacteriological Techniques by FJ Baker.
6. .Molecular Biology of the Cell; *3rd Edition;* Bruce Alberts ,et.al; Garland Publishing.
7. Cell biology; C.B. Powar; Himalaya Publishing House; Fifth edition
8. Cell & Molecular Biology; Gerald Karp; Fourth edition
9. A Textbook of Microbiology; Dubey&Maheshwari; S.chand& Sons.
10. Cell biology & Genetics; P. K. Gupta
11. Introduction to Bioinformatics; T K Atwood and D J Parry-Smith; Pearson Education Ltd

Paper- II: Bioinstrumentation and Biostatistics

UNIT-1: MICROSCOPY AND CENTRIFUGATION
Simple and compound light microscope, Bright field, Dark field, Phase contrast and Electron microscope. Centrifugation- principle and types of centrifuges (analytical and preparatory), types of centrifugation- differential and rate zonal centrifugation.

UNIT-2: pH metry and chromatography
Principle of pH meter, types of electrodes, factors affecting pH measurements, and application of pH meter. Chromatography- principle, types- paper, TLC and column chromatography, HPLC.

UNIT-3: SPECTROPHOTOMETRY
Electromagnetic spectrum, Beers-Lamberts law, Types (Principles, working and application)- colorimeter, UV - Vis Spectrophotometry and IR- Spectrophotometry, Turbidometry.

UNIT-4: Electrophoresis and X-Ray Diffraction
Principle of electrophoresis, instrumentation and Application, types of Paper, Gel electrophoresis and Immunoelectrophoresis. X-ray diffraction- principle and application.

UNIT-5: Biostatistics
Data- Types, characteristics, presentation and distribution. Data analysis- central tendency (Mean, Median and Mode), Deviation (variance SD and SE). Concept of probability.

Text Books Recommended:

1. Introduction to Istrumental analysis by Robert Braun.
2. Instrumental Techniques by Upadhyay and Upadhyay.
3. Instrumental Methods of Chemical Analysis by BK Sharma.
4. Bio statistics; Sunder Rao
5. Statistical Methods; S. P. Gupta; Sultan Chand & Sons

PRACTICAL

M. M. 50

Determination of antibiotic resistance by plating method.
Assaying of microbial enzymes; Catalase, Proteases, Peroxidases,
Cellulase, Cellobioases, Amylase, Diastase.
Exercise on paper, thin layer, column chromatography.
Exercise on paper and gel electrophoresis.
determination of pH of various water and soil sample.
testing of lambert beer's law.
Determination of lamda max of dye by spectrophotometer
Isolation of resistant bacteria from soil and water sample

Scheme of Practical Examination

Time - 4 hours   M.M. 50

1. Exercise on spectrophotometer/ pH meter	10
2. Exercise on chromatography	10
3. Exercise on genetics	05
4. Spotting (1-5)	10
5. Viva-Voce	05
6. Sessional	10

Total 50

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B . Sc . Part II

ELECTRONICS

Paper I

ELB 201 : COMMUNICATION ELECTRONICS
Theory: Max. Marks :50

Unit-1

Electronic communication: Introduction to communication – means and modes. Needfor modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage. Channels and base-band signals. Concept of Noise, signal-to-noise (S/N) ratio.

Unit-2

Analog Modulation: Amplitude Modulation, modulation index and frequency spectrum.Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodyne receiver

Analog Pulse Modulation: Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing.

Unit-3

Digital Pulse Modulation: Need for digital transmission, Pulse Code Modulation,Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK).

Optical Communication: Introduction of Optical Fiber, Block Diagram of optical communication system.

Unit-4

Introduction to Communication and Navigation systems:
Satellite Communication– Introduction, need, Geosynchronous satellite orbits,geostationary satellite advantages of geostationary satellites. Satellite visibility,

transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink.

Unit-5

Mobile Telephony System – Basic concept of mobile communication, frequency bandsused in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitativeonly).GPS navigation system (qualitative idea only)

Reference Books:

1. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.

2. Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.

3. Modern Digital and Analog Communication Systems, B.P. Lathi, 4th Edition, 2011, Oxford University Press.

4. Electronic Communication systems, G. Kennedy, 3rd Edn., 1999, Tata McGraw Hill.

5. Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill

6. Communication Systems, S. Haykin, 2006, Wiley India

7. Electronic Communication system, Blake, Cengage, 5th edition.

8. Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

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Paper II
ELB 202 :MICROPROCESSOR ANDMICROCONTROLLER

Theory: **Max. Marks :50**

Unit-1

Microcomputer Organization: Input/Output Devices. Data storage (idea of RAM andROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map.
8085 Microprocessor Architecture: Main features of 8085. Block diagram. Pin-outdiagram of 8085. Data and address buses. Registers. ALU. Stack memory. Program counter.

Unit-2

8085 Programming : Instruction classification, Instructions set (Data transfer includingstacks. Arithmetic, logical, branch, and control instructions). Subroutines, delay loops. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. Hardware and software interrupts.

Unit-3

8051 microcontroller: Introduction and block diagram of 8051 microcontroller,architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions.

Unit 4

8051 I/O port programming: Introduction of I/O port programming, pin out diagram of8051 microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation.
8051 Programming: 8051 addressing modes and accessing memory locations usingvarious addressing modes, assembly language instructions using each addressing mode, arithmetic and logic instructions,

Unit 5

8051 programming in C: for time delay & I/O operations and manipulation, for arithmetic and logic operations, for ASCII and BCD conversions.
Introduction to embedded system: Embedded systems and general purpose computersystems. Architecture of embedded system. Classifications, applications and purpose of embedded systems.

Reference Books:

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.

2. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill

3. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.

4. Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University Press

5. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.

6. Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India

7. Introduction to embedded system, K.V. Shibu, 1st edition, 2009, McGraw Hill

8. Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning

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ELECTRONICS LABORATORY

The scheme of practical examination will be as follows-

Experiment	--	**30**
Viva	--	**10**
Sessional	--	**10**
Total	--	**50**

ELB 203P: COMMUNICATIONELECTRONICS LAB
(Hardware and Circuit Simulation Software) 60 Lectures
Max.Marks:25

1. To design an Amplitude Modulator using Transistor

2. To study envelope detector for demodulation of AM signal

3. To study FM - Generator and Detector circuit

4. To study AM Transmitter and Receiver

5. To study FM Transmitter and Receiver

6. To study Time Division Multiplexing (TDM)

7. To study Pulse Amplitude Modulation (PAM)

8. To study Pulse Width Modulation (PWM)

9. To study Pulse Position Modulation (PPM)

10. To study ASK, PSK and FSK modulators

Reference Books:

1. Electronic Communication systems, G. Kennedy, 1999, Tata McGraw Hill.
2. Electronic Communication system, Blake, Cengage, 5th edition.

ELB 204P: MICROPROCESSOR ANDMICROCONTROLLER
LAB(Hardware and Circuit Simulation Software)

Max.Marks:25

At least 06 experiments each from Section-A and Section-B
Section-A: Programs using 8085 Microprocessor

1. Addition and subtraction of numbers using direct addressing mode
2. Addition and subtraction of numbers using indirect addressing mode
3. Multiplication by repeated addition.
4. Division by repeated subtraction.
5. Handling of 16-bit Numbers.
6. Use of CALL and RETURN Instruction.
7. Block data handling.
8. Other programs (e.g. Parity Check, using interrupts, etc.).

Section-B: Experiments using 8051 microcontroller:

1. To find that the given numbers is prime or not.
2. To find the factorial of a number.
3. Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number.
4. Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's .
5. Program to glow the first four LEDs then next four using TIMER application.
6. Program to rotate the contents of the accumulator first right and then left
7. Program to run a countdown from 9-0 in the seven segment LED display.
8. To interface seven segment LED display with 8051 microcontroller and display 'HELP' in the seven segment LED display.
9. To toggle '1234' as '1324' in the seven segment LED display.
10. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
11. Application of embedded systems: Temperature measurement & display on LCD

Reference Books:

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
2. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
3. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
4. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
5. Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning

INFORMATION TECHNOLOGY

PAPER - I

DIGITAL CIRCUITS & COMPUTER H/W

(Paper Code - 0874)

UNIT-I (A) Number Systems :

Octal and hexadecimal number, decimal rep., complements, addition, subtraction, multiplication, division, fixed point rep, floating point rep., other binary code-gray code, excess 3 gray, excess-3, 2421, etc. error detection code.

(B) Boolean Algebra :

Laws, demorgan's theorm, Simplification boolean expression & logic diagram, positive & negative logic, K-map and simplification of K-map.

UNIT-II Combinational circuits :

Half adder, full adder, flip-flop : SR, JK, D,T, sequential circuits : encoder, decoder, multiplexer, shift resister, binary counters, BCD adder.

UNIT-III Multivibrator circuits :

Monostable, astable, bistable, smitt trigger, clocked RS, master-slave flip-flop, edge triggered flip-flop, latch.

Intergrated circuits :

RTL, DITL, TTL, CMOS, MOS.

UNIT-IV (A) Central Processing Unit :

Introduction, register organisation, stack organisation, Instruction formats, Addressing modes.

(B) I/O organisatin :

I/O interfaces, Data transfer, types and modes, interrupts, DMA, IOP.

UNIT-V Memory organisation :

Memory hierarcy, main memory, Auxiliary memory, Associative memory, cache memory, virtual memory, memory management techniques.

REFERENCE TAXT BOOK :

1.	Integrated Electronics	-	Millman & Halkias
2.	Principle of Electronics	-	V.K. Mehta
3.	Digital Electronics	-	R.P. Jain
4.	Computer System Architecture	-	Morris Mano
5.	Digital Electronics & Computer Hardware	-	Morris Mano

PAPER - II

(Paper Code - 0875)

UNIT-I Ingroduction to OPP : Advantages of OPP, the Object oriented approach, characteristics of object oriented languages : object, classes, inheritance, reusability, polymorphism and C++.

B.Sc.-II

(54)

UNIT-II Function : function declaration, calling function, function definition, passing arguments to function, passing constant, passing value, fegerence argument, returning by reference, inline function, function overloading, default arguments in function.

UNIT-III Object and classes, using the classes, class constructor, class destructor, object as function argument, copy constructor, struct and classes, array as class member, static class data, static member functions, friend function, friend class, operator overloading, type of inheritance, bass class derive class, access percifier, protectedc, member function.

UNIT-IV Pointers : & and * operator pointer variables, pointer to pointer, void pointer, pointer and array, pointer and functions, pointer and string, memory management, new and delete, pointer to object, this pointer, virtual function : virtual function, virtual member function, accesses with pointer, pure virtual function.

UNIT-V File and stream : C++ steams, C++ manipulators, Stream class, string I/O, char I/O; object I/O, I/O with multiple objects, disk I/O.

REFERENCE TEXT BOOKS :

1.	Programming in C++	-	E. Balaguruswami
2.	Mastering in C++	-	Venu Gopal
3.	Object Oriented Programming in C++	-	Robert Lafore
4.	Let us C++	-	Y. Kanetkar

PRACTICAL WORK

1. The sufficient Practical work should be done for understanding the paper 2.

2. At least five programs on each unit from unit 2 to unit 5 be prepared.

3. All practical works should be prepared in form of print outs and be valuated while practical examination.

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B.Sc. II
BIOTECHNOLOGY

PAPER – I

MOLECULAR BIOLOGY & BIOPHYSICS

M.M. 50

UNIT-I

1. Nucleic Acid: Bases, Nucleosides and Nucleotides, DNA and RNA structure.
2. Plasmids.
3. Transposons: Repetitive elements, LINEs & SINEs, Structure of Gene.

UNIT-II

1. DNA Replication: Enzymes involved and mechanism of DNA Replication in Prokaryotes.
2. Mutation: Molecular level of Mutation, Types of Mutagens, Spontaneous and Induced Mutation.
3. DNA Repair: NER, BER and Mismatch Repair.

UNIT-III

1. Genetic Code: Features, Condon Assignment and Wobble hypothesis.
2. Transcription: Initiation, Elongation and Termination in Prokaryotes.
3. Translation: Initiation, Elongation and Termination Translation machinery in Prokaryotes. Operon-Concept of Operator, Regulator, Promoter gene, Inducer and Co-repressor.

UNIT –IV

1. Biophysics : Introduction, Scope and Application
2. Principle, Structure, Functions of the following:
   a. Microscopy b. Colorimeter and Spectroscopy c. Electrophoresis
   d. Centrifugation e. Chromatography.

UNIT –V

1. Radioisotopes techniques: Measurement of radioactivity, Ionization Chambers, Geiger Muller and Scintillation Counter.
2. Autoradiography and DNA Fingerprinting.
3. Biosensor.

List of Books

1. Gerald Karp - Cell and Molecular biology, 4th Edition (2005).
2. Lewis J.Klein Smith and Valerie M.Kish-Principles of cell and molecular biology-Third
3. Edition (2002)
4. P.K. Gupta- Cell and molecular biology, Second Edition (2003), Rastogi publications.
5. Richard M-Twyaman-Advanced Molecular Biology, First South Asian Edition (1998), VivaBooks Pvt. Ltd.
6. K. Wilson and J.Walker (2012) Principle and Techniques of Biotechnology and MolecularBiotechnology.
7. Upadhya and Upadhya : Biophysical Chemistry.
8. David, I. Nelson and Michael M.Cox :Lehniger : Principal of Biochemistry 4th Edition. W.H. Freeman and Company, New York.
9. Buchanan, Gruissemen& Jones (2015) Biochemistry & Molecular Biology of Plant, 2nd edition.

B.Sc. II
BIOTECHNOLOGY

PAPER II

RECOMBINANT DNA TECHNOLOGYAND GENOMICS

M.M. 50

UNIT-I

1. Recombinant DNA technology: General concept. Steps in gene cloning and application.
2. Host controlled Restriction Modification System, Ligases and Polymerases, Klenow fragment, Taq, Pfu polymerase and Nuclease (Endo, Exo and restriction endonuclease).
3. Modification Enzyme (Kinase, Phosphates and terminal deoxynucleotidyl transferase). Reverse Transcriptase.

UNIT –II

1. Vectors: Plasmid, Bacteriophages, Cosmid, SV40 and Expression vectors.
2. Gene Library: Genomic and cDNA library.
3. Selection and Screening of Recombinants: Genetic and Hybridization methods.

UNIT –III

1. PCR: Types of PCR, Steps (Denaturation, Annealing and Extension); Applications, Advantages and Limitation of PCR.
2. Molecular Marker-RFLP, RAPD and Micro array.
3. Human Genome Project.

UNIT-IV

1. Basic concept of Gene Transfer Methods: Microinjection, Electroporation, Lipofection and Microprojectile.
2. Gene Therapy: *In vivo* and *Ex vivo*, Germ line and Somatic gene therapy.
3. Basic idea of Stem cell technology: Types of stems cell cultures and their Significance.

UNIT-V

1. Introduction to Bioinformatics: History, Objective and Application.
2. Major Bioinformatics Resource – NCBI , Types of Databases (Primary and Secondary Databases) , BLAST and FASTA
3. Basic concept of Genomics and Proteomics

List of Books

1. B.D. Singh (2004) Biotechnology, Expanding Horizons. First Edition. Kalyani Publishers, Ludhiana.

2. P.K. Gupta (2005) Biotechnology and Genomics, Rastogi Publication, Meerut.

3. Stan bury and Whittaker - Principles of Sterilization techniques, First Indian reprint Edition (1997). Aditya Book (P) Ltd. New Delhi.

4. L.E. Casida (1994)Industrial Microbiology Edition .

5. A.H. Patel (2003) Industrial Microbiology 4th Edition.

6. K.S. Bilgrami and A.K. Pandey(1998) Introduction to Biotechnology Edition 2nd (1998)

7. U Satyanarayan (2005) Biotechnology, First Edition Books and Allied (P) Ltd. Kolkata.

8. Atul kumar and VandanaA.Kumar (2004) Plant Biotechnology and tissue culture, Principle and Perspectives, International Books Distributing Co. Lucknow.

10. S Choudhuri, and DB Carlson (2008) Genomics: Fundamentals and applications, 1st edition.

11. TK Attwood and DJ Parry (2009) Introduction of Bioinformatics.

12. Philip E Bourne Helge Whisking (2003) Structural Bioinformatics.

13. Des Higgins and Willie Taylor (2000) Bioinformatics Sequence, Structure and Databanks.

List of Practical's

MOLECULAR BIOLOGY, BIOPHYSICS, RECOMBINANT DNA TECHNOLOGY AND GENOMICS

1. Isolation of DNA from Plant cell.
2. Estimation of DNA by DPA method.
3. Isolation RNA from yeast cells

Experiment based on-
4. Centrifugation
5. Spectrophotometer/Colorimeter
6. Electrophoresis
7. Paper chromatography/TLC

Experiment based on Bioinformatics -
8. Retrieve DNA /Protein sequence from Biological Data Bases (NCBI).
9. Use of tools studied

SCHEME FOR PRACTICAL EXAMINATION

Time: 4 hrs. M.M.: 50

1. Experiment based on DNA/RNA	10 marks
2. Experiment based on Instruments	10 marks
3. Experiment based on Bioinformatics	10 marks
4. Spotting	10 marks
5. *Viva - Voce*	05 marks
6. Record / Sessional	05 marks

FORESTRY
PAPER - I

MM: 50

UNIT- I

Social Forestry

Scope, object and type, important social forestry schemes, economic benefits of social forestry

UNIT- II

Joint Forest Management

Definition, scope and objects, People's participation in JFM, constraints in obtaining people's participation

UNIT- III

Forest Management

Definition, scope and objects,
Brief idea of the following-
a. Growing stock
b. Rotation
c. Sustained yield
d. Normal forest

UNIT- IV

Forest Measurement

Definition, scope and object, measurement of height of trees, measurement of diameter of trees, measurement of girth of tree

UNIT- V

Forest Organisation

Geographical, climatic and functional classification,
Legal classification,
Territorial classification,
Administrative (organizational) classification,
Management (Silvicultural) classification- working circle, felling series, cutting section, coupes and periodic bricks

FORESTRY
PAPER – II

MM: 50

UNIT- I

Wood Anatomy

Introduction, anatomical structure of wood, physical properties of wood, mechanical properties of wood.

UNIT- II

Logging

Felling and conversion, transport, storage, grading of timber

UNIT- III

Minor Forest Products

Definition of minor forest product
General idea of following MFPs of India –
a. Fuel wood
b. Fibre and flosses
c. Grass, Bamboo
d. Essential oils
e. Oilseed
f. Tans and dyes
g. Medicinal plants

UNIT- IV

Forest Based or Wood Based Industries

Pulp and paper, Cutch and Katha, Lac and manufacture of shellac, Resin tapping and manufacture of turpentine and rosin, Charcoal burning

UNIT- V

Forest and Tribals

Life and livelihood: Tribal's, tribal's and forests, constitutional safeguards, tribal welfare and development

REFERENCE BOOKS

1. Forestry for people- S.A. Shah
2. Social forestry- S.S. Negi
3. Forest management- Ram Prakash
4. A hand book of forest utilization- Mehta
5. Theory & practices of Silvicultural systems- Ram Prakash and Khanna
6. Forest mensuration- Chaturvedi and Khanna
7. Forestry in India- V.P. Agrawal
8. Bharat ki janjatiyan- Dr. Shiv Kumar Tiwari
9. Tribal in India- Nadeem Hasnain

FORESTRY

PRACTICAL

MM: 50

List of Practicals

1. Measurement of Diameter, girth, height etc.
2. Nursery management
3. Handling of nursery stock
4. Field planting methods

TASAR TECHNOLOGY
PAPER- I
SEED TECHNOLOGY AND REELING

MM: 50

UNIT- I

1. Spinning behaviour of non-mulberry cocoons, Physical and commercial characters of cocoons.
2. Pierced cocoons: storage and disposal
3. Marketing of cocoons: price fixation according to silk content
4. Selection & transportation of cocoon for reeling

UNIT- II

1. Economics of seed organisation: Equipment for preparation of economically viable unit of grainage, cocoon DFLS-ratio, manpower requirement.
2. Organising a grainage, cost of preparation of DFLS.
3. Maintenance of records and registers in grainage.
4. Economics of seed production: salaries, wages, establishment, charges, cold storing of eggs, sale of eggs, cost of chemical equipments, egg sheets, furniture, contingencies & miscellaneous expenditure.

UNIT- III

1. Protective measures in seed production
2. SILK REELING: Introduction, evolution, importance & statistics of silk reeling
3. Position of reeling industry in India and other silk producing countries.
4. Raw materials for silk reeling-factor affecting the production of silk yarn, different varieties their characteristics.

UNIT- IV

1. Reeling: object, details study of yarn passage, raw silk yarn size (denier) and importance.
2. Physical, Chemical & Microscopic properties of tasar silk. Uses of tasar silk, different type of silk yarn & their characteristics and uses.
3. Difference between mulberry and non-mulberry silk, Main problem of reeling of tasar silk.
4. Silk testing & quality control: Testing of raw silk, advantage of testing, silk conditioning and testing house, wining test, Seri-plane and serigraph tests, cohesion and standardisation of raw silk.

UNIT- V

1. Reeling machine: Conventional charkha, improved charkha, cottage basin/filature basin, multi end silk reeling basin.
2. Automatic & semi-automatic reeling machine, recent advances in reeling.
3. Re-reeling & packing: object, importance of re-reeling yarn distribution and skein formation, skein finishing, Raw silk book making and building.
4. Stifling: Definition, various methods of stifling.

TASAR TECHNOLOGY
PAPER-II
SPINNING, DYEING & PRINTING OF TASAR SILK

MM: 50

UNIT-I

1. Spinning: Principles of spanning. Charkha spinning. Hand spinning, spun silk mills, spun silk Industry.
2. Silk throwing: Introduction. Objective of silk throwing preparation for twisting (Highlight) twist-high twist & low twist.)
3. Winding: object of winding, principle of winding, types and methods of winding.
4. Silk processing: Degumming of silk. Bleaching. Dyeing finishing.

UNIT-II

1. Types of water used in processing.
2. Process Involved in spun silk preparation: washing drying opening. Filling. Combing. Drawing, rowing. Spinning, doubling. Gassing, cleaning, recalling.
3. Introduction of textile fibre general properties classification of textile fibre Physical and chemical properties of different fibres (Tasar, well, action deflector.)

UNIT-III

1. Establishment of small reeling units, efficiency, machinery management, production & economics.
2. By products of silk, pupa different types of silk waste.
3. Traditional ghicha preparation of tasar silk blending of tasar silk with other fibre and its problems.
4. Noil and noil yarns

UNIT-IV

1. Bleaching: Introduction of bleaching, purpose of bleaching, bleaching of tasar silk, wool & cotton.
2. Dyeing: Introduction of dyeing of tasar silk, cotton and wool with different class of dyestuffs normally used after their treatment.
3. Printing: Introduction of printing, study of different methods and styles of printing.

UNIT-V

1. Printing of tasar silk & cotton by block method, with different group of colour normally used.
2. Brief Idea of transfer and foam Printing, thickening agents.
3. Finishing: Introduction of finishing, classification of finishing, study of different type of temporary and permanent finishing of tasar silk and cotton.

PRACTICALS
PAPER-I: SEED TECHNOLOGY AND REELING.
PAPER-II: SPINNING, DYEING & PRINTING OF TASAR SILK.

MM: 50

1. Sorting and grading of tasar cocoons.
2. Determination of physical/commercial characters of cocoons.
3. Stifling and cooking of tasar cocoon.
4. Reeling of tasar cocoons on natwa.
5. Study of reeling and spinning machines.
6. Identification of textile fibres, silk, wool & cotton.
7. Flaw of grainage buildings & equipment.
8. Cutting of seed cocoons: sex separation. By rupal methods.
9. Study of multi-end silk reeling machine, automatic & semi-automatic reeling mechine.
10. Study of silk testing: winding test, denier (size) test.
11. Degumming of raw silk yarn and silk waste by soap & soda method.
12. Study of silk fabric manufacturing unit: power loom & hand loom.
13. Study of silk dying and printing unit: visit to practical centers.
14. Charkha reeling.: economic model of silk reeling unit
15. Visit to seed cocoon markets.
16. Visit to multi-voltime & bi-voltime seed forms.
17. Visit to temperate & tropical states of India.
18. Provision to arrange guest/ lectures/film/slide shows.

LIST OF REFERENCE BOOKS:-

1. Silkworm Egg: by Y. Tazima (1962) Published by CSB Bombay.
2. Silk Dyeing, Printing and Finishing: Gulrabani.
3. Sericulture & Silk Industry: by Tripurali Sharma.
4. Silk Processing: by Kim.
5. Technology of Printing: by Shenai.
6. Finishing: by Marsh.
7. Dye & Dye Intermediates: by S.B.P.
8. Raw Silk Reeling: by B.H. Kim.
9. Silk of Industry Problem and Prospects: by A. Ajab, H. Lawpper.
10. Dying of Textile Fibres: by Shenai.
11. The Development of Indian Silk: by Sanjay Sinha (1990)

केन्द्रीय अध्ययन मंडल द्वारा अनुशंसित पाठ्यक्रम

बी.एससी.

विषय : भूविज्ञान

सत्र : 2018 – 2019

बैठक दिनांक : 11जून 2018

उपस्थित सदस्यों के नाम एवं हस्ताक्षर :

1. डॉ निनाद बोधनकर अध्यक्ष   :

2. डॉ. एम.डब्लू.वाय.खान   :

3. प्रो. एस.के. चन्द्राकर   :

4. प्रो. प्रदीप सिंह गौर   :

5. डॉ. एस.एस.भदौरिया   :

6. डॉ. एस.डी.देशमुख   :

7. डॉ. प्रशांत श्रीवास्तव   :

8. प्रो. महफूज आरिफ   :

Scheme of Examination

कक्षा	प्रश्नपत्र	विषय समूह	सैद्धा.अंक	प्रायो.अंक	योग

BSc. I year	I	भूगतिकी एवं भू–आकृति विज्ञान (Geodynamics & Geomorphology)	50	50	150
	II	खनिज एवं क्रिस्टल विज्ञान (Mineralogy & Crystallography)	50		
BSc. II year	I	शैलिकी (Petrology)	50	50	150
	II	संरचनात्मक भूविज्ञान (Structural Geology)	50		
BSc. III year	I	जीवाश्म विज्ञान एवं संस्तर विज्ञान (Palaeontology & Stratigraphy)	50	50	150
	II	भूसंसाधन एवं व्यावहारिक भूविज्ञान (Earth Resources & Applied Geology)	50		

-: Note :-

प्रत्येक वर्ष के विद्यार्थियों हेतु पाठ्यक्रम में उल्लेखित भूवैज्ञानिक क्षेत्रीय अध्ययन अनिवार्य होगा।

कक्षा / Class- B.Sc-I

Paper –I

भूगतिकी एवं भूआकृति विज्ञान

(Geodynamics & Geomorphology)

इकाई– 01　(i) भूविज्ञान एवं परिप्रेक्ष्य; सौरमण्डल में सूर्य की स्थिति ; परिमाण, आकार, संहति, घनत्व।

(ii) पृथ्वी की उत्पत्ति

(iii) पृथ्वी की आंतरिक संरचना, भूपर्पटी, प्रवार एवं क्रोड

(iv) पृथ्वी की आयु: निर्धारण की विघटनाभिक विधियॉ

(v) वायुमण्डल, जलमण्डल एवं जैवमण्डल का निर्माण एवं संगठन

इकाई– 02　(i) प्लेटविवर्तनिकी का प्रारंभिक– अध्ययन

(ii) महाद्वीपीय विस्थापन की अवधारणायें एवं सिद्धान्त

(iii) समस्थैतिकी की अवधारणायें एवं सिद्धान्त

(iv) समुद्रतल विस्तारण की साक्ष्य

(v) समुद्र, महाद्वीप एवं पर्वतों की उत्पत्ति

इकाई– 03　(i) भूकम्प: भूकम्प की पट्टियॉ, भूकम्प की तीव्रता

(ii) ज्वालामुखी: प्रकार एवं विवरण

(iii) अंतःसमुद्रीपर्वतों, चापाकार द्वीपमालाओं एवं खाइयों का उद्भव, विवरण एवं महत्व

(iv) महाद्वीपीय तटीय क्षेत्रों की विवर्तनिकी : सक्रिय तट एवं सीमांतीय द्रोणियॉ

(v) नवविवर्तनिकी : सक्रियभ्रंश, अपवाह परिवर्तन

इकाई– 04　(i) भूआकृति विज्ञान की मूलभूत धारणायें

(ii) भूआकृतिक कारक एवं शैल अपक्षय की प्रक्रियायें,

(iii) नदी के भूवैज्ञानिक कार्य एवं नदीय भूआकृतियॉ

(iv) वायु के भूवैज्ञानिक कार्य एवं वायुजनित भूआकृतियॉ

(v) हिमनदों के भूवैज्ञानिक कार्य एवं हिमनदजनित भूआकृतियॉ

इकाई– 05   (i) समुद्र के भूवैज्ञानिक कार्य एवं तटीय भूआकृतियॉ

(ii) भूमिगत जल के भूवैज्ञानिक कार्य एवं कार्स्टस्थलाकृति

(iii) ज्वालामुखीय भूआकृतियॉ

(iv) पृथ्वी का उष्माबजट एवं वैश्विक जलवायु परिवर्तन

(V) भारत का भूआकृति विभाजन

प्रायोगिक कार्य–

(1) भूआकृतिक संरचनाओं को प्रदर्शित करने वाले प्रादर्शो का अध्ययन

(2) स्थलाकृतिक मानचित्रों का अध्ययन एवं विभिन्न पैमानों पर सूचक–निर्धारण की जानकारियॉ

(3) भूआकृतिक–मानचित्रों में विभिन्न भूआकृतियों एवं प्रवाह प्रणालियों का अध्ययन

(4) भारत के रेखित–मानचित्र में मुख्य पर्वतों, झीलों एवं नदियों को अंकित करना

(5) भारत के रेखित मानचित्र में भूकम्प प्रेक्षणालयों को अंकित करना

(6) भारतीय महाद्वीपों में आये भूकम्पों का अधिकेन्द्र एवं तीव्रता को मानचित्र में अंकित करना।

(7) आकारिमितिक विश्लेषण

Unit:1   (i)   Geology & it perspectives. Earth in the solar system; size, shape, mass, & density.

          (ii)   Origin of Earth.

          (iii)   Internal structure of Earth, Crust, Mantle and Core.

          (iv)   Age of Earth: with special emphasis on Radioactive dating.

          (v)   Formation & composition of Hydrosphere, & Biosphere & Atmosphere.

Unit:2   (i)   Elementary idea about Plate-Tectonics.

          (ii)   Concept & theories of continental-drift

          (iii)   Concept & theories of lsostasy.

          (iv)   Evidences of Sea-floor spreading.

          (v)   Origin of oceans, continents & mountains.

Unit:3   (i)   Earthquakes, Earthquake Belts, measurement of Earthquakes.

          (ii)   Volcanoes: Types & distribution.

          (iii)   Mid –oceanic- ridges, trenches & island arc; origin, distribution & importance.

          (iv)   Tectonic of continental margins; Active margins & marginal basins.

          (v)   Neo-tectonics; active faults, drainage changes.

Unit:4   (i)   Fundamental concepts of Geomorphology.

          (ii)   Geomorphic agents & processes of rock-weathering.

          (iii)   Geological work of rivers; fluvial land forms.

          (iv)   Geological work of wind; Aeolian land forms.

          (v)   Geological work of Glaciers; glacial land forms.

Unit:5   (i)   Geological work of oceans; coastal land forms.

          (ii)   Geological work of Ground water. Karst topography.

(iii)   Volcanic land forms.

(iv)   Earth's heat budget & global climatic changes.

(v)   Physiographic divisions of India.

PRACTICALS:

(1)   Study of models showing various Geomorphic features.

(2)   Numbering, Indexing of topographic maps on various scales.

(3)   Interpretation of various Geomorphic landforms & drainage pattern on topographic maps.

(4)   Plotting of major mountain Ranges, Lakes & rivers on outline map of India.

(5)   Plotting of seismic observatories on outline map of India.

(6)   Plotting of epicenters & magnitude of major earthquakes of Indian subcontinents.

(7)   Morphometric analysis.

Suggested Readings:-

भौतिक–भूविज्ञान   –   डॉ.मुकुल घोष–

भौतिक–भूविज्ञान   –   जे.पी. तिवारी एव ंबी.के. सिंह–

भूआकृति–विज्ञान   –   डॉ.सविन्द्र सिंह

भूविज्ञान एक परिचय   –   डॉ.विद्यासागर दुबे

Physical Geology   -   Miller

Principles of physical geology -   A. Holmes

An introduction to physical geology-   A.K. Dutta

Principles of Geomorphology   -   W.D. Thornbury

Principles of Geomorphology   -   A.F. Ahmed

कक्षा / Class- B.Sc-I

Paper –II

खनिज एवं क्रिस्टल विज्ञान

(Mineralogy & Crystallography)

इकाई– 01 (i) खनिज एवं क्रिस्टल की परिभाषा।

(ii) क्रिस्टल संरचना एवं एकांक कोष।

(iii) क्रिस्टल के तत्व, क्रिस्टल रूप।

(iv) क्रिस्टलीय अक्ष एवं अक्षीय कोण।

(v) क्रिस्टल नोटेशन, अन्तःखण्डीय अनुपात एवं सूचकांक

इकाई– 02 (i) क्रिस्टल विज्ञान के नियम।

(ii) क्रिस्टलीय सममिति।

(iii) क्रिस्टलों का वर्गीकरण। क्रिस्टल समुदायों के सामान्यवर्ग की सममिति।

(iv) सामान्य वर्ग के रूप।

(v) क्रिस्टलों में यमलन।

इकाई– 03 (i) प्रकाश की प्रकृति, प्रकाश का परावर्तन एवं अपवर्तन।

(ii) अपवर्तनांक, क्रांतिक कोण, पूर्ण आंतरिक परावर्तन एवं बेके प्रभाव।

(iii) द्वि–अपवर्तन, निकॉल प्रिज्म की रचना एवं कार्य प्रणाली।

(iv) ध्रुवण सूक्ष्मदर्शी : अवयव एवं कार्यप्रणाली।

(v) खनिजों के प्रकाशीय गुण।

इकाई– 04 (i) सिलिकेट संरचनाएं

(ii) खनिजों में बंध।

(iii) समाकृतिकता, बहुरूपता एवं कूटरूपता।

(iv) ठोस–विलयन

(v) खनिजों के भौतिक गुण।

इकाई– 05   निम्नलिखित खनिज समूहों के संगठन, भौतिक एवं प्रकाशकीय गुणों का अध्ययन–

        (i)   ऑलिवीन्, गार्नेट एवं अभ्रक समूह।

        (ii)   पायरॉक्सीन।

        (iii)   एम्फीबोल।

        (iv)   फेल्सपार।

        (v)   सिलिका।

प्रायोगिक कार्य–

(1)   क्रिस्टल मॉडल में सममिति तत्वों का अध्ययन।

(2)   क्रिस्टल समुदायों की मूल आकृतियों का अध्ययन।

(3)   यूलर प्रमेय का सत्यापन।

(4)   प्रमुख शैलकर खनिजों का स्थूलदर्शी अध्ययन।

(5)   ध्रुवण–सूक्ष्मदर्शी की सहायता से प्रमुख शैलकर खजिनों के प्रकाशीय गुणों का अध्ययन।

(6)   सात दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन

Paper –II

(Mineralogy & Crystallography)

Unit:1

(i) Definition of Mineral and Crystal.

(ii) Crystal structures, Unit cells

(iii) Elements of crystal. Crystal forms.

(iv) Crystallographic axes and axial angles.

(v) Parameters and indices of crystal notation

Unit:2

(i) Laws of Crystallography

(ii) Crystal symmetry

(iii) Classification and symmetry of normal classes of seven crystal systems

(iv) Forms of normal classes.

(v) Twinning in crystals

Unit:3

(i) Nature of light : reflection and refraction of light.

(ii) Refractive index. Critical angles. Total internal reflection and Becke effect.

(iii) Double refraction. Nicol prism it's construction and working.

(iv) Polarizing Microscope- its parts & functions.

(v) Optical properties of minerals.

Unit:4

(i) Silicate structures.

(ii) Bonding in Minerals.

(iii) Isomorphism. Polymorphism and Pseudomorphism.

(iv) Solid solution

(v) Physical properties of minerals

Unit:5 Study of Composition, physical and optical properties of the following Mineral groups:

(i) Olivine, Garnet and Mica groups.

      (ii)   Pyroxenes

      (iii)   Amphiboles

      (iv)   Feldspars

      (v)   Silica

PRACTICALS-

(1)   Study of symmetry elements in crystal models.

(2)   Study of Fundamental forms of normal classes of all seven crystal system.

(3)   Verification of Euler's theorem.

(4)   Study of Physical properties of rock forming minerals.

(5)   Study of the optical properties of important rock forming minerals using polarizing Microscopes.

(6)   Geological excursion for seven days.

Suggested Readings:

Rutley's elements of Mineralogy	:	Read, H.D.
Dana's text book of Mineralogy	:	Ford W.E.
खनिज तथा क्रिस्टल विज्ञान	–	डॉ.बी.सी. जैश
खनिज विज्ञान के सिद्धांत	–	डॉ. ए.सी. अग्रवाल
प्रायोगिक भू–विज्ञान (भाग–1)	–	डॉ. र. प्र. मांजरेकर
प्रकाशीय खनिज विज्ञान के मूल तत्व	–	विंचेल

कक्षा / Class- B.Sc-II

Paper –I

शैलिकी

(PETROLOGY)

इकाई–01 (i) मैग्मा; परिभाषा, उत्पत्ति एवं संगठन

(ii) बोवेन की अभिक्रिया श्रेणी, मैग्मीय विभेदन एवं स्वांगीकरण

(iii) तंत्र, प्रावस्था एवं घटक, उष्मागतिकी के सिद्धांत, एकघटकीय (सिलिका) द्विघटकीय ऐल्बाईट–एनार्थाइट तथा डायोप्साइड–एनार्थाइट एवं त्रिघटकीय सिलिकेट सिस्टम डायोप्साइड–एल्बाइट–एनार्थाइट क्रिस्टलीकरण, प्रावस्था संतुलन

(iv) आग्नेय शैलों का गठन, संरचनायें एवं वर्गीकरण

(v) आग्नेय शैलों का रूप

इकाई–02 (i) दिक्काल में शैल–संलग्नता, शैल–ग्रंथियों की अवधारणा

(ii) अम्लीय आग्नेय शैलों का शिला विवरणात्मक अध्ययन

(iii) क्षारीय आग्नेय शैलों का शिला–विवरणात्मक अध्ययन

(iv) अल्पसिलिक आग्नेय शैलों का शिलाविवरणात्मक अध्ययन

(v) अत्यल्पसिलिक आग्नेय शैलों का शिलाविवरणात्मक अध्ययन

इकाई–03 (i) अवसाद की उत्पत्ति, परिवहन एवं निक्षेपण

(ii) अवसाद निक्षेपण की वायूढ़, जलोढ़, तटीय, एवं गंभीर समुद्री वातावरण की गतिकी

(iii) अवसादी संलक्षणाओं की अवधारणा

(iv) डायजिनेसिस की अवधारणा

(v) अवसादी शैलों का गठन एवं संरचनायें

इकाई–04 (i) अवसादी शैलों का वर्गीकरण

(ii) अवसादी शैलों की शैलिकी : रूडेशियस, एरेनिशियस, केल्केरियस अवसादी शैल

(iii) कायान्तरणः परिभाषा एवं कारक, संलक्षणा, कायान्तरण श्रेणी

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(iv) कायान्तरित शैलों का गठन, संरचना एवं वर्गीकरण

(v) कायान्तरण प्रक्रियाओं की साम्य एवं असाम्य अभिक्रियायें

इकाई–05 (i) पैराजिनेटिक–ओरखः प्रक्षपीय विशेलषण, ए.सी.एफ. एवं ए.के.एफ. आरेख

(ii) मृण्मय अवसादों का प्रगामी कायान्तरण

(iii) अशुद्ध चूना पत्थरों का प्रगामी–उष्मागतिक कायान्तरण

(iv) अल्प सिलिक शैलों का प्रगामी उष्मागतिक कायान्तरण

(v) भारत का शैलिकीय–प्रादेशिक विभाजन

प्रायोगिक कार्य–

(1) आग्नेय, अवसादी एवं कायान्तरित शैलों के विभिन्न रूपों को रेखाचित्र की सहायता से प्रदर्शित करना।

(2) विभिन्न आग्नेय शैलों का स्थूलदर्शी अध्ययन / सूक्ष्मदर्शी अध्ययन

(3) विभिन्न अवसादी शैलों का स्थूलदर्शी / सूक्ष्मदर्शी अध्ययन

(4) विभिन्न कायान्तरित शैलों का स्थूलदर्शी / सूक्ष्मदर्शी अध्ययन

(5) भारत के शैलिकीय प्रदेशों का मानचित्र में प्रदर्शन

Suggested Readings:-

(1) शैलिकी के सिद्धान्त   —   डॉ.अंबिका प्रसाद अग्रवाल

(2) शैलिकी के सिद्धान्त   —   ए.जी. झिंगरन

(3) Principles of petrology   -   G.W. Gyrrel

(4) Petrology   -   H.William, F.J. Turner & E.M. Gilbert

(5) Petrology of igneous & metamorphic rocks of India- S.C. Chattarjee

(6) A text book of sedimentary petrology   -   Verma & Prasad

(7) Metamorphism & Metamorphic rocks of India- S.Ray

(8) Sedimentary rocks   -   F.J. Pettijhan

(9) Introduction of sedimentology   -   S.Sengupta

(10) Sedimentary environment   -   H.G. Readings

Unit:1
(i)   Magma, definition, origin & composition

(ii)   Bowen's reaction series, magmatic differentiation & assimilation

(iii) System, phases & component, principles of thermodynamics,

Bi-component magma: Albite-Anorthite and Diposide-Anorthite

Tri-component magma: Diopside-Albite-Anorthite

(iv)   Texture, structures & classification of igneous rocks

(v)   Forms of igneous rocks

Unit:2
(i)   Rock association in Time & Space, concepts of rock kindreds

(ii)   Petrographic studies of Acid igneous rocks.

(iii) Petrographic studies of Alkaline igneous rocks

(iv)   Petrographic studies of Basic igneous rock

(v)   Petrographic studies of Ultrabasic igneous rocks.

Unit:3
(i)   Origin, transportation & deposition of sediments

(ii)   Dynamics of sedimentary depositional environment ; Aeolian, fluvial, coastal

and abyssal environment.

(iii) Concepts of sedimentary facies

(iv)   Concepts of diagenesis

(v)   Textures & structures of sedimentary rocks.

Unit:4
(i)   Classification of sedimentary rocks.

(ii)   Petrography of sedimentary rock; rudaceous, aranaceous, calcareous

sedimentary rocks

(iii) Metamorphism; definition, agents, facies & grade

(iv)   Textures, structures & classification of metamorphic rocks.

(v)   Equilibrium & non-equilibrium reactions in metamorphism.

Unit:5   (i)   Paragenetic diagrams; projective analysis A.C.F & A.K.F. diagrams

                    (ii)   Progressive metamorphism of Argillaceous rocks.

                    (iii)   Progressive dynamo-thermal metamorphism of impure lime-stone.

                    (iv)   Progressive dynamo-thermal metamorphism of basic igneous rocks.

                    (v)   Petrographic provinces of India.

Practical:

(1)   Diagrammatic representation of various form & structures of igneous, sedimentary & Metamorphic rocks

(2)   Megascopic studies of various sedimentary, metamorphic & igneous rocks.

(3)   Microscopic studies of various sedimentary, metamorphic & igneous rocks.

(4)   Norm calculation

(5)   Diagrammatic representation of petrography provinces of India in outline map of India.

Suggested Readings:-

(1)   शैलिकी के सिद्धान्त   – डॉ.अंबिका प्रसाद अग्रवाल

(2)   शैलिकी के सिद्धान्त   – ए.जी. झिंगरन

(3)   Principles of petrology   -   G.W. Tyrell

(4)   Petrology   -   H.William, F.J. Turner & E.M. Gilbert

(5)   Petrology of igneous & metamorphic rocks of India- S.C. Chattarjee

(6)   A text book of sedimentary petrology   -   Verma & Prasad

(7)   Metamorphism & Metamorphic rocks of India- S.Ray

(8)   Sedimentary rocks   -   F.J. Pettijohn

(9)   Introduction of sedimentology   -   S.Sengupta

(10)   Sedimentary environment   -   H.G. Readings

कक्षा / Class- B.Sc-II

Paper –II

संरचनात्मक भू–विज्ञान

(STRUCTURAL GEOLOGY)

इकाई–01 (1) संरचनात्मक भूविज्ञान की परिभाषा एवं अध्ययन क्षेत्र।

(2) शैल दृष्यांशों का अध्ययन। दृष्यांशों पर नति तथा ढाल के प्रभाव।

(3) संस्तरण की पहचान। नति एवं नतिलम्ब की माप।

(4) क्लाइनोमीटर एवं ब्रन्टन कम्पास।

(5) संस्तरों के शीर्ष तथा तल की पहचान।

(6) शैलविरूपण की अवधारणा। प्रतिबल तथा विकृति दीर्घवृत्तज की अवधारणा।

इकाई–02 (1) वलन की आकारिकी।

(2) वलन की ज्यामितिक एवं जननिक वर्गीकरण।

(3) स्थलीय तथा भूवैज्ञानिक मानचित्र में वलन की पहचान।

(4) दृश्यांशों पर वलन के प्रभाव।

(5) वलन क्रियाविधि की प्राथमिक अवधारणा।

इकाई–03 (1) भ्रंश आकारिकी। सर्पण और सेपरेशन।

(2) भ्रंश का ज्यामितिक एवं जननिक वर्गीकरण।

(3) स्थलक्षेत्र तथा भूवैज्ञानिक मानचित्र में भ्रंश की पहचान।

(4) दृश्यांशों पर भ्रंश के प्रभाव।

(5) भ्रंशन क्रियाविधि की प्राथमिक अवधारणा।

इकाई–04 (1) संधि; आकारिकी, संधि का ज्यामितिक एवं जननिक वर्गीकरण।

(2) पत्रण की परिभाषिक शब्दावली, प्रकार, उत्पत्ति एवं विशाल संरचनाओं से संबंध।

(3) रेखण की परिभाषिक शब्दावली, प्रकार, उत्पत्ति एवं विशाल संरचनाओं से संबंध।

(4) लवण गुम्बद,

(5) प्लूटान; विवर्तनिकी एवं अभिस्थापन

इकाई—05 (1) विषमविन्यास के प्रकार एवं पहचान।

(2) आउटलायर तथा इनलायर, अतिव्यापन तथा अपव्यापन।

(3) विवर्तनिकी की अवधारणा।

(4) प्रायद्वीपीय, सिंधु गंगा के मैदान तथा प्रायद्वीपेत्तर भारत का विवर्तनिकी विन्यास।

(5) त्रिविमीय प्रक्षेपण का भूविज्ञान में अनुप्रयोग।

प्रायोगिक कार्य–

(1) प्राकृतिक संरचनात्मक प्रादर्शो का अध्ययन।

(2) विभिन्न संरचनाओं का प्रादर्शो के माध्यम से अध्ययन।

(3) मानचित्र में दृश्यांश को पूरा करना।

(4) सरल से जटिल संरचनाओं को प्रदर्शित करने वाले मानचित्रों से भूवैज्ञानिक काट बनाना एवं भूवैज्ञानिक इतिहास की विवेचना करना।

(5) संरचनाओं के अध्ययन में स्टिरियोग्राफिक प्रोजेक्शन का अनुप्रयोग।

(6) सात दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन

Unit:1 (i)   Definition and scope of Structural Geology. Study of outcrops. Effects of dip and slope on outcrops.

(ii)   Identification of bedding. Dip and strike measurement.

(iii)   Clinometer and Brunton compass.

(iv)   Recognition of top and bottom of beds.

(v)   Concept of rock deformation. Concept of stress and strain ellipsoids.

Unit:2 (i)   Fold morphology.

(ii)   Geometric and genetic classification of folds.

(iii)   Recognition of folds in the field and on geological maps.

(iv)   Effect of folds on outcrops.

(v)   Elementary idea of mechanics of folding.

Unit:3 (i)   Fault morphology. Slip and separation.

(ii)   Geometric and genetic classification of faults.

(iii)   Recognition of faults in the field and on geological maps.

(iv)   Effect of faults on outcrops.

(vi)   Elementary idea of mechanics of faulting.

Unit:4 (i)   Joint morphology; geometric and genetic classification of joints.

(ii)   Foliation; terminology, kinds, origin and relation to major structures.

(iii)   Lineation: terminology, Kind, origin and relation to major structures.

(iv)   Salt domes.

(vii)   Plutons; tectonics & emplacement.

Unit:5 (i)   Types and recognition of Unconformity.

(ii)   Outlier and inlier. Overlap & offlap.

      (iii)   Concept of tectonics.

      (iv)   Tectonic framework of Peninsula, Indo-Gangetic Plains and Extra-Peninsular India.

      (v)   Stereographic projection & it use in Structural geology.

Practical-

(1)   Study of Natural Structures on specimens.

(2)   Study of structures with the help of models.

(3)   Completion of outcrops.

(4)   Preparation of geological section from simple to complex geological maps and its interpretation.

(5)   Application of stereographic projection in structural geology.

(6)   Geological excursion for seven days.

Books recommended:

(1)   संरचनात्क भूविज्ञान   – डॉ.डी.के. श्रीवास्तव

(2)   भूवैज्ञानिक संरचनाऍ   – डॉ. भरत सिंह राठौर

(3)   प्रायोगिक भूविज्ञान (भाग–2) – आर.पी. मांजरेकर

(4)   Structural Geology.   M.P. Billings.

(5)   Theory of Structural Geology; Gokhale, N.W. CBS

(6)   Exercises on Geological maps and dip-Strike: Gokhale, N.W. CBS.

(7)   Outlines of structural Geology. E.S. Hills.

(8)   Structural Geology- Hobbs. Means and Williams.

(9)   Geological maps- Chiplonkar and Pawar.

कक्षा / Class- B.Sc-III

Paper –I

जीवाश्म विज्ञान एवं संस्तर विज्ञान

(Palaeontology & Stratigraphy)

इकाई–01　(1)　जीवाश्म विज्ञानः जीवाश्म, परिभाषा, जीवाश्मन की आवश्यक परिस्थितियॉ एवं विधियॉ

(2)　जीवश्मों के उपयोग, सूचक–जीवाश्म एवं उनका महत्व

(3)　संस्तर विज्ञान, पुरापारिस्थितिकी एवं पुराभूगोल के अध्ययन में जीवाश्म विज्ञान का महत्व।

(4)　सूक्ष्मजीवाश्मविज्ञान एवं उसका महत्व।

(5)　पादप जीवाश्मों का अध्ययन एवं उनका महत्व।

इकाई–02　(1)　फोरामिनिफेरा एवं एंथोजोआ जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

(2)　गेस्ट्रोपोडा एवं लेमिलिब्रेन्किया जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

(3)　सिफेलोपोड़ा जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

(4)　इकिनायडी एवं ब्रेकियोपोडा जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

(5)　ट्राइलोबाइट एवं ग्रेप्टोलाइट जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

इकाई–03　(1)　संस्तर विज्ञान के सिद्धान्त, भूवैज्ञानिक समय सारणी।

(2)　अश्मसंस्तरिक, कालानुक्रम संस्तरिक एवं जैव संस्तरिक इकाईयों के विषय में मूलभूत धारणायें।

(3)　भारतीय उपमहाद्वीप का संरचनात्मक एवं भौतिकीय उपविभाजन एवं उसकी विशिष्टतायें।

(4)　भारत वर्ष के आद्यमहाकल्पीय (धारवार) शैलों का वितरण, वर्गीकरण, एवं आर्थिक महत्व।

(5)　छत्तीसगढ़ के बस्तर, रावघाट, संघों का वितरण, संस्तर विज्ञान एवं आर्थिक महत्व।

इकाई–04   (1) विन्ध्य एवं छत्तीसगढ़ महासंघ के शैलों के वितरण, संस्तर विज्ञान एवं आर्थिक महत्व।

          (2) गोंडवाना महासंघ का संस्तर विज्ञान, पुराजलवायु, भौगोलिक वितरण एवं आर्थिक महत्व।

          (3) डेक्कन ट्रेप का संस्तर विज्ञान, भौगोलिक वितरण एवं आयु।

          (4) बाघ संस्तर एवं लेमेटा संस्तर का संस्तर विज्ञान, भौगोलिक वितरण एवं जीवाश्म।

          (5) साल्ट रेंज क्षेत्रों के पुराजीव समूहों का भौगोलिक वितरण संस्तर विज्ञान एवं जीवाश्मिकी।

इकाई–05   (1) स्पिटी क्षेत्रों के पुराजीव समूहों का भौगोलिक वितरण, संस्तर विज्ञान एवं आर्थिक महत्व।

          (2) त्रिचनापल्ली क्षेत्र के क्रिटेशियस शैलों का संस्तर विज्ञान, जीवाश्म एवं आर्थिकी।

          (3) कच्छ क्षेत्र के जुरासिक शैलों का संस्तर विज्ञान, जीवाश्म एवं आर्थिकी।

          (4) असम के तृतीयक महायुग समूह का भौगोलिक वितरण संस्तर विज्ञान एवं आर्थिकी।

          (5) शिवालिक समूह का संस्तर विज्ञान, भौगोलिक वितरण एवं कशेरूकीय जीवाश्मीय तत्व।

प्रायोगिक कार्यः

          (1) सैद्धांतिक पाठ्यक्रम के अन्तर्गत उल्लेखित जीवाश्मों की आकारिकी का अध्ययन।

          (2) प्रमुख पादप जीवाश्मों का अध्ययन।

          (3) भारत के रेखा मानचित्र में विभिन्न संस्तर विज्ञानी इकाईयों को दर्शाना।

          (4) भारत के प्रमुख भूआकृतिक एवं शैल विर्वतनिक इकाईयों को रेखा मानचित्र में प्रदर्शित करना।

Suggested Readings

          (1) जीवाश्म विज्ञान के सिद्धांत– डॉ.अंबिका प्रसाद अग्रवाल

          (2) जीवाश्म विज्ञान– डॉ. आर.पी. मिश्रा

          (3) अकशेरूकी एवं कशेरूकीय जीवाश्म विज्ञान– डॉ. दीपक राज तिवारी

          (4) भारत वर्ष का भूविज्ञान– डॉ.अंबिका प्रसाद अग्रवाल

(5)   प्रायोगिक भू विज्ञान भाग—3— डॉ. गुप्ता, पुनवटकर, रघुवंशी

(6)   Invertebrate Palaeontology- H.Woods.

(7)   Introduction to Palaentology- A.N. Davis.

(8)   An Introduction to Invertebrate Palaeontology- P.G. Jain & M.S. Anantha Raman

(9)   Historical Geology of India- Ravidra Kumar

(10)   Geology of India- R.Vidhyanathan & M.Ramkrishne (GSI Publication)

(11)   Geology of India & Burma- M.S. Krishnan.

Unit-1   (1)   Palaeontology: Fossils- definition, Essentials for fossilization mode of fossilization.

      (2)   Uses of fossils; Index fossils & their significance.

      (3)   Application of palaeontology in the study of stratigraphy. Palaeoecology And Palaeo-geography.

      (4)   Micro palaeontology & their significance.

      (5)   Study of plant fossils & their significance.

Unit-2   (1)   Morphology & Geologic distribution of foraminifera & Anthozoa fossils.

      (2)   Morphology & Geological distribution of Gastropoda and lamellibranchia fossils.

      (3)   Morphology & Geological distribution or Cephalopoda.

      (4)   Morphology & Geological distribution or Echinoidae & Brachiopoda fossils.

      (5)   Morphology & Geological distribution of Triobite and Graptolite fossils.

Unit-3   (1)   Principles of stratigraphy: Geological time scale.

      (2)   Basic concept of lithostratigraphic, chronostratigraphic & Biostratigraphic Units.

      (3)   Structural & Physical Subdivision of Indian subcontinents.

      (4)   Distribution, classification & Economic importance or Archaeozoic rocks of India (Dharwar)

      (5)   Distribution, Stratigraphy & Economic Importance of Bastar & Raoghat group of rocks (Chhattisgarh)

Unit-4   (1)   Distribution, stratigraphy & Economic importance of Vindhya & Chhattisgarh group of rocks.

      (2)   Stratigraphy, Palaeoclimate, Geographical distribution & economic aspects of

Gondwana rocks.

(3)   Stratigraphy, distribution & age of Deccan Traps.

(4)   Stratigraphy, distribution & fossil contents of Bagh & Lameta Bed.

(5)   Distribution, Stratigraphy & Palaeontology of salt Range group of rocks.

Unit-5   (1)   Distribution, Stratigraphy & Economics of Palaeozoic rocks of Spiti Valley.

(2)   Stratigraphy, Distribution, Fossil content of Cretaceous rocks of Trichinapalli.

(3)   Stratigraphy, distribution, Fossil content & Economics of Jurassic rocks of Kutch-Region.

(4)   Distribution, Stratigraphy, economic importance of Tertiary rocks of Assam-Region.

(5)   Distribution, Stratigraphy & Palaeontological importance of Siwalik group of rocks.

Practicals:-

(1)   Study of Morphology of Fossils belonging to various phyla.

(2)   Study of Important plant fossils.

(3)   Representation of Litho-units & Stratigraphic Units in out line map of India.

(4)   Sketching of physiographic and tectonic divisions of India.

(5)   Geological excursion for seven days.

कक्षा / Class- B.Sc-III

Paper –II

भूसंसाधन एवं व्यावहारिक भूविज्ञान

(Earth Resources & Applied Geology)

इकाई–01 (1) आर्थिक भूविज्ञान परिचय एवं परिप्रेक्ष्य : वैश्विक खनिज निचय एवं संसाधन, दिक्काल में खनिज निक्षेपों का वितरण।

(2) खनिज निक्षेपों का वर्गीकरण। भूवैज्ञानिक तापमापी।

(3) अयस्क निर्माण की मैग्मीय सांद्रण विधि। उष्णजलीय प्रक्रियायें।

(4) अपक्षय उत्पाद एवं अवशिष्ट निक्षेप। आक्सीकरण एवं सल्फाइड समृद्धि प्रक्रम।

(5) अयस्क निर्माण की अवसादी प्रक्रिया। बलकृत सांद्रण।

इकाई–02 भारत के संदर्भ में निम्नलिखित धात्विक / अधात्विक खनिज निक्षेपों की प्राप्ति अवस्था, खनिजकीय विशेषता, भूवैज्ञानिक एवं भौगोलिक वितरण एवं आर्थिक उपयोगों का वितरण।

(1) लौह, मैगनीज, क्रोमियम।

(2) ताम्र, सीसा, जस्ता।

(3) सोना, अल्युमिनियम।

(4) तापसह एवं उर्वरकखनिज।

(5) सीमेंट एवं केमिकल उद्योग में प्रयुक्त खनिज।

इकाई–03 (1) कोयला निक्षेपों की उत्पत्ति, परिभाषा एवं संस्तर विज्ञान।

(2) कोल शैलिकी के मूलभूततथ्य। पीट, लिग्नाईट, बिटूमिनस, एंथ्रासाइट कोल, भारतीय कोल निक्षेपः विशेष संदर्भ में छत्तीसगढ़।

(3) प्राकृतिक हाइड्रोकार्बन की उत्पत्ति, स्थानांतरण एवं संचयन। आयल ट्रेप के प्रकारः संरचनात्मक, संस्तर विज्ञानी एवं मिश्रित। भारत के तटीय एवं अपतटीय पेट्रोलियम निक्षेप।

(4) रेडियोधर्मी खनिजः खनिजविज्ञान, भूरसायन, पूर्वेक्षण तकनिकी, भारत में भौगोलिक एवं भूवैज्ञानिक वितरण।

(5) खनिज आर्थिकी के सिद्धान्त, राष्ट्रीय खनिजनीति।

इकाई–04 (1) भूअभियांत्रिकी विज्ञान एवं उसका महत्व। शैलों के अभियांत्रिकी गुण।

(2) वृहद् बांध एवं सुरंग निर्माण के लिये भूवैज्ञानिक परिस्थितियों का अध्ययन।

(3) हवाई छायाचित्रों एवं उपग्रह इमेजियरी का प्रारंभिक अध्ययन। शहरी विकास में सुदूर संवेदन तकनीकी का अनुप्रयोग।

(4) जलचक्र। भूमिगत जल की प्राप्ति अवस्था। भूजल की गुणवत्ता।

(5) शैलों के भूजलीय गुण। जलभृत संस्तरों का वर्गीकरण। भारत का भूजल प्रदेश।

इकाई–05 (1) खनिज अंवेषण का परिचय। खनिज अन्वेषण की सतही एवं अधोसतही विधियॉ।

(2) आर्थिक खनिजों के लिये पूर्वेक्षण विधियॉ: ड्रीलिंग, प्रतिचयन एवं आमापन।

(3) भूभौतिकीय पूर्वेक्षणतकनीक: गुरूत्वीय, विद्युतीय एवं चुम्बकीय विधियॉ।

(4) हवाई पूर्वेक्षण विधि एवं भूकम्पीय विधियॉ।

(5) खनिज स्त्रोंतों के अत्याधिक दोहन के पर्यावरणीय प्रभाव।

प्रयोगिक कार्य:

(1) सैद्धान्तिक पाठ्यक्रम में दिये प्रमुख धात्विक/अधात्विक खनिजों का भौतिक/प्रकाशीय गुणों के आधार पर अध्ययन।

(2) भारत के रेखा मानचित्र में प्रमुख धात्विक/अधात्विक खनिजों का वितरण दर्शाना।

(3) कोयला एवं उसके विभिन्न प्रकारों के नमूनों का स्थूलदर्शी अध्ययन।

(4) खनिज निष्कर्षण से संबंधित प्रायोगिक अभ्यास कार्य: निक्षेप आकलन, टनेज फेक्टर आकलन, ड्रीलिंग आदि से अभ्यास।

(5) स्टिरियोस्कोप के द्वारा ऐरियल छायाचित्र का अध्ययन एवं विवेचना।

(6) उपग्रह इमेजियरी का अध्ययन एवं विवेचना।

(7) शैलों के भौमजलीय गुणों का अध्ययन, भौमजलीय मानचित्रों का बनाना एवं अध्ययन

(8) दस दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन

Suggested Readings:

(1) आर्थिक भूविज्ञान— कृष्ण गोपाल व्यास

(2) आर्थिक एवं व्यावहारिक भूविज्ञान— आर.पी. मांजरेकर

(3) भौमजल विज्ञान— एल.के. रिछारिया

(4) प्रारंभिक खनिकी— बी.के. सिंह

(5) प्रायोगिक भूविज्ञान भाग—3— गुप्ता, पुनवटकर एवं रघुवंशी

(6) Economic mineral deposits of India- Umeshwar Prasad.

(7) Economic mineral deposits- A.Bateman

(8) Ore-deposit of India- Gokhale & Rao

(9) India's Mineral Resource- S. Krishnaswami

(10) Principle of Engineering Geology & Geotechniques- Krynine & Judd.

(11) Groundwater Hydrology- D.K. Todd

(12) Courses in mining Geology- R.N.P. Arogyaswami

(13) Principle & Application of photogeology- S.N. Pandey.

(14) Ground water- Assessment, Development & Management- K.R. Karanth

(15) Geophysical methods in Geology- P.V. Sharma.

(16) Environmental Geology- K.S. Valdiya (1987)

Class- B.Sc-III

Paper –II

(Earth Resources & Applied Geology)

Unit-1
(i)   Economic Geology & its perspectives; Global mineral deposit & resource. Distribution of mineral deposits in time & space.

(ii)   Classification of mineral deposits. Geological thermometers.

(iii)   Magmatic & Hydrothermal processes of mineral formation.

(iv)   Weathering : product & Residual deposit. Oxidation & sulphide supergene Enrichment processes.

(vi)   Sedimentary processes of mineral formation. Placer deposits.

Unit-2   Geological, Geographical distribution, mode of occurrence, mineralogy & economic importance of following metallic & nonmetallic deposits of India.

(i)   Iron, Manganes, Chromium

(ii)   Copper, Lead, Zinc

(iii)   Gold, Aluminium

(iv)   Refractory and Fertilizer minerals

(v)   Minerals used in cement & chemical industries.

Unit-3
(i)   Coal deposit: Origin, Definition & stratigraphy

(ii)   Fundamentals of coal petrography. Peat, Lignite, Bituminous & Anthracite Coal deposits of Chhattisgarh.

(iii)   Origin of Natural-hydrocarbon, migration & accumulation. Types of oil traps; Structural, stratigraphic and composite. Offshore & onshore oil deposits of India.

(iv)   Radioactive mineral : Mineralogy, Geochemistry, Prospecting techniques, Geological & Geographical distribution of atomic-mineral.

(vi)   Principles of mineral economics. National mineral policy.

Unit-4
(i)   Engineering geology & its importance, Engineering properties of rocks

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(ii) Geological conditions for establishing of large Dam and Tunnels.

(iii) Elementary study of Aerial photographs & satellite Imageries. Application of remote sensing in town-planning.

(iv) Hydrologic cycle. Mode of occurrence of ground water, Quality of ground water.

(v) Hydrologic properties of rocks. Classification of Aquifers. Ground water provinces of India.

Unit-5 (i) Introduction to mineral exploration, Surface & subsurface methods of mineral Exploration.

(ii) Prospection methods; Drilling, Sampling & Assaying.

(iii) Geophysical prospecting techniques : Gravity, Electrical & Magnetic methods.

(iv) Aerial and seismic prospecting methods.

(v) Environmental impacts of over exploitation of mineral resources.

Practical-

(1) Study of important metallic/nonmetallic minerals on the basis of physical & optical properties.

(2) Distribution of main metallic/nonmetallic deposits within outline map of India.

(3) Magascopic studies of coal & its varieties.

(4) Exercises related with mineral exploration; Reserve calculation, Tonnage factor calculation, Exercises related with drilling.

(5) Study of Aerial photographs with the help of stereoscopes.

(6) Study of satellite imageries.

(7) Study of hydrologic properties of rocks, Preparation of hydrological maps.

(8) Geological excursion for ten days.

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BIOCHEMISTRY

PAPER - I

ENZYMOLOGY   M.M. 50

UNIT-I INTRODUCTION

History, general characteristics, nomenclature, IUB enzyme classification (rationale, over view and specific examples), significance of numbering system. Definitions with examples of holoenzyme, apoenzyme, coenzymes. cofactors, activators, inhibitors, active site (identification of groups excluded), metallo-enzymes, units of enzyme activity, specific enzymes, Isoenzymes, monomeric enzymes, oligomeric enzymes and multienzyme complexes. Enzyme specificity.

Hostorical perspective, nature of non-enzymatic and enzymatic catalysis. Measurement and expression of enzyme activity-enzyme assays. Definition of IU, Katal, enzyme turn over number and specific acitivity. Role of non-protein organic molecules and inorganic ions coenzyme, prosthetic groups. Role of vitamins as coenzymes precursors (general treatment).

UNIT-I ENZYME CATALSIS

Role of cofactors in enzyme catalysis : NAD/NADP+, FMN/FAD, coenzyme A, biocytin, cobamide, lipoamide, TPP, pyridoxal phosphate, tetrahydrofolate and metal ions with special emphasis on coenzyme functions. Acid-base catalysis, covalent, proximity and orientaton effects, strain and distortion theory. Mechanism of action of chymotrypsin, carboxypeptidase, ribonuclease and lysozyme.

UNIT-III ENZYME PURIFICATION

Methods for isolation, purification and characterization of enzymes.

UNIT-IV ENZYME KINETICS

Factors affecting enzyme activity : enzyme concentration, substrate concentration, pH and temperature. Derivation of Michaelis-Menten equation for uni-substrate reactions. Km and its significance. Line weaver-Burk plot and its limitations. Importance of K_{cat}/K_m. Bi-substrate reactions-brief introduction to sequential and ping-pong mechanism with examples.

Kinetics of zero and first order reactions. Significance and evaluation of energy of activation and free energy.

Reversible and irreversible inhibition, competitive, non-competitive and uncompetitive inhibitions. determination of K_m & V_{max} in presence and absence of inhibitor. Allosteric enzymes.

UNIT-V INDUSTRIAL AND CLINICAL APLLICATION OF ENZYME.

Immobilization of enzyme and their industrial applications. Production of glucose from starch, cellulose and dextran; use of lactase in dairy industry; production of glucose-fructose syrup from sucrose; use proteases in food, detergent and leather industry; medical application of enzymes. use of glucose oxidase in enzyme electrodes.

INTERMEDIARY METABOLISM   M.M. 50

UNIT-I INTRODUCTION TO METABOLISM

General features of metabolism, experimental approaches to study metabolism; use of intact organism, becterial mutants, tissue slices, stable and radioactive isotopes.

CARBOHYDRATE METABOLISM

Reactions and energetics of glycolysis. Alcoholic and lactic acid fermentations. Entry of fructose, galactose, mannose etc. Reactions and energetics of TCA cycle. Gluconeogenesis, glycogenesis and glycogenolysis, Reactions and physiological signifacance of pentose phosphate pathway. Regulation of glycolysis and TCA cycle. Photosynthesis, a brief review.

UNIT-II ELECTRON TRANSPORT CHAIN AND OXIDATIVE PHOSPHORYLATION

Structure of mitochondria, sequence of electron carriers, sites of ATP production, inhibitors of electron transport chain. Hypothesis of mitochondrial oxidative phosphorylation (basic concepts). Inhibitors and uncouplers of oxidative phosphorylation. Transport of reducing potentials into mitochondria.

UNIT-III LIPID METABOLISM

Introduction, hydrolysis of triacylglycerols, transport of fatty acids into mitochondria. β – oxidation of saturated fatty acids, ATP yield from fatty acid oxidation. biosynthesis of saturated and unsaturated fatty acids. Metabolism of ketone bodies, oxidation of unsaturated and odd chain fatty acids. Biosynthesis of triglycerides and important phospholipids, glycolipids, sphingolipids and cholesterol. Regulation of cholesterol metabolism.

UNIT-IV AMINO ACID METABOLISM

General reactions of amino acid metabolism : transmination, oxodative deamination and decarboxylation. Urea cycle. Degradation and biosynthesis of amino acids. Glycogenic and ketogenic amino acids.

UNIT-V NUCLEOTIDE METABOLISM

Sources of the atoms in the purine and pyrimidine molecules. Biosynthesis and degradation of purines and pyrimidines. Regulation of purine and pyrimidine biosynthesis.

PORPHYRIN METABOLISM

Biosynthesis and degradation of porphyrins. Production of bile pigments.

PRECTICAL

1.   Separation of Blood Plasm and Serum

    a.   Estimation of proteins from serum by biuret and lowry methods.

    b.   Determination of albumin and A/G ratio in serum.

2.   Estimation of bilirubin (conjugated and unconjugated) in serum.

3.   i   Estimation of total lipids in serum by vanillin method.

  ii. Estimation of cholesterol in serum.

4. Estimation of lipoproteins in plasma.

5. Estimation of lactic acid in blood before and after exercise.

6. Estimation of blood urea nitrogen from plasma.

7. Separation and identification of amino acids by (a) paper chromatography and (b) thin-layer chromatography.

8. Separation of polar and non-polar lipids by thin-layer chromatography.

9. Estimation of SGPT and SGOT in serum.

10. a. Assay of serum alkaline phosphatase activity.

  b. Inhibition of alkaline phosphatase activity by EDTA.

  c. Effect of substrate concentration on alkaline phosphatase activity and determination of its K_m value.

11. a. Effect of temperature on enzyme activity and determination of activation energy.

  b. Effect of pH on enzyme activity and determination of optimum pH.

  c. Effect of enzyme concentration on enzyme activity.

12. a. Preparation of starch from potato and its hydrolysis by salivary amylase.

  b. Determination of achromatic point in salivary amylase.

  c. Effect of sodium chloride on amylases.

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B.Sc.–II (BOTANY) PAPER-I

(PLANT TAXONOMY, ECONOMIC BOTANY, PLANT ANATOMY AND EMBRYOLOGY)

UNIT-I

Bentham and Hooker system of classification.Binomial Nomenclature, International Code of Nomenclature for Algae, Fungi, and plants (IUCN), Typification, numerical Taxonomy and chemotaxonomy. Preservation of Plant material and Herbarium techniques.Important botanical gardens and herbaria of India, Kew Botanical garden, England.

UNIT-II

Systematic position, distinguishing characters and economic importance of the following families, Ranunculaceae, Magnoliaceae, Brassicaeae, Rosaceae, Papaveraceae, Caryophyllaceae, Rutaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Malvaceae, Convolvulaceae, Orchidaceae, Acanthaceae, verbenaceae, Lamiaceae, Asteraceae, Fabaceae, Euphorbiaceae, Poaceae and Liliaceae.

UNIT-III

Economic Botany: Botanical name, family, part used and uses of the following economically important plants, fiber yielding plants; Cotton, jute, sun, hemp, coir.Timber yielding plants: Sal, Teak, Shisham and Pine.Medicinal plants: Kalmegh, Ashwangandha, Ghritkumari, Giloy, Brahmi, sarpgandha, ---of medicinal plants of C.G. Food plants: Pearl millet, Buck of wheat, Sorghum, Soyabean, gram, Ground nut, Sugarcane and Potato.Fruit plants: Pear, Peach, Litchi. Spices: Cinnamon, Turmeric, Ginger, Asafoetida and Cumin. Beverages : Tea, Coffee Rubber Cultivation of important flowers: Chrysanthemum, Dahelia, Biodiesel plants Jatropha, Pongamia Ethnobotany in context of Chhattisgarh.

UNIT-IV

Plant Anatomy: Root and shoot apical meristems theories of root and shoot apex organization, permanent tissues, anatomy of root, stem and leaf of dicot and monocot, secondary growth in root and stem, Anatomical anomalies in the primary structure of stems (Nyctanthes, Boerhaavia, Casuarina), Anamolous secondary growth in Dracaena, Bignonia, Laptadenia.

UNIT-V

Embryology: Flower as a reproductive organ, anther, microsporogenesis, types of ovules, megasporogenesis, development of male and female gametophyte, pollination, mechanisms, self incompatibility, fertilization, endosperm, embryo, polyembryonoy, apomixes and parthenocarpy.

Books Recommended:

Singh, Pandey, Jain. *Diversity and Systematics of Seed Plants*, Rastogi Publications Merrut

Sharma OP, *Plant Taxonomy,* Tata Mc Graw Hill, New Delhi

Pandey BP, *Taxonomy of Angiosperms,* S. Chand Publishing, New Delhi

Pandey, BP, *Plant Anatomy,* S.Chand Publishing, New Delhi

Pandey, BP, *Economic Botany,* S.Chand Publishing, New Delhi

Bhojwani, SS and Bhatanagar SP, *Embryology of Angiosperm*, Vikas Publication House, New Delhi

Singh, Pandey, Jain, *Embryology of Angiosperms*, Rastogi Publication, Meerut

Sharma, V, Alum, A. *Ethnobotany*, Rastogi Publications, Meerut

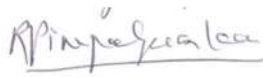Tayal, MS *Plant Anatomy*, Rastogi Publication, Meerut

(Dr. J.N. Verma)   (Dr.Rekha Pimpalgaonkar)   (Dr.Ranjana Shristava)

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Govt. D.B. Girls PG College   Govt. N PG Science College   Govt. VYTPG Science College
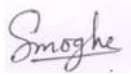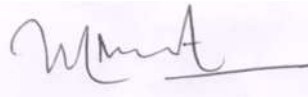
Raipur, (C.G.)   Raipur, (C.G.)   Raipur, (C.G.)

(Mrs. Sanchal Moghe)   (Mr. Shivakant Mishra)   (Mr Sudheer Tiwari)

Govt. Bilasa Girls College, Bilaspur

B.Sc.-II (BOTANY) PAPER-II

(ECOLOGY AND PLANT PHYSIOLOGY)

UNIT-I

Introduction and scope of ecology, environmental and ecological factors, Soil formation and soil profile, Liebig's law of minimum, Shelford's law of tolerance, morphological and anatomical adapataions in hydrophytes, xerophytes and epiphytes.

UNIT-II

Population and community characteristics, Raunkiaer's life forms, population interactions (e.g. Symbiosis, Amensalism etc.), succession, ecotone and edge effect, ecological niches, ecotypes, ecads, keystone species

Concept of ecosystem, trophic levels, flow of energy in ecosystem, food chain and food web, concept of ecological pyramids

Biogeochemical cycles:carbon cycle, nitrogen cycle and phosphorus cycle

UNIT-III

Plant water relations: Diffusion, permeability, osmosis, imbibitions, plasmolysis, osmotic potential and water potential, Types of soil water, water holding capacity, wilting, Absorption of water, theories of Ascent of sap, Mineral nutrition and absorption, Deficiency symptoms, Transpiration, stomatal movement, significance of transpiration, Factors affecting transpiration, guttation.

UNIT-IV

Photosynthesis: Photosynthetic apparatus and pigments, light reaction mechanism of ATP synthesis. C3, C4 CAM pathway of carbon reduction, photorespiration, factors affecting photosynthesis.

Respiration: Aerobic and anaerobic respiration, Glycolysis, Kreb's cycle, factors affecting respiration, R.Q.

UNIT-V

Plant growth hormones: Auxin, Gibberellin, Cytokinin, Ethylene and Abscissic acid. Physiology of flowering, Florigen concept, Photoperiodism and Vernalization. Seed dormancy and germination, plant movement.

Books Recommended:

Koromondy, EJ. *Concepts of Ecology,* Prentice Hall, USA

Singh, JS Singh SP and Gupta SR. *Ecology and Environmental Science and Conservation*, S. Chand Publishing, New Delhi

Sharma, PD. *Ecology and Environment,* Rastogi Publications, Merrut

Hopkins, WG and Huner, PA. *Introduction to Plant Physiology,* John Wiley and Sons.

Pandey SN and Sinha BK, *Plant Physiology,* Vikas Publishing, New Delhi

Taiz, L and Zeiger. E. *Plant Physiology,* 5th edition, Sinauer Associates Inc. M.A, USA

Srivastava, HS *Plant Physiology and Biotechnology*, Rastogi Publications, Meerut

B.Sc. II (BOTANY)

Practical

1. Taxonomy: Detailed description and identification of locally available plants of the families as prescribed in the theory paper.
2. Economic Botany: Identification and comment on the plants and plant products belonging to different economic use categories
3. Preparation of Herbarium of local wild plants.
4. Quantitative vegetation analysis of a grassland ecosystem.
5. Anatomical characteristics of hydrophytes and xerophytes.
6. Demonstration of root pressure.
7. Demonstration of transpiration.
8. Demonstration of evolution of O_2 in photosynthesis, factors affecting of photosynthesis.
9. Comparison of R.Q. of different respiratory substrates.
10. Demonstration of fermentation.
11. Determination of BOD of a water body.
12. Demonstration of mitosis.

PRACTICAL SCHEME

TIME: 4 Hrs.   **M.M. : 50**

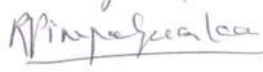|		
1.	Anatomy	08
2.	Economic Botany	04
3.	Physiology	08
4.	Ecology	10
5.	Spotting	10
6.	Viva-Voce	05
7.	Project Work/ Field Study	10

(Dr. J.N. Verma

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Raipur, (C.G.)

(Dr. Rekha Pimpalgaonkar)

Proff. & Head
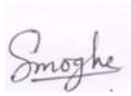
Govt. N PG Science College

Raipur, (C.G.)

(Dr.Ranjana Shristava)

Proff. & Head

Govt. VYTPG Science College

Raipur, (C.G.)

(Mrs. Sanchal Moghe)

(Mr. Shivakant Mishra)

(Mr Sudheer Tiwari)

Govt. Bilasa Girls College, Bilaspur

Zoology
B.Sc. Part – II 2018-19
Paper – I
(Anatomy and Physiology)

Comparative Anatomy of various organ systems of vertebrates:

Unit: I
- Integument and its derivatives: structure of scales, hair and feathers
- Alimentary canal and digestive glands in vertebrates
- Respiratory organs : Gills and lung , air-sac in birds

Unit: II
- Endoskeleton: (a) Axial Skeleton- Skull and Vertebrae, (b) Appendicular Skeleton Limbs and girdles
- Circulatory System: Evolution of heart and aortic arches
- Urinogenital System: Kidney and excretory ducts

Unit: III
- Nervous System: General plan of brain and spinal cord
- Ear and Eye: structure and function
- Gonads and genital ducts

Unit: IV
- Digestion and absorption of dietary components
- Physiology of heart, cardiac cycle and ECG
- Blood Coagulation
- Respiration: mechanism and control of breathing

Unit: V
- Excretion: Physiology of excretion, osmoregulation
- Physiology of muscle contraction
- Physiology of nerve impulse, Synaptic transmission

Zoology
B.Sc. Part – II 2018-19

Paper-II
VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY
BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

Unit: I
- Structure and function of Endocrine glands
- Hormone receptor
- Biosynthesis and secretion of thyroid, adrenal, ovarian and testicular hormones
- Endocrine disorder of pituitary, thyroid, adrenal and pancreas

Unit:II
- Reproductive cycle in vertebrates
- Menstruation, lactation and pregnancy
- Mechanism of parturition
- Hormonal regulation of gametogenesis

Unit: III
- Evidences of organic evolution.
- Theories of organic evolution.
- Variation, Mutation, Isolation and Natural selection.
- Evolution of Horse

Unit:IV
- Introduction to Ethology: Branches and concept of ethology.
- Patterns of Behaviour, Taxes, Reflexes, Drives and Stereotyped behaviour.
- Reproductive behavioural patterns.
- Drugs and behavior, Hormones and behaviour

Unit:V
- Prawn Culture
- Sericulture
- Apiculture
- Pisciculture
- Poultry keeping
- Elements of Pest Control: Chemical & Biological Control

Zoology
B.Sc. Part II 2018-19
Practical

The practical work in general shall be based on the syllabus prescribed and the students will be required to show the knowledge of the following:
- Study of the representative examples of the different chordates (Classified characters).
- Dissection of various systems of scoliodon-Afferent and Efferent branchial cranial nerves, internal ear.

Alternative methods: By Clay/Thermacol/ Drawing/ Model etc.)
- Simple microscopic technique through unstained or stained permanent mount.
- Study of prepared slides histological, as per theory papers.
- Study of limb girdles and vertebrae of Frog, Varanus, Fowl and Rabbit.
- Identification of species and individual of honey bee.
- Life cycle of honey bee and silkworm.
- Exercise based on Evolution and Animal behavior.

Scheme of Practical Exam   Time: 3:30hrs

- Major dissection (Cranial nerves/efferent branchial vessel)   10
- Exercise based on evolution   05
- Exercise based on applied zoology   05
- Exercise based on animal behavior   04
- Spotting-8 (slides-4,bones-2,specimen-2)   16
- Viva   05
- Sessional marks.   05

COMPUTER SCIENCE
PAPER - I
COMPUTER HARDWARE
(Paper Code - 0855)

Duration 3 hours   Max.Marks 50

AIM -   The emphasis in on the desing concepts & organisational details of the common PC, leauing the complicated electronics of the system of the computer Engineers.

OBJECT OF THE COURSE -

1. To introduce the overall organisation of the microcomputers.

2. To introduce the common peripheral devices used in computers.

3. To introduce the hardware components, use of micro processor and function of various chips used in microcomputer.

N.B. :   Since the computer organisation study is very vast & complicated, so the study is restricted to only the description and understanding part, fence the paper setter is requested to keep this important factor in mind.

UNIT-I   CLASSIFICATION AND ORGANIZATION OF COMPUTERS

Digital and analog computers and its evolution. Major components of digital computers; Memory addressing capability of CPU; word length and processing speed of computes. Microprocessors single chip microcomputers; large and small computers. Users interface Hardware software and firmware. multi programming multi user system. Dumb smart and intelligent terminals computer network and multi processing, LAN parallel processing. Flinn's classification of computers. Computer flow and data flow computers.

UNIT-II   CENTRAL PROCESSING UNIT.

CPU organization, ALU control unit registers. Instructions for INTEL 8085, Instruction word size, Various addressing mode interrupts and exceptions, some special Control signals and I/O devices. Instruction cycle fetch and execute operation, time Diagram, data flow.

UNIT-III   MEMORY OF COMPUTERS.

Main memory secondary memory, backup memory, cache memory; real and virtual Memory Semiconductor memory. Memory controller and magnetic memory; RAM; disks, optical disks Magnetic bubble memory; DASD, destructive and non destructive. readout. Program of data Memory and MMU.

UNIT-IV   I/O DEVICES.

I/O devices of micro controller; processors. I/O devices, printer, plotter, other out put devices, I/O port serial data transfer scheme, Micro controller, signal processor, I/O processor I/O processor arithmetic processor.

UNIT-V   SYSTEM SOFTWARE AND PROGRAMMING TECHNIQUE.

ML, AL, HLL, stac subroutine debugging of programs macro, micro programming, Program Design, software development, flow & chart multi programming, multiuser, multi tasking Protection, operating system and utility program, application package.

Amiy 11/6/18
(Dr. A.K. Dwivedi)

(Dr. J. Doye)

11.06.18
Hari Shankar Prasad Tande

(L.K. Gavel)

11-06-2018
(Dr. Sanjay Kumar)

RECOMMENDED BOOKS :

1. Computer Fundamentals : Architecture and Organization - By B.Ram (Wilwy Eastern Ltd.)
2. Computers Today   - By Donal H. Sanders
3. Computers Fundamental   - By Rajaraman.
4. IBM PC - XT Clones   - By Govinda Rajalu

PAPER - II
SOFTWARE
(Paper Code - 0856)

AIM - Introduction to the web-language-HTML & problem solving throgh the concept of object oriented programming.

OBJECT OF THE COURSE -

1. To introduce the internet & web related technology & learn the intricacies of web-page designing using HTML.
2. To introduce the object oriented programming concept using C++ language.
3. To introduce the problem solving methodology using the C++ programming features.

N.B. : Examiners are requested to prepare unit-wise Questions papers.

UNIT-I HTML BASICS & WEB SITE DESIGN PRINCIPLES

Concept of a Web Site, Web Standards, What is HTML? HTML Versions, Naming Scheme for HTML Documents , HTML document/file, HTML Editor , Explanation of the Structure of the homepage , Elements in HTML Documents ,HTML Tags, Basic HTML Tags, Comment tag in HTML, Viewing the Source of a web page, How to download the web page source? XHTML, CSS, Extensible Markup Language (XML), Extensible Style sheet language (XSL), Some tips for designing web pages, HTML Document Structure. HTML Document Structure-Head Section, Illustration of Document Structure,<BASE> Element,<ISINDEX> Element,<LINK> Element ,META, <TITLE> Element,<SCRIPT> Element ,Practical Applications, HTML Document Structure-Body Section:-Body elements and its attributes: Background; Background Color; Text; Link; Active Link (ALINK); Visited Link (VLINK); Left margin; Top margin, Organization of Elements in the BODY of the document: Text Block Elements; Text Emphasis Elements; Special Elements — Hypertext Anchors; Character-Level Elements; Character References ,Text Block Elements: HR (Horizontal Line); Hn (Headings) ; P (Paragraph); Lists; ADDRESS ; BLOCKQUOTE; TABLE; DIV (HTML 3.2 and up) ; PRE (Preformatted); FORM ,Text Emphasis Elements, Special Elements — Hypertext Anchors ,Character-Level Elements: line breaks (BR) and Images (IMG), Lists , ADDRESS Element, BLOCKQUOTE Element, TABLE Element, COMMENTS in HTML ,CHARACTER Emphasis Modes, Logical & Physical Styles, Netscape, Microsoft and Advanced Standard Elements List, FONT, BASEFONT and CENTER.

UNIT-II IMAGE, INTERNAL AND EXTERNAL LINKING BETWEEN WEBPAGES

Netscape, Microsoft and Advanced Standard Elements List, FONT, BASEFONT and CENTER Insertion of images using the element IMG (Attributes: SRC (Source),

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WIDTH, HEIGHT, ALT (Alternative), ALIGN), IMG (In-line Images) Element and Attributes; Illustrations of IMG Alignment, Image as Hypertext Anchor, Internal and External Linking between Web Pages Hypertext Anchors ,HREF in Anchors ,Links to a Particular Place in a Document ,NAME attribute in an Anchor ,Targeting NAME Anchors ,TITLE attribute, Practical IT Application Designing web pages links with each other, Designing Frames in HTML. Practical examples.

UNIT-III   INTRODUCTION TO OOP

Advantages of OOP, The Object Oriented Approach, Characteristics of object oriented languages- Object, Classes, Inheritance, Reusability, Polymorphism and C++.

Function: Function Declaration, Calling Function, Function Defines, Passing Argument to function, Passing Constant, Passing Value, Reference Argument, returning by reference, Inline Function, Function Overloading, Default Arguments in function.

UNIT-IV   OBJECT CLASSES AND INHERITANCE

Object and Class, Using the class, class constructor, class destructors, object as function argument ,copy constructor ,struct and classes , array as class member, Static Class Data, Static Member Functions, , Friend function, Friend class, operator overloading. Type of inheritance, Base class, Derive class. Access Specifier: protected. Function Overriding, member function, String, Template Function.

UNIT-V   POINTERS AND VIRTUAL FUNCTION

pointers: & and * operator pointer variables, .pointer to pointer, void pointer,pointer and array, pointer and function, pointer and string, memory management, new and delete, pointer to object, this pointer Virtual Function: Virtual Function, Virtual member function, accesses with pointer,pure virtual function

File and Stream: C++ streams, C++ Manipulators, Stream class, string I/O, char I/O, Object I/O, I/O with multiple object, Disk I/O,

RECOMMENDED BOOKS :

1	Introduction to HTML	:	Kamlesh Agarwala, O.P.Vyas, Prateek A. Agrawala (Kitab Mahal Publication)
2	Let us C++	:	Y. Kanetkar B.P.B Publication
3	Programming in C++	:	E. Balaguruswami
4	Mastering in C++	:	Venu Gopal
5	Object Oriented Programming in C++	:	Lafore R, Galgotia Publications.

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