



VEER KUNWAR SINGH UNIVERSITY, Ara

content

B. SC. PART- I

GENERAL, SUBSIDIARY AND HONOURS

<u>SERIAL No.</u>	<u>Subject</u>
1.	Physics : Honours & Sub.
2.	Chemistry : Honours & Sub.
3.	Math : Honours & Sub.
4.	Botany
5.	Zoology
6.	Hindi Rachna
7.	Hindi Rachna Ahindi Bhasiyun

B.Sc. PART – I**Course of Study For****Physics (Honours) PART – I**

The Course shall consist of two theory papers-I and II each of 75 Marks. The Pass marks in the two theory papers taken together will be 67 and the examination in each will be of 3 Hours duration. There will be one practical paper of 50 marks. The pass marks will be 23 and the examination will be of 6 hours duration in this paper.

The following will be detailed course.

PAPER – I**THEORY****TIME : 3 Hours****Full Marks : 75**

10 question to set, 5 to be answered. Question number one will be objective (15 Question) and it will be Compulsory 2 question will be set from group A and C each, and 5 from group B. At least one question from each groups is to answered. All question will be of equal marks.

Group – A**SPECIAL THEORY OF RELATIVITY:****2 QUESTIONS**

Galilean Transformation, inertial frame of reference, Michelson – Morley experiment, Lorentz – Fitzerald contraction, Einstein postulates, Lorentz Transformations and its Consequenses, Length contraction and time delation. Addition of velocities Dragging of light by moving medium, Relativistic Doppler effect for propagation of light waves,aberration of light, variation of mass with velocity. Mass energy relation.

Group – B**Mechanics And Properties Of Matter :****5 Questions**

Intertial frame and non – inertial frame of reference. Corioli's and Centrifugal forces and their simple applications, Generalized Coordinates, constraints(holonomic – non holonomic), D' Alembert's Principal and Lagrange's equations of motion, Hamiltonian's equations of motionr andr theirr simpler applications.

Gravitational potential and field due to bodies of regular geometrical shape.Motion in central field, kepler's laws, Two particle motion in a central field.Elasticity and elastic constants. Bending of beams and Cantilever. Torsion of Cylinder and rigidity modulus by flat spiral spring, non-flat spiral spring. Effects of temperature and pressure on elasticity.

Surface tension and surface energy. Principle of virtual work and its application to surface tension.Ripples and gravity waves.Surface tension by the methods of ripples.Effect Of temperature and pressure on surface tension.

Perfect fluids, Equation of continuity, Euler's equation for perfect fluids, Bernoulli's equation, viscosity of liquids, critical velocity, Poiseuille's formula with correction, Flow of a Compressible fluid through a narrow tube, viscosity of gases, Rankin's method, Effect of temperature and pressure on viscosity

GROUP – C

SOUND :**2 Question**

Differential equation of waves, equation of progressive and stationary waves.

B.Sc. PART – I

Compression waves in fluid and extended solids free, damped and for oscillations in one dimension. Fourier's series and its application rectangular and saw – tooth waves. Vibration of strings. Intensity and loudness of sound and their measurement. Acoustics of build.

PAPER – II**THEORY****Time : 3 Hours****Full Marks**

10 Question to be set 5 to be answered question number one will objective (15 Question) and it will be compulsory. 4 Questions will be from group A and 5 from group B. Atleast one questions from group A and from group B have to be answered. All questions will be of equal marks.

GROUP – A**HEAT :****4 Question**

Derivation of Maxwell's law of distribution of velocities and its experimental verification, Equilibration of energy. Mean free path.

Transport phenomean-Viscosity, Conduction and diffusion, Brownian motion – Langevin and Einstein's Theories and experimental determination of Avogadro's numbers.

Rectilinear flow of heat in metal rod, Conductivity by periodic flow method, Relation between thermal and electrical Conductivities. Vander waal's equation of state from virial theorem.

GROUP – B**THERMODYNAMICS:****5 QUESTION**

Zeroth law of thermodynamics, Definition of temperature. First and Second law of thermodynamics, Carnot's engine and Carnot's theorem, Absolute scale of temperature, Classius's inequality, Entropy, Entropy changes in reversible and irreversible processes, Enthalpy, Helmholtz and Gibb's function, Gibb's- Helmholtz equation, Maxwell's equation and its application to simple physical : problems.

: Thermodynamic description of phase transition, Chemical potential, Latent heat of transition, Clapeyron equation. Joule-Thomson effect, Liquefaction of gasses with special reference to hydrogen and helium, Production and measurement of low temperature.

Black body radiation, Kirchoff's law, Stefan's law, Wien's Law, Planck's law : and its experimental verification. " Einstein and Deby Theories of specific heat of 'solids

PRACTICAL PAPER**Time : 6 Hours****Full Marks**

The course shall include the following experiments: ,

1. 'g' by Katter's Pendulum.
2. Young's modulus by Flexure of beam.
3. Elastic Constants by Searlc's method,
4. Rigidity modulus by-
(i) Barton's apparatus

- (ii) Maxwell's needle.
- 5. Moment of inertia of Fly-Wheel
- 6. Surface tension by Jager's method.
- 7. Surface tension by method ripples.
- 8. surface tension of soap bubble.
- 9. Co-efficient of viscosity of gas by Rankines' method.
- 10. Co-efficient of viscosity of water by capillary flow method.
- 11. Laws of transverse vibrations by sonometer.
- 12. Frequency of tuning fork by melde' method.
- 13. Specific heat of solids by radiation correction.
- 14. Specific heat of liquid by cooling method.
- 15. Thermal conductivity of copper.
- 16. Thermal conductivity of Ebonite by Lee's Disc method.
- 17. Determination of J by Mechanical method.
- 18. n of wire by dynamics method.
- 19. Velocity of sounds by kund's tube.

B.Sc. Physics (Sub/Gen)

Part – I

The course shall consist of one Theory paper of 75 marks. The pass.Marks will be 23 and the examination will be of 3 hours duration. There will be one practical paper of 25 marks, The pass marks will be 10 and the examination will be of 3 hours duration.

The Following. will be the detailed Courses-

Paper – I

Theory

Time : 3 Hours

Full Marks : 75

10 Questions to be set, 5 to be answered. Question number one will be

objective (15.Questions) and it will be Compulsory. 4 questions will be set from group-A, 2 from Group-B and 3 from Group-C At least one question from each group is to be answered. All questions will be of equal marks.

Group – A

RELATIVITY, MECHANICS, GENERAL

4 Questions

PROPERTIES OF MATTER:

Galilean Transformation, Inertial frame of reference, Michelson- Morley Experiment, Lorentz-Fitzerald construction, Einstein postulates,Lorentz "Transformation and its Consequences, Length Contraction and time dilation.

Addition of velocities, Relativistic Doppler's eddect for propagation of light waves, variation of mass with velocity, Mass Energy relation. Inertial frame and non-inertial frame of reference, Corioli's and Centrifugal forces and their simple applications, Motion in Central field, kepler's law. generalised Coordinates, Constraints (holonomic: non-holonomic), Lagrange's equations of motion and their simple applications. Elasticity and-elastic Constants, Relation between elastic Constants, –Bending of beams and Cantilever. Torson of cylinder and rigidity modulus by flat spring. Effect of temperature and pressure on

elasticity. Surface tension and surface energy, Ripple' and gravity waves, Surface tension by method ripples, Effect of temperature and Pressure on surface tension.

B.Sc. Part –I

Perfect fluids. Equation of Continuity, Euler's equation for perfect fluids. Bernoulli's equation. Viscosity of liquids, Critical velocity, Poiseuille's formula with correction. Flow of Compressible fluid through a narrow tube, Viscosity of gasses Rankin's method. Effect of temperature on viscosity.

Group-B

2 Questions

WAVES AND ACOUSTICS:

Differential equation Of wave, Equation of Progressive waves, Stationary waves. Compression waves in fluids and in extended solids, Free, damped and forced oscillations, Fourier analysis. Vibration of string. Intensity and loudness of Sound and (heir measurement, Acoustics of buildings Ultrasonics.

GROUP – C

Heat And Thermodynamics

3 Questions

Maxwell's law of distribution of velocities and its experimental verification, Degree of freedom and Equipartition of energy. Mean free path and its experimental verification, Perfect gas equation and Vander wall's equation of state. Laws of thermodynamics, Absolute scale of temperature, Carot's engine. Entry and its calculation in simple cases .Thermodynamics relations and their application to simple physical problems. Clausius-clapeyron equation, Joule-Thomson effect, Liquefaction of gases with special reference to Helium, Super fluidity of helium. Kirchhoff' s law and black body radiation, Stefan- Boltzman law and its experimental verification.

PRACTICAL PAPER

Time : 3 Hours

The Courses shall include the following experiments-

The course shall include the following experiments

1. 'g' by Bar Pendulum.
- 2 Young's modulus by bending of beam. . | .
- 3, Moment of inertia by Fly Wheel. | :
4. Specific heat of solid with radiation correction. .
- 5.. Specific heat of liquid by Cooling method.
- 6 Thermal Conductivity of copper. .
7. Thermal Conductivity of Ebonite by Lee's Disc method.
8. 'J'by joule's calorimeter.
9. Frequency of Tuning Forks by meld's experiment.
10. Surface Tension by Capillary tube method.
11. Elastic Constants by Searle's method.
- 12 Rigidity modulus by Barton's apparatus.
13. Rigidity modulus by Maxwell needle.
14. Laws of transverse vibration by sonomete.
15. Coefficient of viscosity by Poisseule's method.

Paper – I (A) Physical chemistry

Full Marks : 50

There will be Ten Questions each of ten (10) marks including question No. 1 (one) will be of objective type and compulsory covering the entire syllabus. Three questions will be set from each group out of which – four to be answered selecting at least ONE from each group.

GROUP – A

GASEOUS STATE:

Kinetic theory of gases, derivation of kinetic equation deduction of gas laws. Calculation of gas constant and kinetic energy. Maxwell – Boltzmann distribution law of velocities and energy (derivation not needed), distribution curves at different temperatures, calculation of most probable "average and root mean square velocities of molecules. Real and ideal gases. Compressibility factor, derivations from ideal behavior of gases, equation of state for real gases. Van der Waal equation of state and its application. Boyle's temperature critical phenomenon Law of corresponding state and reduced equation of state.

PHYSICAL PROPERTIES OF LIQUIDS:

Molar volume, vapour pressure, surface tension, parachor and viscosity.

SOLID STATE:

Type of solid, crystal forces, seven crystal system and Bravais lattice, law of crystallography Weiss indices, Miller indices and indexing of planes, crystallography and Bragg's equation analysis of cubic crystal system and elementary idea of crystal defects.

GROUP – B

1. CHEMICAL EQUILIBRIUM:

Reversible and irreversible reaction, statement of law of mass action and its kinetic derivation, equilibrium constant for homogeneous and heterogeneous reactions, relationship between K_c , K_p and K_x . Le-Chatelier's principle and its applications.

2. THERMOCHEMISTRY:

Heats in chemical reactions, enthalpy, standard enthalpy change, Hess's law Kirchhoff's law. Bond energies and their calculation.

3. THERMODYNAMICS:

Thermodynamic terms; systems, extensive and intensive properties, thermodynamic process, state function, first law of thermodynamics. Maximum work done in a reversible, irreversible, isothermal and adiabatic changes heat capacities (C_p & C_v and relation between them).

GROUP – C

1. CHEMICAL KINETICS:

Rate of reaction, order and molecularity, expression for specific rate constant of first and second order reaction, half-life period, unit of rate constants. Determination of order of reactions.

2. THEORY OF DILUTE SOLUTIONS:

Colligative properties, osmosis, osmotic pressure and its experimental determination, Van't Hoff factor, vapour pressure of solution and Raoult's law, relative lowering of vapour pressure, experimental determination of relative lowering of vapour pressure, molecular weight determination, relation between osmotic pressure and lowering of vapour pressure, ideal and non-ideal solutions and Azeotrope, Elevation of Boiling point, depression of freezing point, experimental determination, abnormal colligative properties.

3. IONIC EQUILIBRIUM:

Ionic product of water, pH, pK_a , pK_b and pK_w . Buffer solution, pH of buffer solution, buffer index, buffer capacity, buffer range and idea of buffer solutions in day to day life, Dissociation constant of acids and bases. Common ion effect, HSAB Concept.

Paper – I (B)

INORGANIC CHEMISTRY

Full Marks : 50

There will be TEN questions each of ten (10) marks including Question No. 1 (one) will be of objective type and compulsory covering the syllabus. Three questions will be set from each group out of which FOUR to be answered selecting at least ONE from each group.

Group – A

1. ATOMIC STRUCTURE:

Bohr's Postulates and its applications, Bohr-Sommerfeld theory, Bohr-Sommerfeld theory, Orbital and their shapes Question numbers. Pauli's exclusion principle, Hund's rule Aufbau principle. Electronic configuration of elements.

2. CHEMICAL BONDING:

Ionic bond; Energetic involved on ionic bond formation, Born-Haber cycle, lattice energy, radius ratio rule, Fajan's rule, and inert pair effect Covalent bond; Exceptions to octet rule, sigma (s), Pi (p) and Teu (t) bond hybridization, Van der Waals forces and Hydrogen bonding.

3. CLASSIFICATION OF ELEMENTS AND PERIODICITY:

Classification of elements based on electronic configuration. Periodicity; Atomic size, atomic/Ionic radii, ionisation energy, electron affinity, electron negativity, metallic character, hardness and softness, M.Pt. , & B.Pt, Lattice energy and hydration energy.

GROUP – B

HYDROGEN AND HYDRIDES:

Position in P-T., isotopes of hydrogen, different forms of hydrogen hydrides, ionic- covalent metallic and interstitial, H₂O, : Preparation, properties, structure, Use and strength.

2. PRINCIPLE OF METALLURGY:

(A) Position in P-T., isotopes of hydrogen, different forms of hydrogen hydrides, ionic- covalent metallic and interstitial, H₂O, : Preparation, properties, structure, Use and strength.

(b) Chemistry of the following metals: Li, Be, Ra, Si and Pb.

3. CHEMISTRY OF HALOGENS:

Preparation/Extraction, oxidation states and halides. Inter-halogen compounds .

GROUP – C

NOMENCLATURE OF INORGANIC COMPOUNDS:

IUPAC rule for nomenclature of inorganic compounds (Hetero and isopolyanions).

2. (a) MOLECULAR SYMMETRY:

Symmetry elements and symmetry operations, centre of symmetry, axis of symmetry and plane of symmetry

(b) Types of magnetic behaviors, paramagnetic and ferromagnetism

3.(a) Principles involved in the volumetric estimations of Cu⁺⁺ iron and Ca⁺⁺

(b) Principles involved in the gravimetric estimation of Ni⁺⁺ Ba⁺⁺ and so".

Paper – I (C)

ORGANIC CHEMISTRY

Full Marks : 50

There will be TEN questions each of ten (10) marks including Question No. 1 (one) will be of objective type and compulsory covering the syllabus.

Three questions will be set from each group out of which FOUR to be answered selecting at least ONE from each group.

GROUP – A

(a) Shapes and structure of organic molecules; hybridisation. Bond angle, "bond length and bond energy, shapes/structures of methane ethane, acetylene and benzene molecules.

(b) Nomenclature of organic compounds, acquaintance with IUPAC nomenclature of aliphatic and aromatic compounds.

2. REACTION MECHANISM:

Cleavage of bonds, inductive effect, electromeric effect and mesomeric effect, resonance, types of reagents and reaction intermediates.

3. STEROCHEMISTRY:

Brief idea of geometrical and optical Isomerism.

GROUP – B

1. Study of the following Compounds:

- (a) Alcohol: Monohydric, dihydric, trihydric and unsaturated alcohols.
- (b) Aldehydes and ketones.

2. Study of the following Compounds:

- (a) Carboxylic acids, mono and dicarboxylic acids.
- (b) Organometallic compounds of Mg and its synthetic application
- (c) Amines and urea, Aromaticity and structure of benzene monosubstituted benzene derivatives, orientation and directive influence of different group in benzene.

GROUP – C

1. ANALYTICAL ORGANIC CHEMISTRY:

- (a) Qualitative and quantitative estimation of C, H, N, S, P and Halogens in organic compounds. (b) Molecular weight determination of organic acids by silver salt method and organic based by platinum chloride method.

2. Purification of Organic Compounds:

Different method of purification of organic compounds and criteria of purity, Chromatography.

- 3. (a) Synthetic fibres. Rubber and Plastics.
- (b) Soaps and detergents including chemistry of their actions.

B.Sc. Chemistry (Hons)

PAPER – II

PRATICAL

Time : 6 Hours

- 1. Inorganic mixture analysis six radicals inclusive of interfering radicals.
- 2. Organic Detection ; Detection of Nitrogen. in Organic Compounds. Detection of the following functional groups in organic compound
 - (i) -OH (Phenolic)
 - (ii) -CHO
 - (iii) >C=O
 - (iv) -COOH
 - (v) NH₂ (vi) -NO₂
- 3. Note book and viva-voce.

Chemistry (Sub & Gen)

B.Sc. Part – I

Full Marks : 75

There will be TEN questions each of fifteen (15) marks including Question

No.1 (one) will be of objective type and compulsory covering the entire syllabus.

Three questions will be set from each group out of which FOUR to be answered selecting at least ONE from each group.

Group – A

PHYSICAL CHEMISTRY

1. Gaseous State:

Kinetic theory of gases; postulates, derivation of kinetic gas equation, deduction of gas laws, calculation of gas constants and kinetic energy, Real and ideal gases. Deviations from ideal behaviour and van der Waals equation of state.

2. Thermocchemistry:

Heat in chemical reactions, enthalpy, standard enthalpy changes, Hess's laws, Kirchhoff's law, Bond energies and determination.

3. Ionic Equilibrium:

Ionic product of water, pH, pKa, Pkb, Pkw, Buffer solution, idea of buffer solution in day to day life, Solubility product and its applications in salt analysis, common ion effect, conductance, specific conductance equivalent conductance and molar conductance.

4. Colligative Properties:

Colligative properties, osmosis, osmotic pressure and its determination, vapour pressure, Raoult's law of lowering of vapour pressure, Relation between Osmotic pressure and lowering of vapour pressure. Elevation of Boiling point and depression of freezing point.

Group – B Inorganic Chemistry

1. Atomic Structure :

Bohr's postulates and explanation of hydrogen spectra, shapes of orbitals. Quantum numbers. Pauli's exclusion principle. Hund's rules, aufbau principle, Electronic configuration of elements.

2. Chemical Bonding:

Ionic and covalent bonds, sigma (s)Pi (p) and Tau (t) bonds, hybridization.

3. Chemistry of following elements-

Li, Sn, Pb, Fluorine, Chlorine and iodine

4. Isotopes:

Brief idea of detection and separation of isotopes, tracer techniques, radiocarbon dating.

Group – C Organic Chemistry

1. STRUCTURE AND MECHANISM:

Hybridisation, bond angle, bond length, inductive effect, electromeric effect and mesomeric effect, bond fission and fission products. Elementary idea of reagents and types of reactions.

2. NOMENCLATURE:

Acquaintance with IUPAC nomenclature of aliphatic and aromatic compounds.

3. STUDY OF FOLLOWING COMPOUNDS-

- (a) Alcohols; monohydric and glycerol.
 - (b) Grignard reagent.
 - (c) Aldehydes and Ketones.
4. Purification of organic compounds; criteria of purity and chromatography.

(Sub & Gen.) Chemistry Practical

Time : 5 Hours

Full Marks: 25

1. Inorganic mixture analysis with four radicals with our Interfering radical 12

2. Organic Detection -Detection of Nitrogen in Organic Compounds.

"Detection of the following functional groups in organic compounds.

- (i) OH (Phenolic);
- (ii) CHO
- (iii) >C=O,
- (iv) -COOH
- (v) -NH₂
- (vi) -NO₂

Record of class and viva – voc

Math

PART – I

B.A. / B.Sc. (Hons):

will be twelve questions to be set and six to be answered in each.

B.Sc. Part – I

paper selecting at least one from each group, One question will be objective. short answer type will be compulsory. This question will be of " twenty marks and the rest questions are of each of sixteen marks in both the papers.

Paper – I

1. Group – A :

Set theory and trigonometry:

2. Group – B :

Matrices and: Linear Programming

3. Group – C:

Theory Equations:

Group – A

Set Theory

General forms of Demorgan's laws Generalized cartesian product, Equivalence relation, Partial and total order relation, Countable and uncountable sets, countability of real, rational, imational andalgebraie number system, composition and factorization of mappings.

Trigonometry

Hyperbolic functions, Resolution into factors, Summation of series, (C+is) method only and Gregory'sm series.

Group – B

Symmetric and Skew-symmetric matrices, Hermitian and skew- Hermitiat matrices, Transpose, Adjoint and inverse of matrix. Orthogonal matrices, Rank of a matrix.

Linear Programming:

"Convex set and their properties, Linear Programming Problems and their graphical solutions, Theory of Simplex method and their simple applications, Transportation problem, Assignment problems.

Group – C

Theory of Equations:

Fundamental theorem of Algebra, Relation between roots and Coefficients of a Polynimial equations. Evaluation of Symmetric Functions roots, Carbon's Solution of a Cubic, Euler's solution of a biquadratic equation. Descartes rule of sign.

Paper – II

Time : 3 Hours

1. Group- A: Differential Calculus:

2. Group – B: Integral Calculus:

3. Group – C : Analytical geometry of two dimensions:

4. Group – D: Analytical geometry of three dimension.

Group – A

Differential Calculus:

Successive differentiation lebnitz's theorem. Partial differentiation, Euler's theorem, Exact differential, indeterminate from, L. hospital's maclaurin's and series expansion, Tangents and Normal, curvature, asymptotes.

Group – B :

Integral Calculus:

Integration of rational and irrational function, Notion of integral as limit 'of a sum, Evaluation of definite integrals, Reduction formulae, Curve tracing, areas of curves, Length of curves, Volumes and surface area of solids of "revolution, Moment of Inertia, Centre of granty.

Group – C :

Analytical Geometry of two dimensions: System of Circles, Change of axes, condition for the general equation of Second: degree to represent Parabola, ellipse and hyperbola, Equation of tangents and normal in the case of general equation of second degree (via calculus in particular cases. Chord of contact, Polar line and pair of tangents, Polar equation of conic section, Tangents and Normals in polar form.

Group – D:

Analytical Geometry Of Three Dimensions:

Rectangular, Spherical, polar and cylindrical co-ordinates, angle between straight lines, equation of planes and lines. Shortest distance between skew lines. Sphere cone and cylinder, standard equation of conoids, normal and conjugate diameters of an ellipsoid.

Math

(Sub & Gen)

“Stress should be given on development of ideas and theory rather than on solving problems. Problems should be short and intelligent, there be sixteen questions to be set and eight to be answered selecting at least one from each group, One question will be objective/short answer ” type and all be compulsory. This question will be of sixteen marks and the rest questions are of each of twelve marks.

Paper – I

Time : 3 Hours

Full Marks : 100

1. Group – A

Set theory and : matrices

2. Group – B

Linear programming and trigonometry:

3. Group – C

Analytical geometry of two dimensions:

4. Group – D

Analytical geometry of three dimensions:

5. Group – E

Theory of equations

Group – A

Set Theory:

Generalised form of Demorgan's laws, Cartesian product, Equivalence relation, partial order relation, Chain, Countable and uncountable sets, countability of real, rational and irrational, Set mapping.

Matrices :

Symmetric and Skew-symmetric matrices, Hermitian and Skew- Hermitian matrices. Transfer, Adjoint and Inverse of a Matrix, Rank of a matrix. Solution of linear equation by matrix.

Group – B

Linear Programming:

Convex set and their properties. Linear Programming Problems are their graphical solutions, Transportation and Assignment problems.

Trigonometry:

Hyperbolic functions. Resolution into factors, Summation of trigonometrical series (C+is) method only

ANALYTICAL GEOMETRY OF TWO DIMENSIONS :

Change of axis, System of circles, Coaxial circles, standard equation of Parabola. Ellipse and Hyperbola, Equation of tangent Chord of contact.

Group – D

ANALYTICAL GEOMETRY OF THREE DIMENSIONS :

Cartesian, Polar and cylindrical Co-ordinate system-Angles between straight lines, Equation of Planes and straight lines, shortest distance between lines.

Group – E

Theory Of Equations:

Fundamental theorem of Algebra, relation between roots and Coefficients of a Polynomial equations. Evaluation of Symmetric Function of roots, Garden'solution of a Cubic.

B.Sc. BOTANY HONOURS

There shall be two eight papers each consisting of 100 marks.

B.Sc. Part – I
(BOTANY HONOURS)

There shall be two theoretical papers each carrying 75 marks and one practical paper carrying 50 marks.

Paper – I

Time : 3 Hours

The paper will consist of ten questions. Out of which question No. 1 will be of objective type and compulsory, covering the entire syllabus, Remaining 9 questions have to be set from all the five groups; Four questions have to be answered besides. Questions No. 1, selecting one question from each group.

1. PLANT KINGDOM:

Group-I, Classification of Plant Kingdom and criteria laid on Mayr's system of kingdoms Bio diversities of plant, origin evolution and phylogeny of land plant

B.Sc. Part – I

Group – 2 General Character, Classification, evolutionary trends and ultra structure of Algal cell and economic importance of Algae, Salient features and life history of Cyanophyceae chlorophyceae – volvox, oedogonium, coleochaete; Xanthophyceae – vaucheria Phacophyceae-Ectocarpus. Fucus and rhodophyceae – polysiphonia.

Group – 3 Fungal Lichens And Plant Diseases:

General Characters, Modern classification, types of fungal spores and mode of their economic importance Salient features and life history of Mastigomycotina -Pythium, Phytophthora, Zygomycotina-Mucor, Ascomycotina -Eurotium, Peziza, Basidiomycotina-Puccinia, Ustilago. Agaricus, Detuleromycotina-Astermaria, Cercospora. General idea of Lichens, – Classification and their types.

Group – 4 Bryophytes:

Classification and comparative account of morphology, anatomy and reproduction in hepaticopsida – Riccia and Marchantia; Anthocerotopsida – Anthoceros; Bryopsida – Funaria; Evolution of sporophytes and gametophytes; ecological aspect and economic importance.

Group – 5 Pteridophytes:

Salient features of primitive vascular plants; classification; comparative account of morphology, anatomy and reproduction in Psilopsida – Rhynia and Psilotum, Lycopodiopsida – Lycopodium, Selaginella, Sphenopsida-Equisetum and Pteropsida – Marsilea,

Group – 6 Gymnosperms: Salient features and classification; Evolution significance. Comparative account of morphology, anatomy and reproduction in Cycadopsida – Cycas, Coniferopsida – Pinus, Gnetopsida – Gnetum and their economic relevance.

Plant Fossils- Definition and its scope, conditions of fossilization and mode of preservation. A brief account of Lyginodendron and Williamsonia. A brief reference of plant fossils found in Bihar.

Anquiosperm:

Unique – features and diversity. Primitive and advanced features.

Paper – II

Cell Biology And Genetics

Time : 3 Hours

Full Marks : 75

Ten questions have to be set. Out of which question no. 1 will be of objective type and compulsory covering the entire syllabus. Out of remaining 9 questions which have to be set from all the two groups, four questions have to be answered besides questions no. 1 selecting one from Group – A two from Group – B and One from Group – C

Group – A : Cell Biology

1. Cell:

Historical background shape, size and structure of the cell; comparative account Prokaryotic and Eukaryotic cell;

2. Nucleus:

Ultrastructure of nuclear envelop, nuclear pore complex, matrix and nucleoplasm, DNA and histones;

3. Ribosome:

Structure of ribosomes and its functional significance in protein synthesis.

B.Sc. Part – I

4. Mitochondria and chloroplast:

Origin structure, biogenesis and function of mitochondria and chloroplast

5. Structure and function of other organelles:

Golgi complex, Endoplasmic reticulum, Lysosome, Glyoxysome, Microbodies and cytoskeleton.

1. Cell wall and cell membrane;

Origin, ultrastructure, chemical constituents and their functions:

2. Techniques in cell biology:

Principles of light and electron microscope; chromatography; TLC and HPLC, gel electrophoresis and autoradiography and its application

Group – B: GENETICS

1. Mendel's experiments and the laws of inheritance,
2. Gene interaction and modified dihybrid ratio-Complementary, Supplementary, Duplicate, Epistasis and inhibitory factors.
3. Multiple allelisms,
4. Linkage and crossing over.
5. Balance theory of sex determination and sex linked inheritance,
6. Extra-nuclear inheritance :
7. Population Genetics and Evolution ; Evolution by natural selection, in populations: Hardy Weinberg equilibrium. Genetic diversity, Darwinian evolution.
8. Brief of Human genetics such as Genetic diseases, Genes and cancer, (gene therapy,)

9. Mutation and its role in crop improvement, change in chromosome structure (Chromosomal aberrations) and change in chromosome numbers (Polyploidy). |

10. Methods of crop improvement: [introduction; pure line and mass selection, hybridization in self and cross pollinated crops; acclimatization; mutation and polyploid breeding; |

11. Germplasm conservation and its role in crop improvement.

Practical Paper

Based on Paper – I & II

Time : 4 Hours

1. Morphology and structural details of the forms prescribed in the syllabus and their temporary stained microscopic slides-

(a) Algae-(Any two)

(b) Fungi-one

(c) Bryophytes-one

(d) Pteridophytes-one

(e) Gymnosperms-one

2. Study of different stages of chromosomes in Mitosis/Mciosis by or squash technique of onion root tip or pollen grains off flax

3. To study experiments on modified Mendelian ratio with the help of coloured seeds

4. Emasculation and pollination technique in the flower provided by the

5. To comment upon the Spot (any five) 05

6. Class Records

7. Viva-Voee

B.Sc. Part – I

There shall be two papers in B.Sc. Botany subsidiary courses, each containing 100 marks which shall be opted in First (B.Sc.-1) and Second (B.Sc. II) years of another honours course described below:

B.Sc. Part – I Subsidiary Courses

There shall be one theoretical paper, carrying 75 marks and one practical paper carrying 25 marks in first year of B.Sc. Honours examinations.

Paper – I

Biodiversity of Microbes and Cryptogams; Cytogenetics and Cropimprovement Structure, Development and Reproduction in Plants

Time : 3 Hours

Full Marks : 75

Ten questions has to be set. Question No. 1 will be objective type and compulsory covering the entire syllabus, Remaining 9 questions have to be Set from three groups (A, B, C) in which four questions are to be answered besides Question No 1. selecting at least one from each group.

Group – A

Biodiversity of Microbes And Cryptogams

1. 'General: account of viruses, cyanobacteria and Mycoplasma:

; 'Structure, nutrition and reproduction in Bacteria, their economic importance, Role of microbes in fermentation and N₂-fixation.

2. **Fungi**: General characters and classification; important features and life cycle of Mastigomycotina-Phytophthora, zygomycotina-Mucor, Ascomycotina Peziza Basidiomycotina-Puccinia, Deuteromycotina-Ceteospora; General account of Lichens and their economic utilizations.

3. **Bryophyta**: Structure, reproduction and classification of Hepaticopsida Marehantia, Anthoceroptopsida-Anthoceros and Bryopsida-Funaria and their economic utilization.

4. **Pteridophyta**: Struct, reproduction and classification of psilopsida Psilotum, Lycopsida-Selaginella, Sphenopsida-Equisetum pteropsida – marsilea.

Group – B

Cytogenetics and cropimprovement

1. Structure of the cell as seen under electron Microscope: Mitosis and Meiosis: Structure of chromosomes;
2. Mendelian -laws of inheritance: DNA as a hereditary material and its function mutation: Linkage and crossing Crossing over.

Group – C

Structure, Development and Reproduction in Plants

1. The basic body plan of a flowering plant modular type of growth,
2. Shoot system: Meristems, Initiation, activity and functions of cambium;

B.Sc. Part – I

Amomalous secondary in Boerhaavia and Dracaena; Root-stem transition and Peri derm.

3, Embryological development: Development of anther, pollengrains, embryosac. fertilization, endosperm and embryo, :

4 Significance of seed.

5. Vegetative reproduction: Vegetative propagation, grafting, economic: aspects

Practical Paper Based On

Paper – I

Time : 3 Hours

1. Observation of disease symptoms in hosts infected by Virus, Mycoplasmas and fungi, section cutting of diseased material and identification of the pathogens (of the Genera mentioned in theory paper
- 2 Morphology and structural details of Algae, fungi, Bryophyta, pteridophyta, included in theory paper and identifications
- 3 Study of different stages of mitosis/meiosis of study of Primary and secondary (both, normal and abnormal) structures of roots and stems of angiospermic plants, Or, To study the structure of anther and pollen grains of ovule and embryo sac development or simple experiments to show vegetative propagation leaf cutting in Bryophyllum, stem cutting in rose' sugarcane.
4. To identify and Comment upon forms I – V
5. Practical records
6. Vive-Voce

B.Sc. General Course of Botany

There shall be three papers in B.Sc. Botany general course, containing 100 marks.

B.Sc. Botany : Part – I

(General)

There shall be three papers in B.Sc. Botany General Course, each containing 100 marks.

Biodiversity of Microbes, Cryptogams, Cell Biology, Genetics And Plant Diseases

Time : 3 Hours

Ten questions have to be set. Question No. 1 will be objective type compulsory covering the entire syllabus. Remaining 9 questions have to be set from four groups (A&D, B,C) out of which four questions have to be

answered besides question No. 1, selecting at least one from each group.

Group – A

Biodiversity of Microbes

1. General account of viruses, Cyanobacteria and mycoplasma; Structure, nutrition and reproduction in Bacteria: their economic importance, Role of microbes in agriculture and industries. "

B.Sc. Part – I

Cryptogams

1. Algae: General characters, classification and economic importance, Diagnostic features and life cycle of chlorophyceae-volvox, Oedogonium Xanthophyceae -Vaucheria, Phaeophyceae – Ectocarpus and Rhodophyceae' Polysiphonia.
2. Fungi: General characters and classification /important features and life cycle of Mastigomycotina-Phytophthora, Zygomycotina-Mucor, Ascomycotina Peziza, Basidiomycotina-Puccinia, Deuteromycotina-Cercospora, General account of Lichens and their economic utilizations,
3. Bryophyta: Structure, reproduction and classification of Hepaticopsida-Marchantia, Anthoceroptopsida-Anthocergs and Bryopsida Funaria and their economic utilizations.
4. Preteridophyta: Structure, reproduction and classification of Psilopsida- Psttotum; Lycopsida-Selaginella, Sphenopsida-Equisetum and Pigtopsida-Marsiles.

2. Fungi: General characters and classification /important features and life cycle of Mastigomycotina-Phytophthora, Zygomycotina-Mucor, Ascomycotina Peziza, Basidiomycotina-Puccinia, Deuteromycotina-Cercospora, General account of Lichens and their economic utilizations,
3. Bryophyta: Structure, reproduction and classification of " Hepaticopsida-Marchantia, Anthoceroptopsida-Anthocergs and Bryopsida Funaria and their economic utilizations.
- 4 Preteridophyta: Structure, reproduction and classification of Psilopsida- Psttotum; Lycopsida-Selaginella, Sphenopsida-Equisetum and Pigtopsida-Marsiles.

Group – C

Cell Biology & Genetics

1. Structure of the cell and cell organelles; Mitosis and Meiosis, Physical and chemical structure of chromosomes.
2. Mendelian laws of inheritance: DNA as a hereditary material: structure" replication and function of DNA and RNA
3. Linkage and Crossing over
4. Mutation
5. Polyploidy

Group – D

Plant Diseases

Etiology, symptoms and control of important plant diseases of Bihar-

- (a) Tobacco mosaic virus

(b) Late Blight of Potato

(c) Rust of wheat

(a) Red rot of sugarcane

**Practical Paper Based on
Paper – I**

Time : 3 Hours

Full Marks : 25

1. observation of disease symptoms in hosts infected by virus. Mycoplasma and fungi; section cutting of diseased material and identification of the pathogens : as per general mentioned in theory paper .

2. Morphology and structural details of Algae Fungi Bryophyta, Pteridophyta included in the syllabus of the theory paper and their temporary slide preparation and identification.

3. Study of different stages of mitosis/meiosis.

B.Sc. Part – I

4. Comment upon sports 1-V

5. Practical records

6. viva- Voce

B.Sc. Zoology (Part – I)

Subsidiary / General Zoology

Paper – I (Theory)

Time : 3 Hours

Five Questions are to be set from each group. Students shall have to answer five questions attempting at east two from any group.

Group-A: Nonchordate

1. Bionomics, General characters, Classification (upto orders) of teh following Phyla: Protozoa, Porifera, Coelenterata Platyhreiminthos, Aschelminthe, Anneleda, Arthropods, Mollusca, Echinodermata and Hemichordata.

2. Detailed study of the Structure and Life-history of the following types;

(a) Protozoa Paramecium, Leishmania.

(b) Porifera Sycon –

(c) Cnidaria Obelia ;

(d) Platyhelminthes Fasciola ‘

(c) Aschelminthes Ascaris

({} Annelida Pheretima

(g) Arthropoda Palaemon

ch) Mollusca Pila

(i) Echidodermata Asterias

(j) Hemichordata Balanoglossus

Group – B Cell Biology, Genetics And Evolution

1. Cell Biology and Genetics °

(a) Gametogenesis, Fertilization and Parthenogenesis

(b) Ultra structure and function of the following cell organelles Plasma membrane, Endoplasmic reticulum, Mitochondria, Golgi body, Ribosomes, Chromosome, Lysosome,

(c) Structure and function of DNA.

(d) Gene Mutation 7

(e) Linkage and Crossing over |

2 Evolution. . . :

(a) Sources of hereditary variation and their role in evolution.

(b) Dewewin's theory of Natural selection and Neo-Drawinism.

(c) Isolating mechanisms and their role in evolution.

Practical Subsidiary/ General

Time : 3 Hours

1. Dissection : (6

Pheretima : Reproductive system, .

Palaemon : Alimentary canal, Nervous System,

Pila: Alimentary canal, Nervous system, / .

B.Sc. Part – I

2. Mounting : (Permanent stained Preparation)

. Septal nephridia, Ovary and Setac of Pherctima,

" Statocyst of Prawn;

Radula and Osphradium of pila

3. Spotting:

(a) Museum Speimen 2 Nos

(b) Slides 3 Nos

(c) Evolution 1 Nos

4. Pracial records

5. Viva – voce

B.Sc. Honours Part – I

Zoology

Theory

Paper – I

(Non – Chordate)

Time : 3 Hours

Full Marks : 75

In all ten questions are to be set, out of which number 1 and 2 consists of "objective (1×15 marks) and short answer (3×5) questions respectively and both shall span over the whole syllabus in the paper. Students would be required to answer five questions out of which question, number 1 and 2 shall be compulsory.

1. Bionomics-General characters and Classification (upto orders) of the Following Phyla, Protozoa, Porifera, Cnidaria, Platyhebmintes, Annelida. Arthropoda, Mollusca, Echinodermata and Hermichordata.

2 Detailed study of the following types:

- (a) Protozoa-Paramecium. Leishmania donovani, Entamoeba histolytica, Polystomella (Elphidium), Trypanosoma, Vorticella.
- (b) Porifera – Canal system, skeleton and reproduction, affinities of the phylum.
- (c) Cnidaria – Obelia, Aurelia, coral reef formation
- (d) Ctenophora – General organization of Hormiphora, affinities of the phylum.
- (e) Platyhelminthes-Fasciola hepatica and Taenia solium,

- (f) Aschelminthes-Ascaris lumbricoides, Wuchereria bancrofti.
- (g) Annelida – Pheretima posthuma, Hirudo.
- (h) Arthropoda – Palaemon, Peripatus, Sacculina, larval forms of crustaceans
- (i) Mollusca – Unio, Pila, Sepia, Torsion and detorsion in gastropoda
- (j) Echinodermata – Asterias
- (k) Chordata – Balanoglossus

Paper – II A

(Ecology, Animal Behavior And Biometry)

Time : 3 Hours

Full Marks : 75

1. Ecology:

1. Concept of biosphere (Lithosphere, hydrosphere and atmosphere)
2. Ecosystem definition, structure and function of pond ecosystem.
3. Major Ecosystems of the world-Structure (abiotic and biotic) function including Energy flow in the following.
 - (a) Freshwater : .
 - (b) Grassland
 - (c) Desert &
 - (d) Forest Ecosystem

4. Biogeochemical cycles (Carbon, Nitrogen, Oxygen & Sulphur).
5. Community structure & its ecological succession.
6. Pollution and its hazards; Green house effect, Ozone depletion.
7. Wild-life conservation.

II. ANIMAL BEHAVIOUR:

1. Scope of Ethology, Innate and learned behavior.
2. Social behavior in insects,
3. Parental care in fishes and Amphibia.
4. Brooding, nesting and migratory behavior in birds, .
5. Concept of Biological clock.

III. Biometry:

1. Normal distribution.
2. Mean, Mode and Median
3. Standard deviation
4. Standard error of Mean. Median and 'Standard deviation,
5. Student t-test, Testing the significance of (i) the mean of random sample from normal population (i) and the difference between, means,
6. Chi Square test a Se
 - (a) Goodness of fit
 - (b) Test of independence

Practical
(Paper – IB & IIB)

Time : 4 Hours

1. Dissection:

1. Dissection.

Pheretima and Leech : General Anatomy, Alimentary canal, Reproductive, Excretory and Nervous system

Palaemon: Alimentary canal, Nervous system. .

Unio, Pila and Sepia : Nervous system, organs of Pallial complex of Fila

2. Permanent stained preparations of the following:

Paramecium' Gemmules; spicules, Obelia colony, Nephridia and ovary- of Pheretima, Jaw of leech, statocyst] of Prawn, Osphradium, Raduila and gill of Pila, Gill of Unio, Glochidium larvae, larvae of Crustacea and, Echinoderms, Pedicellaria.

3. Spotting (Each of two marks)

(i) Museum specimen

(ii) Slides

(iii) Specimen relating to animal behavior or parental care.

4. Ecology

(i) Analysis of spoil/pond biota.

(ii) Determination of dissolved oxygen in different water samples.

(iii) Community structure of grassland.

(iv) Moisture content of soil sample

5. Biometry

Calculation of the arithmetic mean and standard deviation of the samples provided.

6. Record and field work

7. Viva – Voce.

URDU COMPOSITION PART – I (ARTS, SCIENCE & COMMERCE)

Time : 1.30 Hours

Distribution of Marks:

(a) Objective (10 question):

(b) Critical questions:

(c) Essay :

The Paper will consist of three questions with alternative, one objective of 10 marks, one critical question from prescribed books of 20 marks and one essay of 20 marks. The students will have to answer all the questions within the frame of time.

Books Prescribed:

1. Adabiyat: published by Awwaz – e – Adab Patna

Prose:

(a) Rasm-o-Riwaz : Sir Syed Ahmad Khan

(b) Urdu Hindi : Shiblee Nomani

(c) Swan : Prem Chand

(d) Mahshar : Akhtar Urain

(e) Mirza – Ke- Khatoot : Mirza Ghalib

Poetry:

(a) Jalweyeh Darbar Delhi – By Akbar Allahabadi

(b) Khak – e- Hindi – by Brijji Narain Chakrabarti

(c) Haweeqat – e- Husn – By Dr. Iqbaal

(d) Mazdoor Talib Lim – By Ahsan Bin Danish

