

STRUCTURE OF WRITTEN OBJECTIVE TEST

- Each question will require about 60 seconds to answer.
- **Duration of Test:** For B.Sc. (Engineering) and PGDTDP: Three hours.
- For all other courses: Two hours and No. of Questions: 120.
- Level of questions for B.A., B.Sc.(Home Science), B.A. (Social Science), B.Com., B.Sc. (Engineering), B.Sc., B.B.M., courses will be of Intermediate examination. However, (i) Mathematics paper for entrance test of B.Com. will be of High School level, for those students who have not taken Intermediate Level Mathematics in their Intermediate Examination and (ii) General Science paper for entrance test of B.Sc. (Home Science) will be of High School level.
- Level of questions for B.Ed., M.B.A. (Business Management), M.Tech., PGDCSA, PGDIM, PGDBE, and PGDTDP courses will be of Graduate (10+2+3) examination and for M.Ed. course it will be of B.Ed. examination.

SUBJECT COMBINATION FOR DIFFERENT COURSES

(1) B.A./B.A (Social Science): Besides one compulsory paper on General Knowledge and Current Affairs, the test shall have ten subjects, all having equal marks, on Drawing & Painting, Economics, English, Hindi, Home Science, Music, Political Science (Civics), Psychology, Sanskrit and Sociology of the standard of Intermediate examination. Out of the ten subjects, candidates shall attempt three subjects depending on the subjects they are likely to offer as major and faculty half courses in accordance with grouping as mentioned in the Prospectus.

(2) B.B.M.: The test paper shall have following four subjects all compulsory and of 15 marks each: (i) English Language, Expression and Comprehension, (ii) General Knowledge and Current Affairs, (iii) Logic & Reasoning, and (iv) Anyone subject out of Civics, Economics, Hindi, Home Science, Psychology, Sanskrit, Sociology, Book Keeping and Accountancy, Business Organisation, Banking, Commercial Mathematics, Botany, Chemistry, Mathematics, Physics and Zoology.

(3) B.Com.: The test paper shall have four subjects, all compulsory and all having equal marks: (i) Book Keeping and Accountancy, (ii) Business Organisation, (iii) Banking/Commercial Mathematics/High School level Mathematics and (iv) General Knowledge and Current Affairs.

(4) B.Sc. (Home Science): The student shall answer questions in the following subjects depending on stream from which they have passed the Intermediate examination as under:

Arts students
(with Home Science)

1. General knowledge
2. English / Hindi / Sanskrit
3. Home Science
4. General Science

Science Students

1. General Knowledge
2. English / Hindi / Sanskrit
3. Biology / Mathematics
4. Physics / Chemistry.

(5) B.Ed.: Besides one paper on General Knowledge and Current Affairs, the candidates will also be required to answer two papers from among the following subjects which they have taken at graduate or post-graduate level.

Botany, Chemistry, Commerce, Drawing & Painting, Economics, English, Geography, Hindi, History, Home Science, Mathematics, Music (Sitar, Tabla, Vocal), Physics, Political Science, Sanskrit and Zoology.

(6) B.Sc.(Engineering): The test paper shall have four sections, all compulsory, on Mathematics, Physics, Chemistry and General Knowledge & Current Affairs. Each section will consist of 45 questions. Total number of questions in the test paper will be 180.

(7) B.Sc.: Besides one compulsory paper on General Knowledge & Current Affairs, the test shall have five subjects, all having equal marks on Botany, Chemistry, Mathematics, Physics and Zoology. Out of the five subjects, the candidates will attempt any three subjects depending on the subjects they are likely to offer as major and faculty half courses in accordance with grouping as mentioned in the Prospectus.

(8) Post Graduate Diploma in (i) Computer Science & Applications and (ii) Industrial Mathematics: The test paper shall have questions on (i) English Language, Expression & Comprehension, (ii) General Knowledge & Current Affairs, (iii) Logic & Reasoning, (iv) Mathematics.

(9) Post Graduate Diploma in Textile Designing & Printing: The test shall judge the aptitude and performance ability in the subject through a written objective test (30 minutes) as well as a practical test (150 minutes).

(10) Post Graduate Diploma in Business Economics: The written test shall consist of objective type questions to assess the knowledge in (i) English Language, Expression & Comprehension, (ii) General Knowledge & Current Affairs, (iii) Logic & Reasoning, (iv) Economics.

(11) M.Ed.: The test paper shall have questions of theory papers of the standard of B.Ed. or equivalent examination.

(12) M.B.A. (Business Management): The written test shall consist of objective type questions to assess the knowledge in (i) English Language, Expression & Comprehension, (ii) General Knowledge & Current Affairs, (iii) Logic & Reasoning, (iv) Quantitative ability.

(13) M.Tech.: Syllabus for M.Tech. written test will comprise of three Sections. (i) General Knowledge & Current Affairs, (ii) Logic & Reasoning, and (iii) Mathematics.

NOTE

Using the Answer Sheet: Candidates are required to be careful while using the answer sheets of entrance test. They have to follow the instructions announced at the examination centre/room. It is their own responsibility to make sure that they use the right answer sheet for each test. The supervisor will not be in a position to allow anyone to use fresh answer sheets.

At the conclusion of the test, candidates will be required to return both the test booklet and the answer sheets to the supervisor.

Test Centre Procedure: All candidates are required to reach the test centre 30 minutes before the scheduled time. Everyone is required to possess own pen, pencil, calculator, ruler, sketch pens, poster colours, water container, brushes, etc. Candidates will not be allowed to exchange and/or borrow test/writing material during the examination of entrance-test.

SYLLABUS (HIGH SCHOOL LEVEL)**GENERAL SCIENCE****Unit 1: PHYSICS**

- 1.1 Newton's Law of Motion
- 1.2 Work, Power and Energy
- 1.3 Conduction, Convection, and Radiation
- 1.4 Structure of the Human Eye
- 1.5 Sun as a source of Energy, Absorption of solar energy by the earth-photosynthesis, solar cooker.

Unit 2: CHEMISTRY

- 2.1 Air, Water
- 2.2 Chemicals in daily life-Industrial Chemicals
- 2.3 Nature of Gases-Nitrogen Cycle and Fertilizers
- 2.4 Metals and Non-Metals-Acids, Bases and Salts
- 2.5 Introduction to some important organic and inorganic compounds.

Unit 3: BOTANY

- 3.1 Structure of Cell, Cell Division
- 3.2 Classification of Vegetation
- 3.3 Root and Stem
- 3.4 Absorption and Movements of Fluid in Plants
- 3.5 Respiration in Plants.

Unit 4: ZOOLOGY

- 4.1 Blood and Lymph
- 4.2 Respiratory System
- 4.3 Nervous System and Sense Organs
- 4.4 Reproductive System
- 4.5 Excretion.

Unit 5: HEALTH AND HYGIENE

- 5.1 Aids to Health
- 5.2 Environmental Pollution
- 5.3 General Knowledge about communicable diseases and diseases spread through air
- 5.4 Diseases spread through water and food
- 5.5 Non communicable diseases.

MATHEMATICS**Unit 1: GEOMETRY**

- 1.1 Buddhayan-Pythagoras Principle
- 1.2 Extension of Buddhayan-Pythagoras principle
- 1.3 Locus
- 1.4 Construction of Angles, Triangles, Circle and its Chord, Arc of a Circle
- 1.5 Segment of a circle, tangent of a circle, construction of a circle.

Unit 2: MENSURATION

- 2.1 Area of Triangles
- 2.2 Area of Quadrilaterals
- 2.3 Area of Circle
- 2.4 Cuboid and cube and right circular cylinder
- 2.5 Right circular cone and sphere.

Unit 3: ARITHMETIC

- 3.1 Percentage
- 3.2 Profit and Loss

- 3.3 Interest (Simple and Compound)
- 3.4 Work, Time and Speed
- 3.5 Discount.

Unit 4: ALGEBRA

- 4.1 Number System & Laws of Indices
- 4.2 Factorization
- 4.3 L.C.F. and H.C.F.
- 4.4 Simultaneous Linear Equations
- 4.5 Quadratic-polynomials and Quadratic equations.

Unit 5: TRIGONOMETRY & STATISTICS

- 5.1 Measures of an angle
- 5.2 Trigonometrical ratios
- 5.3 Advanced Trigonometrical Ratios, Height and Distance
- 5.4 Frequency Distribution, Graphical Representation
- 5.5 Measure of central tendency: Mean, Median, Mode.

SYLLABUS (INTERMEDIATE LEVEL): SCIENCE**BOTANY****Unit 1**

- 1.1 Cell, Structure, Ultrastructure, Organelles, Nucleus, & Nuclear Membranes, Mitochondria, Plastids, Centrosomes, Lysosomes, Microsome, Endoplasmic Reticulum, Ribosome.
- 1.2 Protoplasm, Cell wall, Non protoplasmic cell inclusions,
- 1.3 Mitosis, Meiosis, significance of genetics in meiosis, process of meiosis and its relationships with life cycle.
- 1.4 Difference between animal and plant cell and cell division.
- 1.5 RNA and DNA and its replication.

Unit 2

- 2.1 Ecology-Its meaning, ecological factors (climate, edaphic, topographic, and biotic).
- 2.2 Elementary knowledge of ecosystem, its meaning, structure, living & nonliving constituents, dissolved minerals and gases in water, producers, consumers, decomposers.
- 2.3 Lakes and forest ecosystem, food chains, food network, and pyramid, place of men in ecosystem.
- 2.4 Environmental pollution and its elementary knowledge, causes, control, types of pollution. Domestic detergents, sewage, chemicals in industry, Automobile exhaust, nuclear fission of radioactive substances, smoke, noise, pesticide.
- 2.5 Genetics-Its meaning, Mendelism, Experiments of Mendel & Laws of heredity.

Unit 3

- 3.1 Modern classification of plant kingdom (Ostwald & Tippo), Classification of Angiosperms, Description.
- 3.2 Sporogenesis-formation of Micro & Macro spores, detailed study of life cycle of Angiospermic plant.
- 3.3 Fruit, Dispersal of fruits and seeds.
- 3.4 Cell Differentiation-Plant tissue, classification of Meristematic and permanent tissues, their functions and classification of tissue system.
- 3.5 Identification & Economic importance of the following families-Cruciferae, Malvaceae, Leguminosae, Compositae, Cucurbitaceae, Liliaceae.

Unit 4: SYSTEMATIC STUDY OF PHYLTA TAKING REPRESENTATION EXAMPLES-OCCURRENCE, STRUCTURE, ANATOMY AND LIFE CYCLES OF THE FOLLOWING:

- 4.1 Algae-Elementary knowledge (general characteristics & uses), detailed study of Ulothrix & Spirogyra.
- 4.2 Bacteria-Structure, Nutrition, Reproduction & Economic importance. Fungi-Structure, detailed study of Rhizopus, Yeast and their economic importance.
- 4.3 Bryophyta-Structure and economic importance, detailed study of Moss eg. Funaria.
- 4.4 Pteridophyta-Structure, detailed study of Fern.
- 4.5 Gymnosperm-General Description and outline of the life cycle of Cycas.

Unit 5: PLANT PHYSIOLOGY

- 5.1 Chemical composition of inorganic nutrients in plant ash and soil water, absorption, dispersion and osmotic pressure; Nitrogen cycle; Special modes of plant nutrition-autotrophic, parasitic, saprophytic, symbionts, insectivorous, and their inter-relationship.
- 5.2 Photosynthesis-importance of chlorophyll, light and CO₂, production and importance of ATP, important products of photosynthesis.
- 5.3 Transpiration-factors, importance, mechanism of opening & closing of stomata.
- 5.4 Translocation and storage of food.
- 5.5 Growth and movement-definition of growth, spheres of growth and its measurement, main types of movements in plants, hormones & their functions in growth.

CHEMISTRY

Unit 1: GENERAL CHEMISTRY

- 1.1 & 1.2 Atomic structure-Atom, subatomic particles, discovery of electrons, protons, neutrons, Rutherford model of the atom, Bohr's model of the hydrogen atom, Rydberg relationship.
- 1.3 & 1.4 Elementary concepts of binding energy, electronic configuration, electron shells, subshells, quantum numbers, Pauli's exclusion principle, Hund's rule, Aufbau principle, shapes of s, p and d orbitals.
- 1.5 Nuclear structure-Composition of the nucleus, isotopes and isobars, elementary idea of nuclear binding energy, radioactivity, natural and artificial radioactivity, half-life, displacement law, uses of radioisotopes.

Unit 2

- 2.1 Mendeleev's classification of the elements, basis for periodic classification, variation of general properties like ionization potential, electron affinity, atomic volume etc.
- 2.2 Chemical bonding, ionic bonds, covalent bonds, coordinate-covalent bonds, electronic configuration of simple compounds, elementary ideas of hydrogen bonding and its influence on physical properties.
- 2.3 Electrode potential, electrochemical series, oxidation-reduction reactions, oxidation number, balancing of equations by oxidation number and charge.
- 2.4 Characteristics of bonding in organic compounds, structural formulae, atoms and molecular orbitals, hybridization and covalent bonds, hydrogen bonds and position isomerism, functional isomerism, geometric isomerism and optical isomerism (lactic acid).
- 2.5 Ideal gas laws, Dalton's laws of partial pressure, Graham's diffusion law.

Unit 3: INORGANIC CHEMISTRY

- 3.1 I A, zero group elements, H₂, inert gases and alkali metals. Position in periodic table of H₂, inert gases and alkali metals (Na and K), on the basis of electronic configuration. Isotopes of H₂. Chemistry and uses of H₂O₂, Na₂CO₃ and (NH₄)₂HPO₄.

- 3.2 II A & III A group elements-Position in the periodic table of group II A elements (Mg, Ca, Sr and Ba) on the basis of electronic configuration. Chemistry of plaster of Paris, cement, anhydrous AlCl₃, alums, metallurgy of aluminium and its uses.
- 3.3 IV A & V A group elements-Position in periodic table of C, Pb, N, P, Sb and Bi on the basis of electronic configuration. Fuel gases (oil gas, coal gas and petrol gas), their preparation, manufacture and uses. Chemistry of stannous chlorides, white lead, basic lead acetate, NH₃, HNO₂, N₂O, HNO₃, Phosphates, H₃PO₄, As₂O₃, fertilizers of N and P.
- 3.4 VI A & VII A group elements-Position in the periodic table of Cl₂, Br₂ and F₂ on the basis of electronic configuration. Chemistry of O₃, H₂SO₄, Cl₂, Br₂, F₂ and bleaching powder.
- 3.5 Transition metals-Position in periodic table of I B, II B and VIII B group elements on the basis of electronic configuration. Metallurgy of Cu, Ag, Zn and Fe. Chemistry of Cu₂Cl₂, AgNO₃, ZnCl₂, calomel, corrosive sublimate, ZnO, Mohr's salt and FeCl₃.

Unit 4: PHYSICAL CHEMISTRY

- 4.1 The thermodynamics and thermochemistry-First law of thermodynamics, definition, internal energy, Hess's law of constant heat summation (numerical problem), heat of reaction, heat of combustion, heat of formation, heat of neutralization.
- 4.2 Chemical equilibrium-Law of mass action, equilibrium constant, Le Chatelier's principle (qualitative interpretation), effect of temperature, pressure and concentration on equilibrium constant.
- 4.3 Electrolysis-Arrhenius theory of electrolytes and its limitations, Ostwald's dilution law, degree of dissociation, dissociation constant, acids bases and salts, neutralization, hydrolysis, pH, buffer solutions, acid-base indicators, solubility, solubility product and the common ion effect.
- 4.4 Solutions-Variation of various methods of representing concentrations of solutions, vapour pressure, osmotic pressure, Berkeley and Hartley method of determining osmotic pressure, elevation in boiling point and depression in freezing point to determine molecular weight of nonvolatile substances (excluding derivation of relation).
- 4.5 Catalysis-Catalysts, properties of catalysts, types of catalysis, homogeneous and heterogeneous catalysis, theory of catalysis, intermediate compound formation, adsorption theory, enzyme catalysis, colloidal solution types and their properties (excluding electrical properties).

Unit 5: ORGANIC CHEMISTRY

- 5.1 Nature of organic compounds, purification and separation methods, Detection of elements (C, H, N, S and Halogens).
- 5.2 Classification of organic compounds and their nomenclature (IUPAC system), Hybridization.
- 5.3 Hydrocarbons-Alkanes, alkenes and alkynes and alkyl halides (general methods of preparation and properties).
- 5.4 Hydrocarbons having various functional groups. [Alcohols (monohydric), aldehydes and ketones (formaldehyde, acetaldehyde, acetone), carboxylic acids (monocarboxylic acids), ethers, esters (ethyl acetate) and primary amines] Methods of preparation and important physical and chemical properties.
- 5.5 Aromatic Compounds-Comparison of aliphatic and aromatic compounds, benzene and its aromatic character, Preparation, properties of aromatic compounds (nitrobenzene, chlorobenzene, phenol, benzaldehyde, benzoic acid and aniline).
Our food and its composition (introductory ideas about vitamins, carbohydrates, proteins, oils, and fats).

MATHEMATICS

Unit 1: ALGEBRA AND PROBABILITY

- 1.1 Surds, Solution of simultaneous and quadratic equations, Arithmetic, Geometric and Harmonic progressions, Binomial theorem for any Index, Logarithms, Exponential and Logarithmic Series.
- 1.2 Determinants and their application in solving linear simultaneous equations, Matrix, its types, addition, multiplication, adjoint and inverse of 2×2 matrices.
- 1.3 Definition of Probability, Dependent, Independent events, Numerical problems on addition and multiplication theorems of Probability.
- 1.4 Idempotent law, Identities, Complimentary laws, De Morgan's theorem, Mapping, Inverse relation, Equivalence relation, Peano's axioms, Definition of Rationals and Integers through equivalence relation.
- 1.5 Complex number as an ordered pair of real numbers, Geometrical representation, Absolute values, Triangular inequalities.

Unit 2: TRIGONOMETRY AND VECTORS

- 2.1 Simple identities, Trigonometric equations, Properties of triangles, Use of mathematical tables, Solutions of triangles.
- 2.2 Height and Distances.
- 2.3 Inverse function, De Moivre's theorem.
- 2.4 Position vector, addition and subtraction of vectors.
- 2.5 Scalar and vector products, Scalar triple product and their application in geometry and mechanics.

Unit 3: CALCULUS

- 3.1 Notions of limit, Continuity and differentiability, Differentiation of function, Rate of change.
- 3.2 Tangents and normals, simple examples of maxima and minima of functions of one variable.
- 3.3 Integration of functions by parts, by substitution and by partial functions.
- 3.4 Definite Integration, application to volumes, surfaces, frustums of sphere, cone and cylinder.
- 3.5 Ordinary differential equations-variable, separable and linear.

Unit 4: COORDINATE GEOMETRY

- 4.1 Coordinate geometry of the straight line, pair of straight lines.
- 4.2 Circle
- 4.3 Parabola
- 4.4 Ellipse
- 4.5 Hyperbola, Tracing of conics.

Unit 5: STATICS AND DYNAMICS

- 5.1 Velocity, composition of velocity, relative velocity, acceleration, composition of acceleration, motion under gravity.
- 5.2 Projectiles, Laws of motion, Principles of conservation of momentum and energy.
- 5.3 Direct and Oblique impact of smooth bodies.
- 5.4 Composition of Co-planer, Concurrent and Parallel forces, Moments and Couples.
- 5.5 Resultant of a set of Co-planar, forces and conditions of equilibrium, determination of centroids in simple cases, problems involving friction.

PHYSICS

Unit 1: MEASUREMENT AND MECHANICS

1.1 Dimensional Analysis: Examples of Dimensional formulae based on fundamental quantities of S.I. system, Testing of Dimensional Balance, simple examples of establishing relationships among the Physical Quantities through Dimensional Balance.

Motion in a Plane: Scalar Product of a Vector, Scalar product of two Vectors, (Example of work). Vector forms of the Principles of motion and Projectile Motion, Uniform Circular Motion, Angular Displacement, Angular Velocity, Centripetal and Centrifugal forces, simple examples of Centripetal force and simple explanations.

1.2 Rotatory Motion in a Rigid Body: Moment of a force, Torque, Angular Acceleration, Angular momentum, and Angular Kinetic Energy, Relationship between angular and linear motion principles, Moment of Inertia, Moment of Inertia of some definite solid shapes.

Universal Gravitation. Motion of Planets and Kepler's Laws, Laws of Gravitation, Universal Gravitation Constant, Derivation of acceleration due to Gravity under different conditions of Gravitation, change in acceleration of gravity with height, Gravitational field, Gravitational Potential Energy, Gravitational Potential, Orbital speed of Satellite, Weightlessness in Satellite, Maximum height attained by a Projectile, Escape Energy and Velocity, Binding Energy.

1.3 Simple Harmonic Motion: Simple Harmonic Motion as defined in the form of uniform Circular Projectile, Displacement Equations, Restoring Force, Laws of Simple Harmonic Motion in linear form, formulae of Periodic Time, (i) Simple Pendulum and (ii) Ideal spring and its motion. Periodic Displacement Graph of Simple Harmonic Motion. Assumption of Phase and Displacement and its simple nature. Energy Transformation in Simple Harmonic Motion, Conservation of Mechanical Energy, Total Energy, and its relationship with Amplitude, Energy Dissipation and Damping.

1.4 Elasticity: Volume and Longitudinal Strain and stress, Hooke's Law and its limitations, Young Modulus, Potential Energy in a stretched wire, Modulus of Rigidity, Qualitative Explanation of Elasticity through solid's Molecular Model, Inter-Atomic Force Constant.

1.5 Surface-Tension: Cohesive and Adhesive Forces, Assumptions of Surface forces through some examples of liquids, Capillary cohesion and its natural uses, some events based on the Surface Tension.

Flow of Liquids: Perfect (Ideal) liquid, Stream-lined Flow, Energy of a Flowing Liquid, (Pressure, Kinetic and Potential) Bernoulli's Theorem, and its Applications. Assumptions of a Viscous Liquid, Velocity Gradient of Viscosity, Coefficient of Viscosity, Stoke's Law, Terminal Speed.

Unit 2: HEAT & GENERAL PROPERTIES OF MATTER IN BULK STATE

2.1 Temperature: Gas Thermometer and Resistance Thermometer, their Principles and Numerical Problems, Principle of Thermo Couple Thermometer, Calibration Curve, Total Radiation Pyrometer.

2.2 Kinetic Model of Gases: Molecular Agitation, Assumptions of Kinetic theory, Molecular weight of Gaseous Pressure, Number of Molecules and its dependance on their velocity, Boyle's Laws of Gases, Thermal Equilibrium and concept of Temperature, Temperature and Kinetic Energy, Boltzman Constant, Deviations in Common Gases under the laws of Perfect Gases, Finite size of Molecules, Inter-molecular Forces, Van der-Waal's Equation, Isothermal Curves for real gases, Critical Temperature and Critical Pressure, Difference between Vapour and Gas.

Kinetic Models of Liquids and Solids: Inter-molecular Forces and Potential Energy Curves, Molecular attraction and Repulsion, Molecular Models of Liquids and Solid Crystals, Thermal Expansion, Freezing Point, Boiling Point and Explanation of Latent Heat.

2.3 Thermo-dynamics: Work done by a Thermo-dynamics system, Internal Energy (Constant $dQ-w$), The First Law of Thermo-dynamics ($dQ=du+w$), Difference between Specific Heats of an Ideal gas on constant volume and constant pressure, Derivation of the Equation $C_p-C_v=R$, Form of Internal Energy (linear, rotational, molecular and lattice vibrations in molecules), Internal Energy (Randomized Molecular Motion), Explanation of Second Law of Thermo-dynamics.

2.4 Iso-thermal and Adiabatic Processes: General Assumptions and Examples, Relationship between Isothermal and Adiabatic processes in an ideal gas, Volume Elasticities of Processes, Isothermal and Adiabatic Processes.

2.5 Thermal Conduction: Thermal conduction in a rod of a good conductor material, Rate of thermal conduction and its transverse section, Temperature gradient, Heat conduction coefficient, Explanation of thermal conduction through Kinetic Model, Free Electron Model for metallic thermal conduction.

Unit 3: LIGHT & WAVE-MOTION

3.1 Refraction or Light at Spherical Surfaces: Formula for refraction on concave and convex spherical surfaces (Lenses), Refraction formulae for thin lenses, Dependence of focal length on refraction, Joint focal length of two lenses when put together.

Chromatic Aberration: Dispersive power of an optical medium, Longitudinal chromatic aberration of lenses, Spherical aberration and its relationship with the radius of the Lens, Achromatic combination of lenses.

3.2 Telescope and Microscope: Spherical Aberration in common Lenses' images and chromatic aberrations, Dependence of spherical aberration on the radius of the lens, Applicability of thin lenses for elimination, Achromatic association for eliminating spherical aberration, Paraboloidal Mirror and elimination of aberrations, Reflecting Telescope, Concept of Resolving Power, Need of big eye-piece lens in Telescope, Resolving power of microscope, structure and function of Electron-Microscope.

Photometry: Radiant Flux of source of illumination, Luminous Flux, Concept of Luminous Intensity, Units Lumen and candela, Luminous Efficiency of Electric Bulbs, Illumination of a surface, Unit-Lux, Inverse square law for Illuminance, Lambert's Cosine Law for illuminance.

3.3 Progressive Waves: Disturbances in wave-motion, and Energy transference, Time and Distance, Displacement Graphs in Progressive Waves, Phase and Phase Difference, Wave Front, Huygen's Principle of Secondary Wavelets.

Wave-nature or Light: Electromagnetic Spectrum (From Gamma Rays to Hertzian Waves) Newton's Corpuscular Theory, Motion of light in different media, Focault's method of light motion, Diffraction of light.

3.4 Speed or Mechanical Waves: Newton's formula for Longitudinal Waves, Revision in Laplace Law for gases, Effect of Pressure and Temperature on gaseous diffusion.

Super-position or Waves: Interference of two waves, Interference of waves from Coherent Sources, Examples of Sound Interference, Description of Young's Experiments, Quincke's experiments, Formation of Fringes, Width of Fringes, Practical examples of light Interference.

3.5 Beats in Sound Waves, frequency of beats, Stationary Waves in a Bounded Medium, Nodes and Antinodes, Stationary waves in Air Columns, Odd Harmonics, Transverse Waves in a stretched rope, Fundamental frequency of Stationary Waves in a rope, Sonometer, Resonance Tube, and Tuning Fork (Simple musical instruments based on Air Columns and Vibrations as Flute, Sitar and Violin).

Polarization or Light Waves: Un-polarized and Polarized light (Only Transverse Waves), Polarization of light, Production of Plane Polarized light, Polaroid.

Doppler's Effect: Doppler's effect in sound, Examples of Doppler's effect, Doppler's effect in light, Estimation of motion of stars and Galaxies through Doppler's effect.

Unit 4: ELECTRICITY & ELECTRO-MAGNETISM

4.1 Electric Field and Potential: Coulomb's Law, Electric field and Potential of a Point charge, Electric Dipole, Couple on an Electric Dipole in a uniform Electric field, Electric Dipole Moment, Electric field and Potential derivations in transverse and longitudinal positions of Dipole, Equipotential surface, Electric field and Potential on uniform plane surface.

4.2 Electric Capacitance: Concept of Capacitance, Capacitor-Parallel Plate and spherical, Di-electric effect on capacitor, Combinations of Capacitors-in series and in parallel form, Energy of a charged Capacitor, Practical utility and applicability of Capacitor.

Electric Conduction: Free Electron Model of Electric conduction, Drift velocity of free Electrons, Relation between Electric current and drift velocity, Electric Resistance and Ohm's Law, Effect of Temperature on Resistivity, Ohmic and non-ohmic Circuits with examples, Dynamic Resistance.

4.3 Simple Circuits: Kirchoff's Laws, Combination of Resistance in series and in parallel form, Wheat-Stone's Bridge's Principle, Meter Bridge, Need of High Resistance Instrument for measuring Electro Motive Force (EMF), Principle of Potentiometer and its utility.

4.4 Moving Charges and Magnetic Field: Force on a charge in a Magnetic Field, Motion of Charged particle in a Magnetic field, Explanation of the force on a Current-Carrying Conductor on the basis of the force on a Moving charge, Biot-Savart Law, Magnetic field at the Centre of a Circular Current-Carrying Coil, Magnetic-Field inside a long Current-Carrying Solenoid.

Magnetism: Couple on a Current loop in a Magnetic field, Magnetic Dipole Moment, Magnetic field due to a short Bar-Magnet-End-on Position, Broad-side on Position, Atomic Model of Magnetism, Magnetic Moment in axial rotation and spin of Electrons in Dia, Para and Ferro-magnetic substances.

4.5 Electro-magnetic Induction and Alternating Current: Magnetic flux, Laws of Faraday and Lenz, Explanations of Electro-magnetic Induction with Lorentz's forces, Time, Current and Potential Difference, Alternating Current, Peak value of alternating current, Mean value and Root Mean square value, Mutual Induction, Self-Induction, Effect of Core on self-induction, Behaviour of Self-induction coil as a resistance, Power in AC Circuit, Wattless current, uses of Transformers, Behaviour of capacitor in Alternating Current circuits, Qualitative Explanation of Electric pendulum, frequency, Resonant Circuits.

Unit 5: ELECTRON, RADIATION, ATOMIC & NUCLEAR PHYSICS

5.1 Diodes and Triodes: Thermionic Emission, Vacuum tube, Action of Diode, Characteristic Curves of Triode valve, simple Circuits of Diode and Triode, Semi-conductors of 'n' and 'p' type, Explanation of flow of current in n-p type semi-conductors, Simple circuits of p-n-p Transistor, Comparison of transistor with Diode.

5.2 Discovery of Electron: Origin of Cathode Rays, their nature, Positive-Rays, Ion and Isotopes, Trajectory of charged particles in a Electro-magnetic field, Cathode-Ray Oscilloscope. Photo-Electric Effect: Photo-electric emission, Einstein's explanation of Photo electric effect, Work-function and Threshold frequency, Quantum Model of Light, Photo-electric Cell.

5.3 Structure of Atom: Thomson's Model of Atomic structure, Qualitative description of Rutherford's α -particle scattering experiment, Rutherford's Model of Atomic structure, inability of Rutherford's model in explaining linear spectrum, Bohr's Model of Atomic structure, Assumptions and formula.

Origin of Spectrum: Series of Hydrogen Spectrum, energy Levels of Atoms, Excitation and Ionization Potential, energy level graph (Emission and Absorption), Explanation of spectrum, calculation of wave-length through Energy transitions, Linear and Band Spectrum and its relationship with substance, Solar Spectrum, Fraunhofer's lines, Fluorescence and phosphorescence.

5.4 Radiation: Radiation Energy and its similarity with light, Emissive Power and Absorptive Power, Concept of perfectly Black Body, Stefan's Law, Graphical description of the spectrum of black body radiation, Wein's Principle, Hypothesis of Planck, Planck's constant.

X-Rays: Production of X-Rays by Coolidge Tube, Intensity of X-rays, Control on X-Rays Penetration, Electro-magnetic nature of X-rays.

5.5 Radio Activity: Concept of Half-life statistical nature of Radio-active Process, Path of charged Particles, radio active carbon dating.

Structure or Nucleus: Intra-nuclear force, simple process of Exchange (Fundamental Particles), Electron, Proton, Neutron, Pie Meson, Neutrino and mutual transformation of mass and Energy.

Nuclear Energy: Concept of Nuclear Binding Energy (Examples of Deuteron and Alpha), Nuclear Fission, Nuclear Reactor (Critical Mass and Chain Reaction), Retardants and Controlling substances, Uses of Nuclear Reactors, Atomic Fusion, Solar Energy.

Some Modern Applications of Electronics: Television, Radar and Laser-Maser.

ZOOLOGY**Unit 1**

- 1.1 Origin of life-Oparin's theory, Miller's Experiment and place of virus in the evolution of life.
- 1.2 Organic Evolution-Basic idea and its evidences and principles of evolution (Lamarckism and Darwinism)
- 1.3 Mechanism of evolution-Definition of variation, causes and kinds of variations (Mutation theory of Hugo De Vries), Evolution through the ages-outline of evolution (animals & plants together).
- 1.4 Evolution of Man-Prehistoric man, Java Ape man, Peking man, Neanderthal and Cromagnon man in the context of special characteristics.
- 1.5 Human Genetics and Eugenics-Sex determination, Sex-linked characters, human hereditary traits in the context of blood groups, subsidization of superior students and intelligence quotient (IQ).

Unit 2

- 2.1 Metabolism-General treatment, repair of tissues and their regeneration.
- 2.2 Digestion-Food, enzymes and digestion, absorption and assimilation (comparison between man and rabbit).
- 2.3 Physiology of excretion-Chemical nature of excretory products (functions of liver & kidney in Rabbit).
- 2.4 Respiration-Respiration in Rabbit, cellular respiration, function of mitochondria, role of ATP and ADP.
- 2.5 Nervous system-Conduction of impulses (electro-chemical phenomenon), autonomic nervous systems (sympathetic and parasympathetic) and control of nervous system and visceral organs in Rabbit, Endocrine system, hormones and their functions.

Unit 3

- 3.1 Modern Classification and animal kingdom (based on Storer and Usinger book), main characteristics of some classes and phyla with example.
- 3.2 Animal tissues.
- 3.3 Protozoa-Amoeba-Habit and habitat, Morphology, physiology, Osmoregulation, Locomotion; *Entamoeba histolytica*-morphology and prevention of disease caused by it.
- 3.4 Plasmodium-History, life cycle, control and therapy of Malaria.
- 3.5 Porifera-Simple sponge (*Leucosolenia*), its physiology, Economic importance of sponge and sponge industry.

Unit 4

- 4.1 Cnidaria, Hydra-Morphology, Physiology, habit and habitat, regeneration and grafting, Physiological division of labour and tissue differentiation.
- 4.2 Aschelminthes-Ascaris, morphology, life cycle, therapy and control.
- 4.3 Annelida-*Pheretima posthuma*-Morphology and Anatomy, Economic importance.
- 4.4 Arthropoda-Cockroach (*Periplanata americana*)-Morphology and Anatomy.
- 4.5 House fly-Morphology, life cycle and control.

Unit 5

- 5.1 *Rana tigrina*-Cranial skeleton.
- 5.2 Gametogenesis, fertilization and reproduction in Frog.
- 5.3 Three primary germ layers, their fate and metamorphosis in Frog.
- 5.4 Rabbit-Study of reproductive system.
- 5.5 Osteology, anatomy and histology in Rabbit.

SYLLABUS (INTERMEDIATE LEVEL): COMMERCE**BANKING****Unit 1: MONEY, CURRENCY EXCHANGE**

- 1.1 Definition and functions of Money.
- 1.2 Value of Money-Quantity theory of money, factor affecting value of Money.
- 1.3 Inflation, Deflation.
- 1.4 Silver and gold standard, different forms of gold standard.
- 1.5 Mono-metalism and Bi-metalism.

Unit 2: PAPER MONEY

- 2.1 Monetary standard in India.
- 2.2 Paper Money-Merits, Demerits and Kinds (Representative, Convertible and Non-convertible).
- 2.3 Methods of Note issue, Government & Banks, Single and multiple Bank note issue.

- 2.4 Characteristics of a good paper Money.
- 2.5 Paper Money in India.

Unit 3: BANKING

- 3.1 Definition, Origin and Growth of Banks.
- 3.2 Organisation of Banking Business.
- 3.3 Functions of Banks-Deposits, Loans and Other Services.
- 3.4 Bank Accounts-Saving, Fixed, Recurring, Current etc.
- 3.5 Instruments-Bill, Promissory Notes, Hundies etc.

Unit 4: EMPLOYMENT OF FUNDS BY BANKS

- 4.1 Cash, Credit and Investment.
- 4.2 Loans & Advances, Security against Advances.
- 4.3 Bank Balance Sheet.
- 4.4 Bank Failure and Bank Crisis.
- 4.5 Period of Banking Crisis in India.

Unit 5: INDIAN BANKING

- 5.1 Development of Banking Business in India.
- 5.2 Agricultural, Industrial and Commercial Banks-Meaning, Organisation etc.
- 5.3 Money Lender, Indigenous Bankers, Cooperative Credit Societies, Chit Fund & Government takavi, Land Mortgage Banks, etc.
- 5.4 Banking System-Industrial Banks, Foreign Exchange Banks, State Bank of India, Banking Services of Post Office.
- 5.5 Reserve Bank of India.

BOOK-KEEPING & ACCOUNTANCY

Unit 1

- 1.1 Principles of Double Entry System, Concept of Accounting.
- 1.2 Journal and its Subsidiary Books.
- 1.3 Ledger and Trial Balance.
- 1.4 Errors and its rectification.
- 1.5 Final Accounts-Trading, Profit & Loss Account, and Balance Sheet with Adjustments.

Unit 2

- 2.1 Bills of Exchange, Self Balancing System.
- 2.2 Banking Transaction, Bank Reconciliation Statement.
- 2.3 Average Due Date & Account Current.
- 2.4 Joint Venture.
- 2.5 Consignment.

Unit 3

- 3.1 Adjustments, Admission of Partner .
- 3.2 Outgoing of Partner.
- 3.3 Dissolution of Firm.
- 3.4 Similarities & Difference between Indian Accounting System & Double Entry System.
- 3.5 Indian System of Accounting-Kachchi & Pakkhi Rokar Bahi, Jama & Nam Nakal Bahi, Khatoni, Preparation of Final Accounts.

Unit 4

- 4.1 Issue, Forfeiture, Re-issue of Forfeited Shares.
- 4.2 Issue & Redemption of Debentures.
- 4.3 Purchase of Business by Company and Profit or Loss prior to Incorporation.
- 4.4 Disposal of Profit, Bonus Shares & Dividend.
- 4.5 Final Accounts of Company-Trading, Profit & Loss Account, Profit & Loss Appropriation Account, and Balance Sheet.

Unit 5

- 5.1 Capital & Revenue, Reserves & Fund.
- 5.2 Depreciation.
- 5.3 Receipt & Payment Account, Income & Expenditure Account
- 5.4 Single Entry System
- 5.5 Investment Account.

BUSINESS ORGANIZATION

Unit 1

Business and Modern Civilization, Social-responsibility of Business, Establishment of Business, Necessary qualities for getting success, Sole proprietorship.

Unit 2

Concept of Partnership, Registration and Dissolution of Partnership, Joint Stock Companies, Management of Joint Stock Companies, Company Meetings.

Unit 3

Banking Services of Post Office, Other Services of Post Office, Cheque, Bills of Exchange and Hundi, Promissory Note and Endorsement.

Unit 4

Definition and Functions of Management, Importance of Management, Procedure of Business Office, Filing (Vertical and flat), Inland and Foreign Service.

Unit 5

Import and Export Trade, Middlemen, Agents, Commercial Correspondence, Official Correspondence.

COMMERCIAL MATHEMATICS

Unit 1

- | | |
|-----------------------------------|--------------------------|
| 1.1 Metric System of Measurements | 1.2 Ratio and Proportion |
| 1.3 Partnership | 1.4 Percentage |
| 1.5 Profit and Loss | |

Unit 2

- | | |
|-------------------------------|--------------------------|
| 2.1 Simple Interest | 2.2 Compound Interest |
| 2.3 Percent Worth & Discount | 2.4 Commission & Premium |
| 2.5 Exchange, Share and Stock | |

Unit 3

- | | |
|---------------------------|----------------------------|
| 3.1 Quadratic Equations | 3.2 Arithmetic Progression |
| 3.3 Geometric Progression | 3.4 Harmonic Progression |
| 3.5 Miscellaneous Series | |

Unit 4

- | | |
|------------------------|------------------------|
| 4.1 Permutation | 4.2 Combination |
| 4.3 Binomial Expansion | 4.4 Exponential Series |
| 4.5 Logarithmic Series | |

Unit 5

- | | |
|---------------------------|----------------------------------|
| 5.1 Data Representation | 5.2 Measures of central tendency |
| 5.3 Dispersion & Skewness | 5.4 Index numbers |
| 5.5 Sampling | |

SYLLABUS (INTERMEDIATE LEVEL): ARTS**चित्रकला**

Practical Examination

Time: One Hour

वस्तु चित्रण (Still Life): किसी एक वस्तु का अथवा कुछ वस्तुओं के समूह (जैसे-किताब, डिब्बा, बोतल, लोटा, गिलास, प्लेट तथा प्रयोग में आने वाली सभी वस्तुएँ) का जिस स्थिति में वह हमारे सामने रखा है और जैसा उसमें प्रकाश, छाया व अन्धकार का प्रभाव हमको दिखाई देता है, ठीक उसके अनुरूप अपने चित्र को बनाना।

ECONOMICS**Unit 1: INTRODUCTION, CONSUMPTION & PRODUCTION**

- 1.1 Introduction to Economics, Problem of choice, Indian Economic Thought, Definition of Western Thinkers.
- 1.2 Consumption-Meaning and Importance, Utility.
- 1.3 Law of Demand, Price Elasticity of Demand.
- 1.4 Production-Meaning & Importance, Laws of Production.
- 1.5 Factors of Production.

Unit 2: PRICE THEORY

- 2.1 Market-Definition, Classification & Extension of Market
- 2.2 Cost of Production, M. C., A. C. and their relationship.
- 2.3 Revenue-T. R., A. R., M. R., and their relationship.
- 2.4 Price determination under perfect competition.
- 2.5 Price determination under imperfect competition.

Unit 3: FOREIGN TRADE & PUBLIC FINANCE

- 3.1 Foreign Trade-Merits & Demerits.
Foreign Exchange-Methods of earning foreign exchange.
- 3.2 Import and Export trade of India.
- 3.3 Foreign Trade Policy of India.
- 3.4 Direct & Indirect tax.
- 3.5 Sources of Income of Central & State Govts.

Unit 4: DISTRIBUTION

- 4.1 Problems of Distribution, Modern theory of Distribution, National Distribution with reference to India.
- 4.2 Rent-Definition, Ricardian Theory, Relation between Rent & Price.
- 4.3 Wages-Money, Wage & Real Wage, Standard of Living Efficiency of Labour, Effect of TU's on rate of wage.
- 4.4 Interest-Definition, Difference in rate of gross and net interest.
- 4.5 Profit-Gross and Net Profit.

Unit 5 : ECO. SYSTEMS, STATISTICS & EXCHANGE

- 5.1 Economic Systems-Capitalism, Socialism and Mixed Economy.
- 5.2 Statistics-Meaning, Definition and Importance, Measures of Central Tendency.
- 5.3 Presentation of Data-Bar diagrams.
- 5.4 Exchange-Direct & Indirect exchange.
- 5.5 Economy & Employment-Causes and remedies of unemployment, Present position of unemployment in India.

ENGLISH**Unit 1:** Common Errors in English.**Unit 2:** Julius Caesar.**Unit 3:** Figures of Speech, Idioms and Phrases.**Unit 4:** Transformation of Sentences and Synthesis.