Selection Test - Tapas and Saadhana – Test portions- 2026-27 – PCMB

Physics

1. **Rectilinear motion:** distance, displacement, speed and velocity (average and instantaneous), acceleration, uniform and non-uniform motion, motion under constant acceleration (including gravity), graphical representation of motion.
2. **Newton's laws of motion:** Newton's three laws and its application, momentum, FBD, Friction, equilibrium and non-equilibrium cases (connected bodies with same magnitude of acceleration)
3. **Ray optics**- laws of reflection, reflection from plane surfaces, reflection from spherical surfaces, paraxial ray approximation, mirror formula and its application, concept of refractive index, laws of Refraction, Refraction from plane surface, total internal reflection and its application, Refraction through spherical surface, Refraction through lens, human eye, defects of vision, Refraction through prism, relation between angle of minimum deviation and refractive index, dispersion through a prism, atmospheric Refraction, scattering of light. combination of lenses and silvered lenses

Chemistry

1. Mole concept and Stoichiometry

Laws of Chemical Combination; Relative atomic masses (atomic weight) and relative molecular masses (molecular weights); Idea of mole; Avogadro's Law – molar volume of a gas at S.T.P and calculations based on the molar volume; Deduction of simple (empirical) and molecular formula from the percentage composition of a compound; simple calculations based on chemical equations including reacting weight, volumes and number of moles, Limiting reagent.

2. Structure of atom and Chemical Bonding

Electrons, protons and neutrons; JJ Thomson's Model, Rutherford's Model and Bohr's model; Atomic Number, Mass Number Isotopes and Isobar; Valency and distribution of electrons in orbits; Covalent and Ionic Bond formation and structures of basic covalent compounds.

3. Chemical reactions

Chemical equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, endothermic exothermic reactions, oxidation and reduction.

4. Acids, bases and salts

Their definitions in terms of furnishing of H^+ and OH^- ions, General properties, examples and uses, neutralization, concept of pH scale (Definition relating to logarithm), importance of pH in everyday life; preparation and uses of Sodium Hydroxide, bleaching powder, baking soda, Washing soda and Plaster of Paris; Electrolytes and non-electrolytes, basic electrolysis reactions of salts.

5. Metals and non-metals

Physical and Chemical Properties of metals and non-metals; Reactivity series and its application; Formation and properties of ionic compounds; Basic metallurgical processes; Corrosion and its prevention.

6. **Carbon and it's Compounds**

   Bonding in carbon, Allotropic forms of Carbon, Versatile nature of carbon, IUPAC Nomenclature, Homologous series, Structural Isomerism, Chemical Properties of carbon compounds, Soaps and detergents.

Mathematics

1. **Real numbers:**

   Fundamental Theorem of Arithmetic - statements after reviewing work done earlier and after illustrating and motivating through examples, Proofs of irrationality of sqrt 2 etc.

2. **Commercial Mathematics:**

   Simple interest, compound interest, brokerage, discount etc.

3. **Pair of linear equations in two variables:**

   Pair of linear equations in two variables and graphical method of their solution, consistency / inconsistency. Algebraic conditions for number of solutions. Solution of a pair of linear equations in two variables algebraically - by substitution, by elimination. Situational problems.

4. **Quadratic equations:**

   Nature of roots of a quadratic equation, Methods to solve quadratic equations, relation between the roots and the coefficients of a quadratic equation.

5. **Polynomials:**

   Zeros of a polynomial. Relationship between zeros and coefficients of quadratic polynomials, Algebraic expressions and identities.

6. **Geometry:**

   Lines and angles, triangles - similar triangles and connected properties, quadrilaterals. Problems on Mensuration

7. **Areas related to circles:**

   Area of sectors and segments of a circle. Problems based on areas and perimeter / circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of 60°, 90° and 120° only.

8. **Introduction to trigonometry:**

   Trigonometric ratios of an acute angle of a right-angled triangle. Proof of their existence (well defined); Values of the trigonometric ratios of 30, 45 and 60 degrees etc. Relationships between the ratios. TRIGONOMETRIC IDENTITIES Proof and applications.

9. **Heights and distances:**

   Angle of elevation, Angle of Depression. Simple problems on heights and distances.

10. **Coordinate geometry:**

    Concepts of coordinate geometry, graphs of linear equations. Distance formula. Section formula (internal division).

11. **Statistics:**

    Mean, median and mode of grouped data.

Biology

1. **Life process:**
   - Nutrition: Autotrophic and heterotrophic nutrition, Nutrition in organisms, nutrition in Human beings, Human alimentary canal.
   - Respiration: Aerobic and anaerobic respiration, Breakdown of glucose, ATP, Human respiratory system, Haemoglobin.
   - Transportation: Transportation in Human beings, the Heart, Blood, Double circulation, Blood pressure, blood vessels, platelets, lymph, Transportation in plants, transport of water, transpiration, transport of food and other substance, translocation.
   - Excretion: Excretion in Human beings, excretory system in Human beings, structure of nephron, artificial kidney (haemodialysis), Excretion in plants.
2. **Control and Coordination:**
   - Coordination in animals: Animal nervous system, Structure of neuron, neuromuscular junction, reflex action, reflex arc, Human brain, Bony box, vertebral column, nervous tissue.
   - Coordination in plants, response to stimuli in plants, movements due to growth, geotropism, response of plant to the direction of light.
   - Hormones in animals, endocrine glands.
3. **Reproduction in organisms:**
   - The importance of variation, Modes of reproduction (fission, fragmentation, regeneration, budding, vegetative propagation, spore formation.
   - Sexual reproduction: sexual reproduction in flowering plants, reproduction in human beings, Male and female reproductive system, Fertilization and embryo development, menstrual cycle.
   - Reproductive health.
4. **Heredity:**
   - Accumulation of variation during reproduction, heredity, inherited traits, rules of inheritance of traits (Mendel's contribution), Mendel's experiments, inheritance of traits of two genes, sex determination.
5. **Our environment:**
   - Ecosystem and its components, food chain and food web, flow of energy in ecosystem, activities that affect the environment, ozone layer depletion, managing the garbage we produce.