Subject: English

Comprehension of reading passages on a variety of topics and style with special references to (i) General English and (ii) Technical English.

Grammar – Familiarity with the following aspects:


Subject: Chemistry

Language of Chemistry & Physical Chemistry: Symbol, formulate valency and chemical questions, Problems based on chemical equations (relation with weight and weight, and weight and volume);


Electronics Theory of Valency: Octet rule, Electrovalency, covalency and coordinate valency, General characteristics ionic and covalent compounds;

Oxidation and Reduction: Classical definitions, Electronic interpretations of oxidation and reduction, Balancing of redox equations by oxidation number method;

Periodic Classification of Elements: Mendeleev's periodic law, anomalies of Mendeleev's periodic table, Modern periodic Law, Periodic Properties viz. ionization potential, electronegativity and atomic radii, and their variation in the periodic table; Equivalent Weight and Atomic Weight: Concept of equivalent weight, and its determination by hydrogen displacement method and oxide method, Concept of atomic weight, equivalent weight and valency, determination of atomic weight using Dulong and Petit's rule;

Molecular Weight and Mole: Avogadro's hypothesis and its deductions, Avogadro number and concept of mole, Determination of molecular weight by Victor Meyer's method; Electro–Chemistry; Electrolytes and non-electrolytes, strong electrolytes and weak electrolytes, Faraday's
laws of electrolysis, Solubility product principle and its applications in qualitative analysis;
Theories of Acids and Bases: Arrhenius theory, Bronsted and Lowry theory, Lewis theory;
Volumetric Analysis Equivalent weights of acids, base and salts, Principles of acidimetry and
alkalimetry, pH and pH scale

**Non-Metals:** Water: Hard water and soft water, Causes and removal of hardness of water;
Nitrogen and its Compounds: Nitrogen cycle, Preparation of ammonia and nitric acid in the lab,
and their properties, Manufacture of ammonia and nitric acid, Sulphur and its Compound.
Allotropy of sulphur, Preparation of hydrogen sulphide, sulphure dioxide in the lab, and their
properties, Manufacture of sulphuric acid by contact process; Halogens and Their Compound:
Position of halogens in the periodic table, Preparation of chlorine and hydrogen chloride in the
lab, and their properties.

**Metals:** Compounds of Metals: General methods of preparation and properties of oxides,
hydroxides, chlorides, nitrates, sulphates and carbonates of metals; Sodium: Extraction of
Sodium (Down's process), Manufacture of caustic soda sodium carbonate; Copper: Extraction of
copper from copper pyrite, Manufacture of Blue vitriol; Zinc: Extraction of zinc from zinc blend,
Galvanization; Iron: Extraction of cast iron from hematite, Cast iron, steel and wrought iron,
Types of steel, Manufacture of steel

**Organic Chemistry:** Sources and Purification of organic Compounds: Characteristics of organic
compounds, Sources of organic compounds, Purification of organic compounds; Classification
and nomenclature of organic Compounds: Functional group, homologous series, and isomerism
(structural only), Classification of organic compounds, Common names, and I.U.P.A.C. naming
system.

**Saturated and unsaturated Hydrocarbons & Aromatic compound:** Preparation and properties
of methane, Preparation and properties of ethylene and acetylene, Alkyl Halides: Preparation and
properties of ethyl iodide; Aromatic Compounds: Structure of benzene, Preparation of benzene
in the laboratory, Properties of benzene.
Subject: Physics


Subject: Mathematics

Set and Function: Set and relations, Functions and graphs, Algebraic, Trigonometric, Exponential, Logarithmic and hyperbolic functions and their inverses.

Algebra: Determinants, matrices, Inverse of a matrix, uses of complex numbers, Polynomial equations, sequence and series, Permutation and combination, Binomial theorem, exponential, Logarithmic series.

Trigonometry: Trigonometric equations and general values, Inverse trigonometric functions, Principal values, Properties of triangles; Centroid, incentre, Orthocentre and circumcentre and their properties.

Coordinate Geometry: Coordinates in a plane, Straight lines, Pair of lines, Circles, Conic sections: Parabola, ellipse and hyperbola. Standard equations and simple properties, Coordinates in space, Plane and its equation.

Calculus: Limit and continuity of functions, Derivatives and application of derivative – Tangent and normal, Rate of change, differentials dy and actual change Δy. Maxima and Minima of a function. Antiderivatives (Integrations): rules of Integration, Standard Integrals, Definite integral as the limit of a sum. Application to areas under a curve and area between two curves.

Vectors: Vectors in space, addition of vectors. Linear combination of vectors, Linearly dependent and independent set of vectors, Scalar and vector product of two vectors, simple applications.
Subject: Engineering Aptitude Test

1. Concept of Polygons and Engineering Drawings: (Triangle, Square, Pentagon, Hexagon, Octagon), Circle, Inscribing and Circumscribing Circle; Arcs and Tangents; Introduction to Geometrical Solids (Cylinder, Cone, Prism and Pyramid) Orthographic Views of Lines and Surface (Horizontal, Vertical and Inclined), Orthographic Views of Geometrical Solids, Objects consisting of Plane Surfaces, Curved Surfaces and Rectangular/cylindrical holes.

2. Two-Stroke and Four Stroke Engines, Petrol and Diesel Engines, Renewal Energy.

