

**I. PHYSICAL SCIENCE****80 Questions****A. PHYSICS****(25 questions)****1. Wave motion :**

Transverse and longitudinal waves, propagation of wave, medium dependence. Sound - loudness, frequency, wavelength, pitch, reflection and refraction of sound waves, echo, beats, Doppler effect, reverberation,

SONAR, sound pollution, resonance and musical instruments.

2. Light :

Reflection - plane mirror, spherical mirror, multiple reflection, image formation by spherical mirrors and its applications. Refraction : Optical density, total internal reflection and applications. Ray diagram and image formation by lens, lens equation, microscopes, telescope, camera, human eye and common defects of eye and its remedy. Dispersion of light, scattering of light, rainbow, Newton's Disc, colour of sky, cloud, snow. Primary colours, secondary colours - complementary colours.

3. Force and pressure :

Thrust, atmospheric pressure, Pascal's law, Archimedes principle, surface tension and capillarity.

4. Heat :

Temperature and temperature scales, modes of heat transmission, boiling, melting, Specific heat capacity, latent heat, regulation

5. Motion :

Displacement, velocity, acceleration, equations of motion, graphs of s-t, v-t and their relevance. Circular motion, centripetal acceleration, angular speed, momentum, Newton's law of motion, law of conservation of momentum. Recoil of gun, action - reaction pairs. Centre of gravity, banking of curve.

6. Gravitation :

Mass and weight, universal law of gravitation, acceleration due to gravity and factors affecting it, Solar system, orbits, planets, satellite, escape velocity, space exploration and weightlessness in space. Galaxies, stars, big bang, clusters, nebula, Super Nova, solar and lunar eclipse.

7. Work and Energy :

Conventional and Non-conventional sources of energy, forms of energy - heat, light, sound, mechanical, nuclear energy, mass energy. Law of conservation of energy.

8. Electricity and Magnetism

Natural and artificial magnets, different types of magnets and their properties, magnetic field lines or lines of force. Earth and its magnetism. Magnetic induction, magnetic properties of matter - para, dia and ferro magnetic materials. Static electric properties, electroscopes, electro static induction, methods of charging, lightning and lightning conductors, earthing, current electricity, electric potential, Ohm's law, resistance, conductance, resistivity, conductivity, factors affecting resistance. Resistance in series, parallel, use of voltmeter, galvanometer,



ammeter, rheostat, Joule's law of heating.

9. Effects of current and Electromagnetic Induction

Electrolysis, voltameter, Faraday's law of electrolysis, chemical cells, solenoids, electromagnets, electromagnetic induction, AC, DC Generators, electric motors, transmission of AC, self induction, mutual induction, transformers, moving coil microphones, loud speaker.

10. Electronics

Conductors, insulators, semi conductors, doping, different types of diodes and applications, transistor and its applications, ICs.

B. CHEMISTRY

(25 questions)

1. Physical changes and Chemical changes :

Exothermic and endothermic reactions, electrolysis of water, energy changes in chemical reactions, electroplating

2. Atoms and Molecules

Basic concepts, structure of atom, sub atomic particles - electrons, protons and neutrons, Rutherford's gold foil experiment, Atom models, Rutherford's atom model, Bohr model of atom, electron shell model, stability and electronic configuration

3. Metals

Properties - metallic luster, malleability, ductility, conducting property, sonority, corrosion - factors responsible for corrosion, prevention of corrosion, reactions of metals with water, air and acids, Displacement reactions of metals, reactivity series, iron - historical background, extraction using blast furnace, extraction of aluminium from bauxite

4. Solutions

Definition, components of a solution, water as universal solvent, suspensions, concentration of a solution, solubility, super saturated solution

5. Colloids

Definition, properties, artificial drinks, chemicals used in soft drinks

6. Nature of matter

Three states of matter and their characteristic properties, surface tension, cohesive force and adhesive force, capillarity, capillarity rise and capillarity dip, applications of surface tension and capillarity.

7. Separation of Mixtures

Classification of matter, mixtures and pure substances, homogeneous and heterogeneous mixtures, methods of separation of mixtures - filtration, sedimentation, decantation, centrifugation, distillation, fractional distillation, differential extraction using separating funnel, chromatography.

8. Periodic table and chemical bonding

Early attempts of classification of elements, Mendeleev's periodic table, periodic law, merits and demerits.



Modern periodic table - Moseley's periodic law, nature of elements and electronic structure, valency, representative elements, transition elements, sub shell electronic configuration, classification of elements into blocks (s, p, d & f) and their characteristics. *Periodic trends in properties of elements* - Atomic size, number of shells, number of valence electrons, electro negativity, ionisation energy, electro positivity, metallic and non-metallic character

10. Chemical bonding

Octet rule, ionic bond and covalent bond, valency and electro negativity, difference in the formation of compounds, comparison of the properties of ionic compounds and covalent compounds, representation of chemical reactions using chemical formula and chemical equation.

11. Non-metals

Non metals in food, water and air, reaction of non-metals with oxygen

Oxygen - Allotropes of oxygen, methods of preparation, uses of oxygen, respiration, combustion and photo synthesis

Nitrogen - Position in periodic table, inert nature of nitrogen, nitrogen fixation, nitrogenous fertilizers - merits and demerits

Ammonia - Laboratory preparation, manufacture of ammonia by Haber process, nitrogen cycle

Hydrogen - Properties, methods of preparation, hydrogen as future fuel-merits and demerits

Chlorine - Position in periodic table, properties, bleaching action

Hydrogen chloride - Laboratory preparation, properties, environmental problems of chlorine compounds

Carbon - Unique nature, allotropes, important compounds, carbon cycle, green house effect, global warming

12. Organic compounds

Classification, catenation, tetra covalency of carbon

13. Acids and Alkalies

Constituents of soil and plant growth, acidity of soil, properties of acids, pH, Properties of alkalies, neutralisation, properties of salts - their naming and importance, fertilizers - merits and demerits

14. Gas Laws

Boyle's law, Charles' law, Combined gas equation, Avogadro's law

15. Chemical reactions and Mole concept

Factors influencing rate of reaction - concentration, surface area, temperature and presence of catalyst.

Mole Concept - Atomic mass and molecular mass, Avogadro's law and mole concept, gram atom and gram molecule, mole concept and balanced chemical equations

**C. PEDAGOGY**

(30 questions)

- Science and its development in India - Science teaching as a process - product and contributions of eminent Indian scientists - developing scientific attitude.
- **Aims and objectives of teaching Physical Science**
 - Objectives of science teaching as envisaged in National Curriculum Framework (2005) - Values (practical, disciplinary, recreational etc) to be attained.
 - Taxonomy of educational objectives - Bloom, Yager - science process skills - developmental strategies.
- **Theoretical basis of science teaching and learning.**
 - Cognitive theories - Piaget, Bruner, Gagne - constructivist learning - Vygotsky, generating knowledge - experiential learning - scope and limitation - reflection - a basic process from learning experience - problem based learning.
- Planning science teaching and learning, unit plan, lesson plan - strengthening instruction by means of A-V aids, video lessons and computer assisted lessons.
- Models of teaching - characteristics - science process models, information processing models
 - concept attainment model, inquiry training model, constructivist model.
- **Methods and strategies for teaching and learning Physical Science - direct and indirect, inductive, deductive, guided discovery, enquiry, investigatory and constructivist methods of instruction - scientific method.**
- **Approaches - integrated, interdisciplinary, environmental, problem solving and scientific process approach**
 - behaviorist approach and constructivist approach.
- **Science curriculum - modern trends in curriculum construction - concept of correlation - features of a science textbook. Workbook for pupils and handbook for teachers.**
- Role of science laboratories, libraries, science clubs, science museums, fairs etc in promoting science learning.
- **Tools and Techniques of evaluation in science learning - objective based - formative, summative, continuous and comprehensive evaluation, achievement tests - construction and administration - diagnostic testing, remedial teaching - objective type tests - advantages, new trends in evaluation grading, question bank.**
- **Professional development of teachers, strategies.**