

GROUP-25

Scientific Assistants/Analyst (Level of Exam- B.Sc.-PCB)

1) General awareness, Reasoning, Mathematics, Science, History including Haryana related history, current affairs, literature, Geography, Civics, Environment, Culture etc.- (Weightage 20%)

2) Computer terminology, Fundamentals, word software, excel software, Power point, internet, web browsing, Communication, emails, downloading and uploading data on websites etc. -

(Weightage 10%)

3) Subject related syllabus-

(Weightage 70%)

Inorganic Chemistry

Atomic Structure Idea of de Broglie matter waves, Heisenberg's uncertainty principle, atomic orbitals, quantum numbers, radial and angular wave functions, normal and orthogonal wave functions, significance of Ψ and Ψ^2 , probability distribution curves, shapes of s, p, d, f orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rules, electronic configuration of elements, effective nuclear charge, Slater's rules.

Periodic table and atomic properties Classification of periodic table into s, p, d, f blocks, atomic and ionic radii, ionisation energy, electron affinity and electronegativity definition, methods of determination or evaluation, trend in periodic table (in s and p-block elements).

Covalent Bond Valence bond theory (Hettler-London and Pauling approach) and its limitation, directional characteristics of covalent bond, various type of hybridisation and shapes of simple inorganic molecules and ions (BeF_2 , BF_3 , CH_4 , PF_5 , SF_6 , IF_7 , SO_4^{2-} , ClO_4^- , NO_3^-) valence shell electron pair repulsion (VSEPR) theory to NH_3 , H_3O^+ , SF_4 , ClF_3 , H_2O , SnCl_2 , ClO_3^- and ICl_2^- . Molecular orbital theory of homonuclear (N_2 , O_2) heteronuclear (CO and NO) diatomic molecules and ions, bond energy, bond angle, bond length and dipole moments, percentage ionic character from dipole moment and electronegativity difference

Ionic Solids Ionic structures (NaCl , CsCl , ZnS (Zinc blende), CaF_2) size effects, radius ratio rule and its limitations, Stoichiometric and Non stoichiometric defects in crystals, born Haber cycle, Solvation energy and its relation with solubility of Ionic solids, Polarizing power and Polarizability of ions, Fagan's rule.

Hydrogen Bonding and Van der Waals forces Hydrogen Bonding – Definition, types, effects of hydrogen bonding on properties of substances, application Brief discussion of various types of Van der Waals forces.

Metallic Bond and semiconductors Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators). Semiconductors – Introduction, types and applications.

s-Block elements Comparative study of the elements including diagonal relationship, salient features of hydrides, oxides, halides, hydroxides (methods of preparation excluded).

Chemistry of Noble Gases General physical properties, low chemical reactivity, chemistry of xenon, structure and bonding in fluorides, oxides and oxyfluorides of xenon.

p-Block elements: Boron family (13th group, Carbon family and Nitrogen family (14th and 15th group): Oxygen family (16th group): Halogen family (17th group): Chemistry of d-Block elements Coordination Compounds

Physical Chemistry

Gaseous States Kinetic Molecular Theory of Gases, Maxwell's distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity, average velocity and most probable velocity. Collision diameter, collision number, collision frequency and mean free path (Derivations excluded), Deviation of Real gases from ideal behaviour, Derivation of Van der Waal's Equation of State, its application in the calculation of Boyle's temperature (compression factor)

Critical Phenomenon Critical temperature, critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, the isotherms of Van der Waal's equation, relationship between critical constants and Van der Waal's constants. Critical compressibility factor. The Law of corresponding states.

Liquid States Structure of liquids, Properties of liquids

Solid State Classification of solids, Law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry and symmetry elements, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law.

Kinetics Rate of reaction, rate equation and its types, Electrochemistry Electrolytic conduction, Laws of Thermodynamics, Chemical Equilibrium, Distribution Law, Nernst distribution law

Organic Chemistry

Structure and Bonding Localized and delocalized chemical bond, Stereochemistry of Organic Compounds Concept of isomerism, Relative and absolute configuration, sequence rules, R & S systems of nomenclature, Geometric isomerism, Mechanism of Organic Reactions, Alkanes and Cycloalkanes IUPAC nomenclature of branched and unbranched alkanes, Alkenes, Dienes and Alkynes, Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation of alkynes, Alkyl and Aryl Halides, Alcohols, Phenols, Epoxides, Carboxylic Acids & Acid Derivatives, Ultraviolet (UV) absorption spectroscopy.

Zoology

A) Life and Diversity from Protozoa to Porifera & Cell Biology

1. Protozoa: 2. Porifera 3. Endoplasmic reticulum (ER): types 4. Golgi complex 5. Ribosomes 6. Lysosomes, 7. Mitochondria, 8. Cytoskeleton, 9. Cilia and Flagella

B) Life and Diversity from Coelenterate to Helminths & Cell Biology

Type Study – Obelia, Corals and coral reefs, Polymorphism in Siphonophores, Type study – Fasciola hepatica; Helminths parasites: Brief account of life history, mode of infection and pathogenicity of Schistosoma, Ancylostoma, Trichinella, Wuchereria and Oxyuris, Ultrastructure and functions of Nucleus

C) Life and Diversity from Annelida to Arthropoda & Genetics

Biodiversity and economic importance of Annelida, Biodiversity and economic importance of insects, Type study – Grasshopper, Elements of Heredity and variations

D) Life and Diversity from Mollusca to Hemichordate & Genetics

Type study of – Pila, Torsion and detorsion in gastropods, Respiration and foot, Type study – Asterias (Sea Star), Echinoderm larvae, Aristotle's Lantern, Phylum Hemichordate: General Character; Type Study of Ballangosus, Multipleallelism, Humangenetics, Inborn errors of metabolism, Nature and function of genetic material, Eugenics, euthenics and euphonic

E) Life and Diversity of Chordates.

Functional morphology, 1. Chordates: Origin and Evolutionary tree. 2. Protochordates: 3. clostomes: Type study of Petromyzon 4. Pisces: Scales & Fins, Parental care in fishes, fish migration. Types study of Labeo 5. Amphibia: Origin, Evolutionary tree. Type study of frog (Rana tigrina), Parental Care in Amphibia 6. Reptilia: Type study of Lizard (Hemidactylus), Origin, Evolutionary tree. Extinct reptiles; Poisonous and non-poisonous snakes; Poison apparatus in snakes. 7. Aves: Type study of Pigeon (Columba Livia); Flight adaptation, Principles of aerodynamics in Bird flight, migration in birds. 8. Mammals: Classification, type study of Rat; Adaptive radiations of mammal's dentition.

F) Mammalian Physiology

1. Introduction, Classification, Structure, function and general properties of proteins, carbohydrates and lipids. 2. Nomenclature, Classification and mechanisms of enzyme action. 3. Transport through bio membranes (Active and Passive), buffers 4. Nutrition 5. Muscles 6 Bones 7. Circulation 8. Respiration 9. Excretion 10. Neural Integration 11. Chemical integration of Endocrinology 12. Reproduction

G) Environmental Biology

1. Basic concepts of ecology 2. Factors affecting environment 3. Introduction to major ecosystem of the world. 4. Ecosystem 5. Biogeochemical cycles 6. Population: Growth and regulation. 7. Concept of biodiversity and conservation of natural resources. 8. Migration in fishes and birds. 9. Parental care in animals. 10. Population interactions 11. Environmental Pollution

H) Evolution and Developmental Biology

1. Origin of life. 2. Concept and evidences of organic evolution. 3. Theories of organic evolution. 4. Concept of micro, macro-and mega-evolution. 5. Concept of species 6. Phylogeny of horse. 7. Evolution of man. 8. Historical perspectives, aims and scope of developmental biology. 9. Generalized structure of mammalian ovum & sperm, spermatogenesis and Oogenesis, fertilization, parthenogenesis, different types of eggs and patterns of cleavage. 10. Process of blastulation and fate-map construction in frog and chick. 11. Gastrulation in frog and chick up to the formation of three germinal layers. 12. Elementary knowledge of primary organizers. 13. Elementary knowledge of extra embryonic membranes. 14. Concepts of competence, determination and differentiation. 15. Concept of regeneration

I) Aquaculture and Pest Management

1. Introduction to world fisheries 2. Fresh Water fishes of India 3. Fishing crafts and gears. 4. Fin fishes, Crustaceans, Molluscs and their culture 5. Sugarcane 6. Cotton 7. Wheat 8. Paddy 9. Vegetables 10. Seed production 11. Nutrition 12. Field Culture 13. Culture technology 14. Stored grains 15. Insect control 16. Chemical control 17. Integrated pest management. 18. Important bird and rodent pests of agriculture & their management.

Important Note: The Weightage as mentioned against the syllabus is tentative & may vary.