

## GROUP-45

### (LEVEL- 10+2 with science, agriculture as one of the subjects)

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%)**

---

#### **Agriculture:**

Introduction to Agriculture, Principles of Agronomy, Fundamentals of Soil Science, Fundamentals of Entomology, Economic Botany, Principles of Horticulture, Biomathematics.

Crop Production, Soil Chemistry, Principles of Insect Control, Plant Pathology, Agricultural Meteorology, Livestock and Poultry Production, Basics of Agricultural Engineering.

Principles of Genetics, Water Management, Pests and Pest Control, Diseases of Field Crop, Production of Technology of Food Crops, Dairy Cattle and Buffalo, Organic Farming and Sustainable Agriculture, Plant Nutrition, Manures, and Fertilizers.

Plant Breeding, Agricultural Statistics, Weed Management, Green House Technology, Agricultural Microbiology, Seed production Technology, Post-Harvest Technology.

#### **Physics:**

**Electromagnetic waves:** Basic Idea of displacement current, Electromagnetic waves, Sources, and Characteristics of EMW, Transverse Nature of EMW (qualitative Ideas only) Electromagnetic Spectrum, (Radio waves, Microwaves, infrared visible, ultraviolet, X-rays, gamma rays). including elementary facts about their uses.

**Ray optics and optical instruments:** Ray optics: Reflection of light by spherical mirrors, Mirror formula, refraction of light, lateral shift of a ray refraction through a glass slab, real and apparent depth, Advance Sunrise and delayed sun set due to atmospheric refraction, Total internal reflection, and its applications, Optical fibre, Mirage, totally reflecting prism, Brilliancy of diamond, Refraction at convex spherical surfaces. Lenses, Refraction by a lens, Power of a lens, Combination of thin lenses and mirror in contact, lens formula lens maker's formula. Refraction and Dispersion of light through a prism, pattering of light-blue colour of sky and reddish appear of the sun at sunrise and sunset. Some Natural phenomena due to sunlight- The rainbow. Optical instruments: - Microscopes and Astronomical telescopes (reflecting and refracting) and their magnifying powers.

**Wave optics:** Wave front and Huygens's principle, refraction and reflection of plane waves at a plane surface using Huygens principle. Proof of law of reflection and refraction using Huygens's principle. Interference of light waves. Young's double slit experiment and expression for fringe width, Coherent Sources and sustained Interference of light. Diffraction, Diffraction due to a Single Slit width of Central maxima, resolving power of microscopes and telescopes. Polarisation, plane polarised light. Brewster's law, Uses of plane Polarised light & polaroid.

**Atoms:** Alpha- particle Scattering experiment. Rutherford's Model of atom, Drawbacks of Rutherford's Model. Bohr's Model of hydrogen atom- postulates, Bohr radius, Total Energy of electron in nth orbit. Energy levels of hydrogen atom The line spectra of hydrogen atom.

**Nuclei:** Atomic masses & composition of Nucleus, Size of nucleus isotopes, isobars isotones Mass energy relation, Nuclear Binding Energy and Mass Defect. Binding Energy and Mass Defect. Binding Energy Curve, Radioactivity. Law of radioactive decay, Alpha, Beta & Gamma particles/rays and their properties, nuclear fission and fusion.

**Semiconductor Electronics, Materials, Devices & Simple Circuits:** Energy bands in Conductors, Semiconductor & Insulators (Qualitative Ideas only). Intrinsic & Extrinsic Semiconductor, Semiconductor diode-I-V Characteristics in Forward and reverse bias. Diode as full wave & half wave rectifier Special purpose p-n junction diodes- Zener Diode and their Characteristics, Zener Diode as a Voltage regulator,

LED, Photodiode, Solar Cell Junction Transistor, Transistor Action, Characteristics of a transistor , transistor as an amplifier( C.E. Configuration) basic Idea of analog& digital signal, logic gates(OR,AND,NOT, NAND, NOR).

## Chemistry:

**Solution:**Types of solutions, expression of concentration of solution of solid in liquids, solubility of gases in liquids, (Henry's law) solid solutions, colligative properties- relative lowering of vapour pressure, Raoult's law, ideal and non-Ideal solutions, osmotic pressure, osmosis and its applications, depression of freezing point, elevation of boiling point, determination of molecular masses using colligative properties, Abnormal molecular masses, Van't Hoff- factor, Van't Hoff equation for colligative properties.

**Electrochemistry:** Redox reactions, conductance in electrolytic solutions, specific and molar conductivity, variation of conductivity with concentration, Kohlrausch's law, electrolysis and laws of electrolysis (only elementary Idea), Electrochemical cell, (construction, representation and working) dry cell- electrolytic cells, lead accumulator, Ni-cd cell, fuel cell, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, reference electrode (NHE) Relation between Gibb's free energy change and EMF of a cell, Electrochemical series and its applications.

**Coordination compounds:**Coordination compounds- Introduction, difference between Coordination compounds and double salts, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mono nuclear Coordination compounds, bonding in complex compounds, Werner's theory, VBT and CFT: Structure and stereo isomerism, importance of Coordination compounds (In qualitative inclusion, extraction of metals and biological system).

**Haloalkanes and Haloarenes:** Haloalkanes: Nomenclature, nature of C-X bond physical and chemical properties, mechanism of substitution reaction, optical rotation. Haloarenes: Nature of C-X bond, substitution reaction (Directive Influence of halogen in monosubstituted compounds only) Uses and environmental effects of – dichloromethane, trichloro methane, tetra chloro-methane, Iodoform, freons, DDT.

**Alcohols, Phenols and Ethers:**Alcohols: Nomenclature, methods of preparation, physical and chemical properties (Primary alcohols only), Identification of Primary, Secondary and Tertiary alcohols, Mechanism of dehydration of alcohols, uses of alcohol with special reference to ethanol and methanol. Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenol. Ethers: Nomenclature, methods of preparation, physical and chemical properties, uses.

**Aldehydes, Ketones and Carboxylic acids:**Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation of aldehyde & ketones, physical and chemical properties and mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes; uses.Carboxylic acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

**Organic compounds containing Nitrogen:**Amines: Nomenclature, classification, structure, methods of preparation, Physical and chemical properties, basic nature of amines. Identification of primary, secondary and tertiary amines and uses of amines. Diazonium salts: Preparation, chemical reaction and importance in synthetic organic chemistry.

## Biology:

### Diversity of Living Organisms:

**The Living World:** Biodiversity; Need for classification; three domains of life; taxonomy and systematics; concept of species and taxonomical hierarchy; binomial nomenclature.

**Biological Classification:** Five kingdom classification; Salient features and classification of Monera, Protista and Fungi into major groups; Lichens, Viruses and Viroid's.

**Plant Kingdom:** Classification of plants into major groups; Salient and distinguishing features and a few examples of Algae, Bryophyta, Pteridophyte, Gymnospermae (Topics excluded – Angiosperms, Plant Life Cycle and Alternation of Generations)

**Animal Kingdom:** Salient features and classification of animals, non-chordates up to phyla level and chordates up to class level (salient features and at a few examples of each category). (No live animals or specimen should be displayed.)

## Structural Organization in Animals and Plant:

**Cell-**The Unit of Life Cell theory and cell as the basic unit of life, structure of prokaryotic and eukaryotic cells; Plant cell and animal cell; cell envelope; cell membrane, cell wall; cell organelles - structure and function; endomembrane system, endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles, mitochondria, ribosomes, plastids, microbodies; cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); nucleus.

**Biomolecules Chemical constituents of living cells:** biomolecules, structure and function of proteins, carbohydrates, lipids, nucleic acids; Enzyme - types, properties, enzyme action. (Topics excluded: Nature of Bond Linking Monomers in a Polymer, Dynamic State of Body Constituents – Concept of Metabolism, Metabolic Basis of Living, The Living State)

**Cell Cycle and Cell Division:** Cell cycle, mitosis, meiosis and their significance

## Plant Physiology:

**Photosynthesis in Higher Plants:** Photosynthesis as a means of autotrophic nutrition; site of photosynthesis, pigments involved in photosynthesis (elementary idea); photochemical and biosynthetic phases of photosynthesis; cyclic and non-cyclic photophosphorylation; chemiosmotic hypothesis; photorespiration; C<sub>3</sub> and C<sub>4</sub> pathways; factors affecting photosynthesis.

**Respiration in Plants:** Exchange of gases; cellular respiration - glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations - number of ATP molecules generated; amphibolic pathways; respiratory quotient.

**Plant - Growth and Development:** Seed germination; phases of plant growth and plant growth rate; conditions of growth; differentiation, dedifferentiation and redifferentiation; sequence of developmental processes in a plant cell; growth regulators - auxin, gibberellin, cytokinin, ethylene, ABA.

## Reproduction:

**Sexual Reproduction in Flowering Plants:** Flower structure; development of male and female gametophytes; pollination - types, agencies and examples; out breeding devices; pollen-pistil interaction; double fertilization; post fertilization events - development of endosperm and embryo, development of seed and formation of fruit; special modes- apomixis, parthenocarpy, polyembryony; Significance of seed dispersal and fruit formation.

## Genetics and Evolution:

**Heredity and variation:** Mendelian inheritance; deviations from Mendelism – incomplete dominance, co-dominance, multiple alleles and inheritance of blood groups, pleiotropy; elementary idea of polygenic inheritance; chromosome theory of inheritance; chromosomes and genes; Sex determination - in humans, birds and honey bee; linkage and crossing over; sex linked inheritance - haemophilia, colour blindness; Mendelian disorders in humans - thalassemia; chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.

**Molecular Basis of Inheritance:** Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central Dogma; transcription, genetic code, translation; gene expression and regulation - lac operon; Genome, Human and rice genome projects; DNA fingerprinting.

**Evolution:** Origin of life; biological evolution and evidences for biological evolution (palaeontology, comparative anatomy, embryology and molecular evidences); Darwin's contribution, modern synthetic theory of evolution; mechanism of evolution - variation (mutation and recombination) and natural selection with examples, types of natural selection; Gene flow and genetic drift; Hardy - Weinberg's principle; adaptive radiation; human evolution.

## Ecology and Environment:

**Organisms and Populations:** Population interactions - mutualism, competition, predation, parasitism; population attributes - growth, birth rate and death rate, age distribution. (Topics excluded: Organism and its Environment, Major Abiotic Factors, Responses to Abiotic Factors, Adaptations)

**Ecosystems:** Patterns, components; productivity and decomposition; energy flow; pyramids of number, biomass, energy (Topics excluded: Ecological Succession and Nutrient Cycles)

**Biodiversity and its Conservation:** Biodiversity-Concept, patterns, importance; loss of biodiversity; biodiversity conservation; hotspots, endangered organisms, extinction, Red Data Book, Sacred Groves, biosphere reserves, national parks, wildlife, sanctuaries and Ramsar sites.

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