

SYLLABUS OF ALLEN - MPPMT

PHYSICS

SECTION - 1

Bar magnet, lines of force, torque on a bar magnet due to magnetic field, earth's magnetic field, tangent galvanometer, vibration magnetometer.

Coulomb's law of electrostatics, dielectric constant, electric field and potential due to a point charge dipole dipole field, Gauss's law in simple geometrics.

Electrostatic potential, capacitance, parallel plate and spherical capacitors, capacitors in series and parallel, energy of a capacitor.

Electric current, Ohm's law, Kirchoff laws, resistances in series and parallel temperature dependance of resistance, Wheatston bridge, potentiometer.

Measurement of voltages as currents.

Electric power heating effects of currents, chemical effects and law of electrolysis, thermoelectricity, Biot Savart law, Magnetic fields due to a straight wire, circular loop and solenoid.

Force on a moving charge in a magnetic field (Lorentz force), magnetic moment of a current loop, effects of a uniform magnetic field of a current loop, forces between two currents, moving galvanometer, ammeter and voltmeter.

Bohr model of the atom, Hydrogen spectrum, composition of nucleus, atomic masses and isotopes radioactivity, laws of radio active decay, decay constant, half life and mean life, Mass-energy relation, fission X-Ray: properties and uses.

Elementary ideas of conductor, semi-conductor and insulator, intrinsic and extrinsic semi-conductors, pn junction as a rectifier.

Electromagnetic induction induced emf, Faradays law, Lenz's law, self and mutual inductance, Alternating currents impedance and reactance, growth and decay of current in L-R circuit, elementary idea of dynamo and transformer.

SECTION - 2

Units and dimensions, Dimensional analysis, S.I. Units, motion in two dimensions. Cases of uniform velocity and uniform acceleration. General relation among position and velocity. Uniform circular motion. Force and inertia, Newton's Laws of motion. Conservation of momentum and energy, Static and kinetic friction, Work energy and power, Elastic collisions, Potential energy, gravitational potential energy and its angular commision to kinetic energy, Potential energy of a spring, Rigid body rotation and conservation of its momentum, Moment of inertia, theorems of parallel and perpendicular axis, (Moment of inertia of uniform ring, disc thin rod cylinder only)

Acceleration due to gravity and its variation. Universal law of gravitation, geostationery satellites, escape velocity.

Hooke's law, Young's modulus, shear and bulk modulus, surface energy and kinetic theory of gases, gas laws, kinetic energy and temperature.

Specific heats at constant volume and constant pressure, Mechanical equivalent of heat, isothermal and adiabatic processes.

Heat conduction in one dimension, convection and radiation, Stefan's law and Newton's law of cooling.

Periodic motion, simple harmonic motion, Oscillations due to spring. Wave motion principle of superposition Progressive and stationary waves, beats and Doppler effect.

Wave nature of light, Interference, Young's double slit experiment, velocity of light and Doppler's effect in light.

Reflection, refraction, total internal reflection, curved mirrors, Lenses, mirror and lens formulae. Dispersion in prism, absorption and emission spectra.

The human eye, defects of vision, magnification and resolving power of telescope and microscope 'e' and 'e/m' for an electron, Einstein's photoelectric equation, photocells.

CHEMISTRY

SECTION - 1

Calculation of empirical and molecular formulae of organic compounds, Nomenclature of organic compounds, common functional groups, isomerism, Structure and shapes of alkanes, alkenes and benzene

Preparation properties and uses of alkynes, alkynes and alkenes, benzene petroleum cracking octane number, gasoline additives

Nomenclature, Physical Chemical properties, correlation of physical properties with structure properties and uses of haloalkanes, haloalkanes, alcohols and phenols : General ideas of some polyhalogen compounds viz dichloroethanes, dichloroethers, chloroform, carbon tetrachloride, D.D.T. benzene hexachloride

Nomenclature, methods of preparation, Chemical properties, correlations of physical properties with structure and uses of esters aldehydes, ketones carboxylic acids and their derivatives Brief account of the chemistry of Cyanides, isocyanides, amines and nitro compounds

Polymers Classification : Preparation and uses of common natural and synthetic polymers

Biomolecules : Classification, Structures and biological importance of carbohydrates, amino acids, peptides, proteins and enzymes, nucleic acids and lipids.

Structure of Atom : Constitution of nucleus, Bohr's atom model quantum numbers aufbau principle, electronic configuration of elements (upto-kr) : de-Broglie relation, shapes of orbitals

Nuclear chemistry : Radio active radiations : Half-life, radioactive decay, group displacement law, Structure and properties of nucleus: Nuclear reactions, disintegration series, artificial transmutation : isotopes and their uses: Radiocarbon dating.

Chemical bond : Electrovalent, covalent and coordinate bonds, hybridisation (sp): hydrogen bond : shapes of molecules (VSEPR theory) : bond polarity resonance, Elements of VBT and MOT

Chemical periodicity : s.p.d. and f-block elements, periodic Table : periodicity : atomic and ionic radii valency ionisation energy, electron affinity, electronegativity, metallic character.

Comparative study of elements : Comparative study of the following families of elements : (i) Alkali metals (ii) Alkaline earth metals (iii) Nitrogen family (iv) Oxygen family (v) Halogens (vi) Noble gases.

Transition metals : Electronic configuration of 3d-metal ions, oxidation states, other general characteristic properties, Potassium permanganate, potassium dichromate.

SECTION - 2

Co-ordination compounds : Simple nomenclature, bonding and stability, classification and bonding in organometallics.

Principles of metallurgical operations : Furnaces, ore concentration, extraction, purification metallurgies of Na, Al, Fe, Cu, Ag, Zn and Pb and their properties.

Chemical equilibrium : Chemical equilibrium, Law of mass action : K_p and K_c : Le Chatelier principle and its applications.

Ionic Equilibria in solutions, Solubility product, common ion effect, theories of acids and base hydrolysis of salts : pH; buffers.

Chemical Kinetic : Rate of a reaction factors affecting the rate : rate constant, rate expression, order of reaction, first order rate constant - expression and characteristics, Arrhenius equation

Electrochemistry : Oxidation, Oxidation number and io-electron methods, Electrolytic conduction, Faraday's laws : voltaic cell, electrode potentials, electromotive force, Gibb's energy and cell potentials.

Nernst equation, commercial cells, fuel cell, electrochemical theory of corrosion.

Solutions : Modes of expressing concentrations of solutions : Types of solutions, Raoult's law of colligative properties non-ideal solution abnormal molecular weights.

Thermochemistry and Thermodynamics : Energy changes during a chemical reaction: intrinsic energy enthalpy; First law of thermodynamics : Hess's law Heats of reactions: Second law of thermodynamics: entropy: free energy; spontaneity of a chemical reaction; free energy change and chemical equilibrium; free energy as energy available for useful work.

Chemical analysis : Chemistry involved is simple inorganic qualitative analysis : calculations based on acid-base titrimetry

Solid State : Crystal lattices unit cells, Structure of ionic compounds : close packed structure ionic radii imperfections (Point defects): Properties of solids

Surface chemistry, Colloids and Catalysis; Adsorption, Colloids (types preparation and properties), Emulsions, Micelles, Catalysis: Types and characteristics.

BOTANY

SECTION - 1

Structural organisation of cell, Cell theory : Light and Electron Microscopic view of cell, Structure and functions of cell organelles : Nucleus, Mitochondria, Chloroplast, Endoplasmic reticulum, Golgi complex lysosome microbodies, microfilaments, Ribosomes, Centrioles and Plasmids, Eukaryotic Chromosome (Morphology) cell and plasma membrane. Differences between plant and animal cell, Cell Division, Cell cycle, Significance of Mitosis and meiosis.

Ecosystem-Structures and function: Major ecosystem i.e. Lake and Forest: Food chain. Food Web and Energy flow. Ecological crisis-Role of man in Polluting Environment-Air, Water and Soil.

Difference between prokaryote and Eukaryotes: Bacteriophage, Cyanobacteria (Nostoc) and Bacteria

Five kingdom classification: Binomial nomenclature

Structure, reproduction and economic importance of viruses, Mycoplasma.

External morphology and life cycle of Spirogyra, Mucor, Funaria, Selaginella and Pinus.

Elementary knowledge of Microsporogenesis, megasporogenesis, Fertilisation endosperm and embryo development in Angiosperms.

Tissue and tissue systems meristematic and permanent tissue.

SECTION - 2

Mineral nutrition-essential elements and their function: Uptake of minerals, transport of water and solutes. Transpiration Photosynthesis and Respiration Importance, mechanism and factors affecting these processes : photorespiration.

Enzymes and growth hormones with reference to their classification, Chemical nature, mode of action and importance, Elementary idea of photoperiodism and phytochrome.

Role of plants in human welfare: A general knowledge of plant products of economic value -Drugs, Fibers, cereals. (wheat and Rice) Pulse (gram). Oil seeds (Ground nut) Sugarcane, Coal and Petroleum. Principle of plant breeding and its role in improvement of crops.

Mendel's Laws of inheritance, Monohybrid and dihybrid cross; Linkage and crossing over of genetic material and gene regulation. DNA replication, genetic code, transcription, translation .

Food preservation-Methods and importance

Biotechnology: scope and importance in Agriculture and industries manufacture of cheese, Yoghurt, Alcohol, Antibiotics.

ZOOLOGY

SECTION - 1

Structure and function of Animal tissues- Epithelial, Connective, Muscular, Skeletal and Nerve

Structure and Physiology of Human body Skin,

Digestive System, Vitamins & minerals (source and disorders due to deficiencies), Histology of Mammalian organs-Stomach, Intestine, Liver

Structure and Physiology of Human body - Respiratory System, Histology of Mammalian organs - Lungs.

Structure and Physiology of Human body - Circulatory system

Structure and Physiology of Human body - Excretory system, Histology of Mammalian organs-Kidney

Structure and Physiology of Human body - Nervous system.

Structure and Physiology of Human body - Reproductive system, Histology of Mammalian organs-Testis and Ovary.

Skeleton, joints, Muscles on the basis of movement Receptors

Endocrine system with special reference to various Endocrine glands of man and Hormonal co-ordination

Female reproductive cycles in mammals. Gametogenesis along with structure of Sperm and Ovum. Types of eggs. Fertilization, cleavage, type of cleavage and blastula. Development of mammals upto three germinal layers. Foetal membranes Structure and functions in mammals.

Classification Binomial and trinomial nomenclature, Basic features of classification, Classification of different animal phyla upto classes with characters and suitable examples.

SECTION - 2

Growth, repair and ageing.

Chromosomes, Types of chromosome, Human Karyotype and chromosomal abnormalities and syndromes, Hormonal, Chromosomal and Genetic balance theory of sex determination, Sex linkage and Sex linked inheritance in Man. Blood Groups and their significance.

Tissue culture, Genetic Engineering (Brief idea).

Human population-Natality, Mortality, Sex ratio, Population explosion, dynamics of human life with respect to food supply housing, health and standard of living impact of population, problems and their control, amniocentesis.

Origin of life, Theories of Organic evolution-Darwin, Lamarck, Synthetic, Evidences of organic evolution Human Evolution, Mutation, gene mutation

Economic Zoology/Sericulture, Apiculture, Lac culture, Poultry, Fishery and pearl industry

Protozoan disease in relation to man, Insect carrying diseases in relation to man.

Cancer-types of cancer and cancer cell, Communicable diseases (Hepatitis, AIDS) STD, Immune response, Vaccines and antisera, Allergies.

Smoking alcoholism and drug addiction, symptoms and control, Blood bank

Wild conservation

Pesticides-Uses, advantages and hazards