AIIMS 2019 Syllabus

BIOLOGY

Diversity in Living World

Biology – its meaning and relevance to mankind What is living; Taxonomic categories and aids (Botanical gardens, herbaria, museums, zoological parks); Systematics and Binomial system of nomenclature.Introductory classification of living organisms (Two-kingdom system, Five-kingdom system); Major groups of each kingdom alongwith their salient features (Monera, including Archaebacteria and Cyanobacteria, Protista, Fungi, Plantae, Animalia); Viruses; Lichens
Plant kingdom – Salient features of major groups (Algae to Angiosperms); Animal kingdom – Salient features of Nonchordates up to phylum, and Chordates up to class level.

Cell

The Unit of Life ; Structure and Function Cell wall; Cell membrane; Endomembrane system (ER, Golgi apparatus/Dictyosome, Lysosomes, Vacuoles); Mitochondria; Plastids; Ribosomes; Cytoskeleton; Cilia and Flagella; Centrosome and Centriole; Nucleus;
Microbodies. Structural differences between prokaryotic and eukaryotic, and between plant and animal cells.Cell cycle (various phases); Mitosis; Meiosis.Biomolecules – Structure and function of Carbohydrates, Proteins, Lipids, and Nucleic acids.Enzymes – Chemical nature, types, properties and mechanism of action.

Genetics and Evolution

Mendelian inheritance; Chromosome theory of inheritance; Gene interaction; Incomplete dominance; Co-dominance; Complementary genes; Multiple alleles;
Linkage and Crossing over; Inheritance patterns of hemophilia and blood groups in humans. DNA – its organization and replication; Transcription and Translation; Gene expression and regulation; DNA fingerprinting.Theories and evidences of evolution, including modern Darwinism.

Structure and Function – Plants

Morphology of a flowering plant; Tissues and tissue systems in plants;Anatomy and function of root, stem(including modifications), leaf, inflorescence, flower (including position and arrangement of different whorls, placentation), fruit and seed; Types of fruit; Secondary growth;Absorption and movement of water

(including diffusion, osmosis and water relations of cell) and of nutrients; Translocation of food; Transpiration and gaseous exchange; Mechanism of stomatal movement. Mineral nutrition – Macro- and micro-nutrients in plants including deficiency disorders; Biological nitrogen fixation mechanism. Photosynthesis – Light reaction, cyclic and non-cyclic photophosphorylation; Various pathways of carbon dioxide fixation; Photorespiration; Limiting factors. Respiration – Anaerobic, Fermentation, Aerobic; Glycolysis, TCA cycle; Electron transport system; Energy relations.

Structure and Function – Animals

Tissues; Elementary knowledge of morphology, anatomy and functions of different systems of earthworm, cockroach and frog.
Human Physiology – Digestive system – organs, digestion and absorption; Respiratory system – organs, breathing and exchange and transport of gases. Body fluids and circulation – Blood, lymph, double circulation, regulation of cardiac activity; Hypertension, Coronary artery diseases. Excretion system – Urine formation, regulation of kidney function Locomotion and movement – Skeletal system, joints, muscles, types of movement. Control and co-ordination – Central and peripheral nervous systems, structure and function of neuron, reflex action and sensory reception; Role of various types of endocrine glands; Mechanism of hormone action.

Reproduction, Growth and Movement in Plants

Asexual methods of reproduction; Sexual Reproduction – Development of male and female gametophytes; Pollination (Types and agents); Fertilization; Development of embryo, endosperm, seed and fruit (including parthenocarpy and apomixis).Growth and Movement – Growth phases; Types of growth regulators and their role in seed dormancy, germination and movement; Apical dominance; Senescence; Abscission; Photo- periodism; Vernalisation; Various types of movements.

Reproduction and Development in Humans

Male and female reproductive systems; Menstrual cycle; Gamete production; Fertilisation; Implantation; Embryo development; Pregnancy and parturition; Birth control and contraception.

Ecology and Environment

Meaning of ecology, environment, habitat and niche.Ecological levels of organization (organism to biosphere); Characteristics of Species, Population, Biotic Community and Ecosystem; Succession and Climax. Ecosystem – Biotic and abiotic components; Ecological pyramids; Food chain and Food web; Energy flow; Major types of ecosystems including agroecosystem. Ecological adaptations – Structural and physiological features in plants and animals of aquatic and desert habitats.

Biodiversity – Meaning, types and conservation strategies (Biosphere reserves, National parks and Sanctuaries)Environmental Issues – Air and Water Pollution (sources and major pollutants); Global warming and Climate change; Ozone depletion; Noise pollution; Radioactive pollution; Methods of pollution control (including an idea of bioremediation); Deforestation; Extinction of species (Hot Spots).

Biology and Human Welfare

Animal husbandry – Livestock, Poultry, Fisheries; Major animal diseases and their control. Pathogens of major communicable diseases of humans caused by fungi, bacteria, viruses, protozoans and helminths, and their control.Cancer; AIDS Adolescence and drug/alcohol abuse; Basic concepts of immunology. Plant Breeding and Tissue Culture in crop improvement.Biofertilisers (green manure, symbiotic and free-living nitrogen-fixing microbes, mycorrhizae); Biopesticides (micro-organisms as biocontrol agents for pests and pathogens); Bioherbicides; Microorganisms as pathogens of plant diseases with special reference to rust and smut of wheat, bacterial leaf blight of rice, late blight of potato, bean mosaic, and root – knot of vegetables.Bioenergy – Hydrocarbon – rich plants as substitute of fossil fuels.

Biotechnology and its Applications

Microbes as ideal system for biotechnology;Microbial technology in food processing, industrial production (alcohol, acids, enzymes, antibiotics), sewage treatment and energy generation.Steps in recombinant DNA technology – restriction enzymes, DNA insertion by vectors and other methods, regeneration of recombinants.
Applications of R-DNA technology. In human health –Production of Insulin, Vaccines and Growth hormones, Organ transplant, Gene therapy. In Industry – Production of expensive enzymes, strain improvement to scale up bioprocesses. In Agriculture – GM crops by transfer of genes for nitrogen fixation, herbicide-resistance and pest-resistance including BT crops.

CHEMISTRY

Some basic concepts in Chemistry

Importance of Chemistry, physical quantities and their measurement in Chemistry, SI Units, uncertainty in measurements and use of significant figures, Unit and dimensional analysis, Matter and its nature, laws of chemical combinations, atomic, and molecular, masses mole concept, molar masses, percentage composition and molecular formula, chemical stoichiometry.

States of matter

Three states of matter, gaseous state, gas laws (Boyle's Law and Charles Law), Avogadro's Law, Graham's law of diffusion, Dalton's law of partial pressure, ideal gas equation, Kinetic theory of gases, real gases and deviation from ideal behaviour, vander Waals' equation, liquefaction of gases and critical points, Intermolecular forces; liquids and solids.

Atomic structure

Earlier atomic models (Thomson's and Rutherford) , emission spectrum of hydrogen atom,Bohr's model, of hydrogen atom, Limitations of Bohr's model, dual nature of matter and radiation, Heisenberg uncertainty principle, quantum mechanical model of atom (quantum designation of atomic orbitals and electron energy in terms of principal, angular momentum and magnetic quantum numbers), electronic spin and spin quantum numbers, Pauli's exclusion principle, general idea of screening (constants) of outer electrons by inner electrons in an atom, Aufbau principle, Hund's rule, atomic orbitals and their pictorial representation, electronic configurations of elements.

Classification of elements and periodicity in properties

Need and genesis of classification of elements (from Doebereiner to Mendeleev), Modern periodic law and present form of periodic table, Nomenclature of elements with atomic number > 100, electronic configurations of elements and periodic table, electronic configuration and types of elements and s, p, d and f blocks, periodic trends in properties of elements (atomic size, ionization enthalpy, electron gain enthalpy, valence/ oxidation states and chemical reactivity).

Chemical energetics

Some basic concepts in thermodynamics, first law of thermodynamics, heat capacity, measurement of Uand H, calorimetry, standard enthalpy changes, thermo chemical equations, enthalpy changes during phase transformations, Hess's Law, standard enthalpies of formation, bond enthalpies and calculations based on them.

Chemical bonding: Kossel -Lewis approach to chemical bond formation, ionic bonds, covalent bonds, polarity of bonds and concept of electronegativity, valence shell electron pair repulsion (VSEPR) theory , shapes of simple molecules, valence bond theory, hybridization involving s, p and d orbitals and shapes of molecules and bonds; Molecular orbital theory involving homounclear diatomic molecules; Hydrogen-bonding.

Equilibrium

Equilibrium in physical and chemical processes: Equilibrium in physical and chemical processes, dynamic equilibrium, law of chemical equilibrium and equilibrium constant, homogeneous equilibrium, heterogenous equilibrium, application of equilibrium constants, Relationship between reaction quotient Q,

equilibrium constant, K and Gibbs' energy G; factors affecting equilibrium-Le Chateliar's principle.

Ionic equilibrium

Acids, Bases and Salts and their ionization, weak and strong electrolytes degree of ionization and ionization constants, concept of pH, ionic product of water, buffer solution, common ion effect, solubility of sparingly soluble salts and solubility products.

Redox reactions

Electronic concepts of reduction – oxidation, redox reactions, oxidation number, balancing of redox reactions.

Solid state Chemistry

Classification of solids based on different binding forces: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids; unit cells in two dimensional and three dimensional lattices,calculation of density of a unit cell, packing in solids, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties.

Chemical thermodynamics

Spontaneous processes, energy and spontaneity , entropy and second law of thermodynamics, concept of absolute entropy, Gibbs energy and spontaneity, Gibbs energy change and equilibrium constant.

Solutions

Types of solutions, different units for expressing concentration of solution, mole fraction, percentage (by volume and mass both), definitions of dilute solutions, vapour pressure of solutions and Raoult's Law, Colligative properties, lowering of vapour pressure, depression of freezing point, elevation of boiling points and osmotic pressure, determination of molecular masses using colligative properties, abnormal values of molecular masses, van't Hoff factor. simple numerical problems.

Chemical kinetics

Rate of chemical reactions, factors, affecting rates of reactions –concentration, temperature and catalyst, order and molecularity of reactions, rate law and rate constant, differential and integral forms of first order reaction, half-life (only zero and first order) characteristics of first order reaction, effect of temperature on reactions, Arrhenius theory – activation energy, collision theory of reaction rate (no derivation).

Electrochemistry

Conductance in electrolytic solutions, specific and molar conductivity, variation of conductivity with concentration, Kohlrausch's law, electrolysis and laws of electrolysis (elementary idea), electrolytic and galvanic cells, emf. of a cell, standard electrode potential, Nernst equation, concentration cell, fuel cells, cell potential and Gibbs energy, dry cell and lead accumulator.

Surface chemistry

Adsorption – physisorption and chemisorption, factors affecting adsorption of gases on solids, catalysis, homogeneous and heterogeneous activity and selectivity, enzyme catalysis, colloidal state, distinction between true solutions, colloids and suspensions; lyophillic, lyophobic, multimolecular andmacromolecular colloids, properties of colloids, Tyndal effect, Brownian movement, electrophoresis, coagulation, emulsions – type of emulsions.

Hydrogen

Position of hydrogen in periodic table, isotopes of hydrogen, heavy water, hydrogen peroxide-preparation, reactions and structures; hydrides and their classification.

s-Block Elements (Alkali and Alkaline Earth metals)

Group 1 and Group 2 elements: Electronic configurations and general trends in physical and chemical properties, anomalous properties of the first element of each group, diagonal relationship.
Preparation and properties of some important compounds, sodium carbonate, sodium hydroxide, sodium hydrogen carbonate and industrial uses of lime and limestone, biological significance of Na, K, Mg and Ca.

General principles and processes of isolation of elements

Principles and methods of extraction – concentration, reduction, (chemical and electrolytic methods), and refining.
Occurrence and principles of extraction of Al, Cu, Zn and Fe.

p-Block Elements

Introduction to p-block elements: Electronic configurations and general trends in properties, viz. atomic sizes,ionization enthalpies, electronegativity values, electron gain enthalpies and oxidation states across the periods and down the groups in the p-block.
Unique behaviour of the top element in each group of the block – the covalency limit and the p – p overlap in some molecules (e.g. N_2, O_2) and its consequences; general trend in catenation tendency down each group.

Group-wise study of the p-block Elements: Group 13 – In addition to the general characteristics as outlined above, properties and uses of aluminium, nature of hydrides/ halides and oxides; Properties, structures and uses of

diborane boron halides, aluminium chloride, borax, boric acid and alums.
Group 14 – In addition to the general characteristics; carbon – catenation, allotropic forms (diamond and graphite), properties and structures of oxides; silicon – silicon tetrachloride, and structures and uses of silicates, silicones and zeolites.
Group 15 – In addition to the general characteristics, the general trends in the nature and structures of hydrides, halides and oxides of these elements. Preparation and properties of ammonia, nitric acid, phosphine and halides of phosphorus, structures of the oxoacids of phosphorus.
Group 16 – In addition to the general characteristics, preparations, properties and uses of dioxygen, simple oxides, ozone; sulphur – allotropic forms, compounds of sulphur, preparation, properties and uses of sulphur dioxide and sulphuric acid, industrial preparations of sulphuric acid, structures of oxoacids of sulphur.
Group 17 – In addition to the general characteristics, occurrence, trends in physical and chemical properties, oxides and oxoacids of halogens (structures only), preparation, properties and uses of chlorine and hydrochloric acid, trends in the acidic nature of hydrogen halides. Interhalogen compounds (structures only).
Group 18 – General introduction, electronic configurations, occurrence, trends in physical and chemical properties and uses, – fluorides and oxides of xenon (structures only).

The d-and f-Block elements

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals –physical properties, ionization enthalpy, oxidation states, ionic radii, color, catalytic property, magnetic property, interstitial compounds, alloy formation; preparations and properties of $K_2Cr_2O_7$ and $KMnO_4$.
Lanthanoids – Electronic configuration and oxidation states, chemical reactivity and lanthanoid contraction.
Actinoids – Electronic configuration and oxidation states.

Coordination compounds

Introduction to ligands, coordination number, colour, magnetic properties, andshapes; IUPAC – nomenclature of mononuclear coordination compounds, isomerism , bonding-valence bond approach to the bonding and basic ideas of Crystal Field Theory, colour and magnetic properties.
Elementary ideas of metal – carbon bonds and organometallic compounds, importance of co-ordination compounds (in qualitative analysis, extraction of metals and biological systems).

Some basic principles of Organic Chemistry

Tetravalence of carbon, hybridization (s and p), shapes of simple molecules, functional groups:-C=C-, -C C- and those containing halogens, oxygen, nitrogen and sulphur; homologous series, isomerism.
General introduction to naming organic compounds-trivial names and IUPAC nomenclature.
Electronic displacement in a covalent bond; inductive effect, electromeric effect, resonance and hyperconjugation. Fission of covalent bond: free radicals, electrophiles and nucleophiles, carbocations and carbonanions.
Common types of organic reactions: substitution, addition, elimination and rearrangement reactions.

Hydrocarbons

Alkanes and cycloalkanes : classification of hydrocarbons, alkanes and cycloalkanes, nomenclature and conformations of alkanes and cycloalkanes.
Alkenes and alkynes : Nomenclature and isomerism, general methods of preparation, properties (physical and chemical), mechanism of electrophilic addition, Markownikoff's rule, peroxide effect, acidic character of alkynes, polymerisation reactions.
Aromatic hydrocarbons: Benzene and its homologues, nomenclature, sources of aromatic hydrocarbons (coal and petroleum), structure of benzene, chemical reaction of benzene-mechanism of electrophilic substitution. Directive influence of substituents and their effect on reactivity.
Petroleum and petrochemicals: Composition of crude oil fractionation and uses, quality of gasoline, LPG, CNG, cracking and reforming, petrochemicals.

Purification and characterization of carbon compounds

Purification of carbon compounds: filtration, crystallisation, sublimation, distillation chromatography,
Qualitative analysis: detection of nitrogen, sulphur, phosphorus and halogens.
Quantitative analysis: estimation of different elements (H, N, halogens, S and P)
Determination of molecular masses: Silver salt method, chloroplatinate salt method, calculations of empirical and molecular formulas.

Organic compounds with functional groups containing halogens (X)

Nature of C-X bond in haloalkanes and haloarenes, nomenclature, physical and chemical properties, mechanism of substitution reactions, reactivity of C-X bond in haloalkanes and haloarenes.Some commercially important compounds : dichloro, trichloro and tetrachloromethanes; p-dichlorobenzene, freons, BHC, DDT, their uses and important reactions.

Organic compounds with functional groups containing oxygen

Alcohols and phenols : Nomenclature, methods of preparation, physical and chemical properties; chemical reactivity of phenols in electrophilic

substitutions, acidic nature of phenol, ethers: electronic structure, structure of functional group, nomenclature, important methods of preparation, physical and chemical properties, some commercially important compounds.
Aldehydes and ketones : Electronic structure of carbonyl group, nomenclature, important methods of preparation, physical properties and chemical reactions, relative reactivity of aldehydic and ketonic groups, acidity of -hydrogen, aldol condensation. Connizzarro reaction, nucleophilic addition reaction to >C=O groups.
Carboxylic acids: Electronic structure of-COOH, Nomenclature, important methods of preparation, physical properties and effect of substituents on -carbon on acid strength, chemical reactions.
Derivatives of carboxylic acids: Electronic structure of acid chloride, acid anhydride, ester and amide groups, nomenclature, important methods of preparation, comparative reactivity of acid derivatives. Some commercially important compounds.

Organic Compounds with functional group containing nitrogen

Structure, nomenclature of nitro, amino, cyano and diazo compounds.
Nitro compounds – important methods of preparation, physical properties and chemical reactions.
Amines: primary, secondary and tertiary amines, a general awareness, important methods of preparation, physical properties, basic character of amines, chemical reactions.
Cyanides and isocyanides: preparation, physical properties and chemical reactions.
Diazonium salts: Preparation, chemical reaction and uses of benzene diazonium chloride. Some commercially important nitrogen containg carbon compounds, (aniline, TNT)

Polymers

Classification of polymers, general methods of polymerization-addition and condensation: addition-free radical, cationic, anionic polymerization, copolymerisation, natural rubber, vulcanization of rubber, synthetic rubbers, condensation polymers, idea of macromolecules, biodegradable polymers. Some commercially important polymers (PVC, teflon, polystyrene, nylon-6 and 66, terylene and bakelite).

Environmental Chemistry

Environmental pollution – air, water and soil pollutions, chemical reactions in atmosphere, smogs, major atmospheric pollutants, acid-rain, ozone and its reactions, effects of depletion of ozone layer, green house effect and global warming – pollution due to industrial wastes, green chemistry as an alternative tool for reducing pollution, strategy for controlling environmental pollution.

Biomolecules

Carbohydrates: Classification, aldose and ketose, monosaccharides (glucose and fructose), oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen); important simple chemical reactions of glucose, elementary idea of structure of pentose and hexose.
Proteins: Elementary idea of -amino acids, peptide bond, polypeptides, proteins; primary, secondary and tertiary structure of proteins and quaternary structure (qualitative idea only), denaturation of proteins, enzymes.
Vitamins: Classification and functions
Nucleic acids: Chemical composition of DNA and RNA
Lipids: Classification and structure
Hormones: Classification and functions in biosystem.

Chemistry in everyday life

Chemicals in medicines – analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antacids, antihistamins.
Chemicals in food – preservativess, artificial sweetening agents.
Cleansing agents – soaps and detergents, cleansing action.
Rocket propellants: characteristics and chemicals used.

PHYSICS

Introduction and Measurement

What is Physics? Scope and excitement; Physics in relation to science, society and technology; Need for measurement of physical quantities, units for measurement, systems of units-SI: fundamental and derived units. Dimensions of physical quantities. Dimensional analysis and its applications. Orders of magnitude, Accuracy and errors in measurement – random and instrumental errors, Significant figures and rounding off the numbers.
Graphs, Trigonometric functions, Concepts of differentiation and integration.

Description of Motion in One Dimension

Objects in motion in one dimension, Motion in straight line, Uniform and non-uniform motion, its graphical representation and formulae, speed and velocity, relative velocity, average speed and instantaneous velocity. Uniformly accelerated motion, velocity-time graph, position-time graph and their formulae. Relations for uniformly accelerated motion with examples. Acceleration in one-dimensional motion.

Description of Motion in Two and Three Dimensions

Vectors and scalars quantities, vectors in two and three dimensions, vector addition and multiplication by a real number, null-vector and its properties. Resolution of a vector in a plane, rectangular components. Scalar and vector

products. Motion in two dimensions, cases of uniform velocity and uniform acceleration-projectile motion, general relation among position-velocity-acceleration for motion in a plane and uniform circular motion. Motion of objects in three dimensional space (elementary ideas).

Laws of Motion

Force and inertia, first law of motion. Momentum, second law of motion, impulse, examples of different kinds of forces in nature. Third law of motion, conservation of momentum, rocket propulsion. Equilibrium of concurrent forces. Static and kinetic frictions, laws of friction, rolling friction, lubrication, Inertial and non-inertial frames (elementary ideas).

Work, Energy and Power

Work done by a constant force and by a variable force, unit of work, energy and power. Work Energy Theorem. Elastic and in-elastic collisions in one and two dimensions. Notions of potential energy, conservation of mechanical energy : gravitational potential energy, and its conversion to kinetic energy, potential energy of a spring. Conservative forces. Different forms of energy, mass-energy equivalence, conservation of energy.

Rotational Motion

Centre of mass of a two-particle system, momentum conservation and centre of mass motion. Centre of mass of rigid body, general motion of a rigid body, nature of rotational motion, rotational motion of a single particle in two dimensions only, torque, angular momentum and its geometrical and physical meaning, conservation of angular momentum, examples of circular motion (car on a level circular road, car on banked road, pendulum swinging in a vertical plane). Moment of inertia, its physical significance, moment inertia of uniform bodies with simple geometrical shapes, parallel axis and perpendicular axis theorem (statements only), Comparison between translatory (linear) and rotational motion.

Gravitation

Acceleration due to gravity, one and two dimensional motion under gravity. Universal law of gravitation, inertial and gravitational mass, variations in the acceleration due to gravity of the earth, statement of Kepler’s laws of planetary motion, orbital velocity, geostationary satellites, gravitational potential, gravitational potential energy near the surface of earth, escape velocity, weightlessness.

Heat and Thermodynamics

Thermal equilibrium and temperature (zeroth law of thermodynamics). Heat, work and internal energy. Specific heat, specific heat at constant volume and constant pressure of ideal gas and relation between them. First law

ofthermodynamics. Thermodynamic state, equation of state and isothermals, pressure-temperature phase diagram. Thermodynamic processes (reversible, irreversible, isothermal, adiabatic). Carnot cycle, second law ofthermodynamics, efficiency of heat engines. Entropy. Transfer of heat : conduction, convection and radiation. Newton's law of cooling.
Thermal conductivity. Black body radiation, Wien's law, Solar constant and surface temperature of the sun, Stefan's law,

Oscillations

Periodic and oscillatory motions. Simple harmonic motion (S.H.M.) and its equation of motion. Oscillations due to a spring, kinetic energy and potential energy in S.H.M., Simple pendulum, physical concepts of forced oscillations, resonance and damped oscillations; Simple examples.

Waves

Longitudinal and transverse waves and wave motion, speed of progressive wave. Principle of superposition of waves; reflection of waves, harmonic waves (qualitative treatment only), standing waves. Normal modes and its graphical representation. Beats, Doppler effect.
Electrostatics:
Frictional electricity, charges and their conservation, unit of charge, Coulomb's law, dielectric constant, electric field, electric field due to a point charge, electric potential – its physical meaning, potential due to a di-pole, di-pole field and behaviour of dipole in a uniform (2-dimensional) electric field. Flux, Statement of Gauss's theorem and its applications to find electric field due to uniformly charged simple systems. Conductors and insulators, presence of free charges and bound charges inside a conductor, Capacitance (parallel plate), Dielectric material and its effect on capacitance (concept only), capacitances in series and parallel, energy of a capacitor. Van de Graff generator.

Electrostatics:

Frictional electricity, charges and their conservation, unit of charge, Coulomb's law, dielectric constant, electric field, electric field due to a point charge, electric potential – its physical meaning, potential due to a di-pole, di-pole field and behaviour of dipole in a uniform (2-dimensional) electric field. Flux, Statement of Gauss's theorem and its applications to find electric field due to uniformly charged simple systems. Conductors and insulators, presence of free charges and bound charges inside a conductor, Capacitance (parallel plate), Dielectric material and its effect on capacitance (concept only), capacitances in series and parallel, energy of a capacitor. Van de Graff generator.

Current Electricity

Introduction (flow of current), sources of e.m.f., cells : simple, secondary, chargeable, combinations of cells in series and parallel. Electric current, resistance of different materials, temperature dependence, thermistor, specific resistivity, colour code for carbon resistors. Ohm's law and its limitation. Superconductors (elementary ideas). Kirchoff's laws, resistances in series and parallel, Wheatstone's bridge, measurement of resistance. Potentiometer – measurement of e.m.f. and internal resistance of a cell.

Thermal and Chemical Effects of Currents

Electric power, heating effects of current and Joule's law. Thermoelectricity: Seebeck effect, measurement of temperature using thermocouple. Chemical effects and Faraday's laws of electrolysis.

Magnetic Effect of Currents

Oersted's observation, Biot-Savart's law (magnetic field due to an element of current), magnetic field due to a straight wire, circular loop and solenoid. Force on a moving charge in a uniform magnetic field (Lorentz force), cyclotron (simple idea), forces and torques on currents in a magnetic field, forces between two currents, definition of ampere, moving coil galvanometer, ammeter and voltmeter. Conversion of galvanometer into voltmeter/ammeter.

Magnetism

Bar magnet (comparison with a solenoid), magnetic lines of force, torque on a bar magnet in a magnetic field, earth's magnetic field as a bar magnet, tangent galvanometer, vibration magnetometer. Para, dia and ferromagnetic substances with examples (simple idea). Electromagnets and permanent magnets.

Electromagnetic Induction and Alternating Currents

Faraday's Law of electromagnetic induction, Lenz's Law, induced emf, self and mutual inductance. Alternating current, and voltage, impedance and reactance; A.C. circuits containing inductance, capacitance and resistance; phase relationships, and power in a.c. circuits, L.C oscillations. Electrical machines and devices (transformer, induction coil, generator, simple motors, choke and starter), eddy current.

Electromagnetic Waves

Electromagnetic oscillations, brief history of electromagnetic waves (Maxwell, Hertz, Bose, Marconi). Electromagnetic spectrum (radio, micro-waves, infra-red, optical, ultraviolet, X-rays, gamma rays) including elementary facts about their uses, propagation of electromagnetic waves in atmosphere.

Ray Optics and Optical Instruments

Ray optics as a limiting case of wave optics. Phenomena of reflection, refraction, and total internal reflection. Optical fibre. Curved mirrors, lenses; mirror and lens formulae. Dispersion by a prism. Spectrometer. Absorption and emission spectra. Scattering and formation of rainbow. Telescope (astronomical), microscope, their magnifications and resolving powers.

Electrons and Photons

Discovery of electron, e/m for an electron, electrical conduction in gases, photoelectric effect, particle nature of light, Einstein's photoelectric equation, photocells. Matter waves – wave nature of particles, de-Broglie relation, Davison and Germer experiment.

Atoms, Molecules and Nuclei

Rutherford model of the atom, Bohr model, energy quantization. Hydrogen spectrum. Composition of nucleus, atomic masses, binding energy per nucleon of a nucleus, its variation with mass number, isotopes, size of nucleus. Radioactivity : properties of α, β and γ rays. Mass energy relation, nuclear fission and fusion.

Solids and Semiconductor Devices

Crystal structure-Unit cell; single, poly and liquid crystals (concepts only). Energy bands in solids, difference between conductors, insulators and semi-conductors using band theory. Intrinsic and extrinsic semiconductors, p-n junction, semiconductor diodes, junction transistor, diode as rectifier, solar cell, photo diode, LED, Zener diode as a voltage regulator, transistor as an amplifier and oscillator. Combination of gates. Elementary ideas about IC.

AIIMS MBBS General Knowledge Syllabus 2019

- Inventions in the World
- Sports
- Basic Computer
- Indian History
- Indian Economy
- Famous Days & Dates
- Famous Books & Authors
- Indian Parliament
- Indian Politics
- Environment
- Indian Culture

- Important Logos