Dr. D.Y. Patil Vidyapeeth, Pune

(DEEMED UNIVERSITY)

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Re-accredited by NAAC with a CGPA of 3.62 on a four point scale at 'A' Grade

An ISO 9001 : 2008 Certified University

Syllabus for AIBTCET- 2017

Annexure – I

Recommended Syllabus

PHYSICS

Introduction and Measurement

What is Physics; Scope and excitement; Physics in relation to science; society and technology, Need for measurement, system of units SI: fundamental and derived units, Dimensions and their application. Orders of magnitude, accuracy and errors in measurements: random and instrumental errors, Significant figures and rounding off, graphs, Trigonometric functions, simple ideas of differentiation and integration.

Description of Motion in one dimension

Objects in motion in one dimension. Motion in a straight line, unit and dimension for time and position measurement. Uniform motion, its graphical representation and formulae, speed and velocity, relative velocity, instantaneous velocity, uniformly accelerated motion, its velocity-time graph, position - time graph and formulae. General relation between position and velocity, application to uniformly accelerated motion. Acceleration in general; one dimensional motion.

Description of motion in two and three dimensions

Vectors and scalars, vectors in two dimensions, general-vector addition and multiplication by a real number, zero-vector and its properties. Resolution of 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-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, some kinds of forces in nature. Third law of motion, conservation of momentum, rocket propulsion.

Equilibrium of concurrent forces. Static and kinetic friction, 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, kinetic energy, power, elastic collision in one and two dimensions, potential energy, gravitational potential energy, and its conversion to kinetic energy, potential energy of a spring. Different forms of 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 moment of inertia, its physical significance, parallel axis and perpendicular axis theorem (statements only).

Gravitation

Acceleration due to gravity, one - dimensional motion under gravity, two-dimensional motion under gravity. Universal law of gravitation, inertia and gravitational mass, variations in the acceleration due to gravity of the earth, orbital velocity, geostationary satellites, gravitational potential energy near the surface of earth, gravitational potential, escape velocity.

Heat Thermodynamics

Specific heat, Specific heat at constant volume and constant pressure of ideal gas, relation between them, first law of thermodynamics state, equation of state and isothermal, pressure-temperature phase diagram. Thermodynamic processes (reversible, irreversible, isothermal, adiabatic). Carnot cycle, second law of thermodynamics, efficiency of heat engines, conduction, convection and radiation. Thermal conductivity, black body radiation, Wien's Law, Stefan's law, Newton's law of cooling.

Oscillations

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

Waves

Wave motion, speed of wave motion, principle of super-positions, reflection of waves, harmonic waves (qualitative treatment only) standing waves and normal modes and its graphical representation. Beats, Doppler effect. Musical scale, acoustics of building.

Electronics

Frictional electricity, charges and their conservation, elementary unit, Coulomb's law dielectric constant, electric field, electric field due to a point charge, di-pole field and dipoles' behaviour in an uniform (2-dimensional) electric field, flux, Gauss's law in simple geometric, conductors and insulator, presence of free charges and bound charges inside a conductor, Dielectric (concept only), Capacitance (parallel plate) series and parallel, energy of a capacitor, high voltage generators, atmospheric electricity.

Current Electricity

Introduction (flow of current), sources of e.m.f. (cells: simple, secondary, chargeable), electric current, resistant of different materials, temperature dependence, thermistor, specific resistivity, colour code for carbon resistance. Ohm's law. Kirchoff's law, resistance in series and parallel, series and parallel circuits. Whetstone's bridge, measurement of voltages and currents, potentiometer.

Thermal and Chemical effects of Currents

Electric power, heating effects of current, chemical effects and law of electrolysis, simple concept of thermoelectricity, thermocouple.

Magnetic Effect of Current

Oersted's observation, Biot-Savart's law (magnetic field due to a current element), 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 torque on currents in a magnetic field, forces between two currents, definition of ampere, moving coil galvanometer, ammeter and voltmeter.

Magnetism

Bar magnet (comparison with solenoids), lines of force, torque on a bar magnet in a magnetic field, earth's magnetic field, tangent galvanometer, vibration magnetometer, para, di and ferromagnetism (simple idea).

Electromagnetic Induction and Alternating Current

Induced e.m.f. Faraday's Law, Lenz's law, induction, self and mutual inductance, alternating currents, impedance and reactance, power in a.c., electrical machines and devices (transformer, induction coil, generator, simple motors, choke and starter).

Electromagnetic Waves (Qualitative Treatment)

Electromagnetic oscillations, some history of electromagnetic waves (Maxwell, Hertz, Bose, Marconi). Electromagnetic spectrum (radio, micro-waves, infra-red, optical, ultraviolet, X-rays,

alpha, beta and gamma rays) including elementary facts about their uses and propagation, properties of atmosphere w.r.t. various parts of electromagnetic spectrum.

Ray Optics and Optical Instruments

Ray optics as a limiting case of wave optics, refraction, total internal reflection, optical fibre, curved mirrors, lenses, mirror and lens formulae, Dispersion by a prism, spectrometer and spectra-absorption and emission, scattering rainbow, Magnification and resolving power, telescope (astronomical), microscope.

Electrons and Photons

Discovery of electrons, e/m for an electron, electrical conduction in gases, particle nature of light, Einstein's photoelectric equation, photocells.

Atoms, Molecules and Nuclei

Rutherford model of the atom, Bohr model, energy quantization, hydrogen spectrum composition of nucleus, atomic masses, isotopes, size of nucleus, radioactivity, mass energy relation, nuclear fission and fusion, nuclear holocaust.

Solids and Semiconductor Devices

Crystal structure Unit cell; single, poly and liquid crystal (concepts only) Energy bands in solids, conductors, insulators and semi-conductors, PN junction, diodes, junction transistor, diode as rectifier, transistor as an amplifier and oscillator, logic gate and combination of gates.

CHEMISTRY

Atoms, Molecules and Chemical Arithmetic

Measurement in chemistry (significant figures, SI unit, Dimensional analysis). Chemical classification of matter (mixtures, compounds and elements and purification. Law of chemical combination and Dalton's Atomic theory. Atomic Mass (mole concept, determination of chemical formulas). Chemical equation (balancing of chemical equation and calculations using chemical equations).

Elements, their Occurrence and extraction

Earth as a source of elements, elements in biology, elements in sea, extraction of metals (metallurgical process, production of concentrated ore, production of metals and their purification). Mineral wealth of India. Qualitative test of metals.

States of Matter

Gaseous state (measurable properties of gases, Boyle's Law, Charles' Law and absolute scale of temperature, Avogadro's hypothesis, ideal gas equation, Dalton's law of partial pressure).

Kinetic molecular theory of gases (the microscopic model of a gas, deviation form ideal behaviour).

The solid state (classification of solids, X-ray studies of crystal lattices and unit cells, packing of constituent particles in crystals).

Liquid state (Properties of liquids, Vapour pressure, Surface Tension, Viscosity).

Atomic Structures

Constituents of the atom (Discovery of electron, nuclear model of the atom).

Electronic structure of atoms (nature of light and electromagnetic waves, atomic spectra, Bohr's model of Hydrogen atom, Quantum mechanical model of the atom, electronic configurations of atoms, Aufbau principle).

Chemical Families: Periodic Properties

Mandeleev's Periodic Table, Modern Periodic Law, Types of elements (Representative elements-s and p block elements, inner transition elements-d inner transition element-f-block elements). Periodic trends in properties. (Ionizastion energy, electron affinity, atomic radii, valence, periodicity in properties of compounds).

Bonding and Molecular Structure

Chemical bonds and Lewis structure shapes of molecules (VSEPR Theory). Quantum theory of the covalent bond (Hydrogen and some other simple molecules, carbon compounds, hybridization, Boron and Beryllium compounds). Coordinate covalent bond (Ionic bond as an extreme case of polar covalent bond), ionic character of molecules and polar molecules. Bonding in solid state (Ionic, molecular and covalent solids, metals). Hydrogen bond, Resonance.

Carbon and its Compounds

Elemental carbon, carbon compounds, Inorganic compounds of carbon (Oxides of carbon, halides, carbides). Organic compounds, nomenclature of organic compounds (Hydrocarbons, functional groups). Some common organic compounds (Alkanes, Alenes, Alkyles, Alcohols, Aldehydes, Ketones, Halides, Acids, Nitro compounds and amines).

Energetics

Energy changes during a chemical reaction. Internal energy and Enthalpy (Internal energy, Enthalpy, Enthalpy changes, Origin of Enthalpy change in reaction, Hess's law of constant heat summation, numerical based on these concepts). Heats of reactions (heat of neutralization, heat of combustion, heat of fusion and vapourization).

Sources of energy (Conservation of energy sources, pollution associated with consumption of fuels. The sun as the primary source).

What decides the direction of a spontaneous change in a chemical reaction? (an elementary idea of free energy change). Why energy crisis if energy is conserved in nature?

Chemical Equilibrium

Equilibria involving physical changes (solid-liquid-gas equilibria, equilibrium involving dissolution of solid in liquids, general characterists of equilibrium involving physical process).

Equilibria involving of electrolytes, weak and b electrolytes, acid-base equilibrium, various concepts of acids and bases, ionization of water, PH, solubility product, numericals based on these concepts.

Redox Reactions

Oxidation and reduction as an electron transfer process. Redox reactions in aqueous solution, electrochemical cells. EMF of a galvanic cell. Dependence of EMF on concentration and temperature (nearest equation and numerical problems based on it). Electrolysis, Oxidation numbers (rules for assigning oxidation number, redox reactions in terms of oxidation number and nomenclature). Balancing of oxidation-reduction equations.

Rates of Chemical Reactions

Rate of reaction, Instantaneous rate of a reaction and order of reaction. Factors affecting rates of reaction (factors effecting rate of collisions encountered between the reactant molecules, effect of temperature on the reaction rate, concept of activation energy, catalysis). Effect of light on rates of reactions. Elementary reactions as steps to more complex reactions. How fast are chemical reactions.

Chemistry of Non-metals-I

(Hydrogen, Oxygen and Nitrogen) Hydrogen (position in periodic table, occurrence, isotopes, properties, reactions and uses), Oxygen (occurrence, preparation, properties and reactions, uses, simple oxides, ozone). Water and hydrogen peroxide (structure of water molecule and its aggregates, physical and chemical properties of water, hard and soft water, water softening, hydrogen peroxides, preparation, properties, structure and uses). Nitrogen (Preparation, properties, uses, compounds of Nitrogen, Ammonia, Oxides of Nitrogen, Nitric Acid preparation, properties and uses).

Chemistry of Non-metals II

(Boron, Silicon, phosphorus, sulphur, halogens and the noble gases).

Boron, (occurrence, isolation, physical and chemical properties, borax and boric acid, uses of boron and its compounds).

Silicon (occurrence, preparation and properties, oxides and oxyacid of phosphorus, chemical fertilizers).

Sulphur (occurrence and extraction properties and reactions, oxides; Sulphuric acid preparation, properties and uses, sodium thiosulphate).

Halogens (occurrence, preparation, properties, hydrogen halides, uses of halogens).

Noble gases (discovery, occurrence and isolation, physical properties, chemistry of noble gases and their uses)

Chemistry of Lighter Metals

Sodium and Potassium (occurrence and extraction, properties and uses, important compounds Nacl, Na2Co3, NaHCO3, NaOH, KCl, KOH).

Magnesium and Calcium (occurrence and extraction, properties and uses, important compounds NgCl2, MgSO4, CaO, Ca(OH)2, CaCO3, CaSO4, plaster of paris).

Aluminium (occurrence, extraction, properties and uses, compounds AlCl3 alums).

Cement Biological role of Sodium, Potassium, Magnesium and Calcium.

Chemistry of Heavier Metals

Iron (occurrence and extraction, compounds of iron, oxides, halides, sulphide, sulphate, alloy and steel. Copper, silver and gold (occurrence and extractions properties and uses, compound sulphide, halides and sulphates, photography).

Zinc and Mercury (occurrence and extraction, properties, uses, compounds oxides, halides, sulphide and sulphates).

Tin and Lead (occurrence and extraction, properties, uses, compounds oxides, sulphides,halides).

Structure and Shapes of Hydrocarbons

Alkanes (structure, isomerism, conformation), Stereo Isomerism and chirality (origin of chirality, optical relation, racemic mixture), Alkenes (isomerism including cis-trans), Alkynes, Arenes (structure of benzene, resonance structure, isomerism in arenes).

Preparation and Properties of hydrocarbons

Sources of hydrocarbons (origin and composition of coal and petroleum; Hydrocarbons from coal and petroleum, cracking and reforming, quality of gasoline-octane number, gasoline additives).

Laboratory preparation of alkynes (preparation from unsaturated hydrocarbons, alkyl halides and carboxylic acids). Laboratory preparation of alkenes (preparation from alcohols, alkyl halides).Laboratory preparation of alkynes (preparation from calcium carbide and acetylene). Physical properties of alkanes (boiling and melting points, solubility and density). Reactions of hydrocarbons (oxidation, addition, substitution and miscellaneous reactions).

Purification and Characterization of Organic Compounds

Purification (crystallization, sublimation, distillation, differential extraction, chromatography)

Qualitative analysis (analysis of nitrogen sulphur, phosphorus and halogens). Quantitative analysis (estimation of carbon, hydrogen, nitrogen, halogens, sulphur, phosphorus and oxygen). Determination of molecular mass (Victor Mayer's method, volumetric method). Calculation of empirical formula and molecular formula.

Numerical problems in organic quantitative analysis, modern methods of structure elucidation.

The Molecules of Life

The cell. Carbohydrates (monosaccharides, disaccharides and polysaccharide). Proteins (amino acids, peptide bond, structure of proteins, tertiary structure of proteins and denaturation, enzymes). Nucleic acids (structure, the double helix, biological function of nucleic acid, viruses).

Atomic Structure and Chemical Bonding

Atoms; dual nature of matter and radiation. The uncertainty principle. Orbitals and Quantum numbers, Shapes of orbitals, electronic configuration of atoms. Molecules: Molecular orbital method. Hybridisation, Dipole moment and structure of molecules.

The Solid State

Structure of simple ionic compounds. Close-packed structures. Ionic-radii, Silicates (elementary ideas). Imperfection in solids (point defects only). Properties of solids. Amorphous solids.

The Gaseous State

Ideal gas equation-kinetic theory (fundamentals only)

Solutions

Types of solution, Vapor-pressure of solutions and Raoult' law. Colligative properties. Non-ideal solutions and abnormal molecular masses. Mole concept-stoichemistry, volumetric analysis-concentration unit.

Chemical Thermodynamics

First law of thermodynamics: Internal energy, Enthalpy, application of first law of thermodynamics.

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.

Third law of thermodynamics.

Electrochemistry

Electrolytic conduction. Voltage cell, Electrode potential and Electromotive force, Gibb's free energy and cell potential. Electrode potential and Electrolysis. Primary cells including fuel cells. Corrosion.

Chemical Kinetics

Rate expression. Order of reaction (with suitable examples). Units of rate and specific rate constants. Order of reaction and concentration. (Study will be confined to first order only).

Temperature dependence of rate constant-Fast reactions (only elementary idea). Mechanism of reaction (only elementary idea). Photochemical reactions.

Organic Chemistry Based on Functional Group-I

(Halides and Hydroxy compounds) Nomenclature of compounds containing halogen atoms and hydroxylgroups: haloalkanes, haloareness; alcohols and phenols.

Correlation of physical properties and uses:

Preparation, properties and uses of the following Polyhalogen compounds; Chloroform, idoform

Polyhydric Compounds

Ethane 1, 2-diol; Propane-1, 2, 2 triol

Structure and reactivity

a) Induction effect,

b) Mesomeric effect,

c) Electrophiles & Nucleophiles,

d) Types of organic reaction.

Organic Chemistry Based on Functional Group-II

(Ethers, aldehydes, ketones, carboxylic acids and their derivatives).

Nomenclature of ethers, aldehydes, ketones, carboxylic acids and their derivatives. (acylhalides, acid anhydrides, amides and esters). General methods of preparation, correlation of physical properties with their structure, chemical properties and uses. (Note: Specific compounds should not be stressed for the purpose of evaluation)

Organic Chemistry Based on Functional Groups-III (Cyanides, isocyanides, nitrocompounds and amines)

Nomenclature of cyanides and isocynaides; nitro compounds and amines and methods of preparation; correlation of physical properties with structure, chemical reactions and uses.

Chemistry of Representative Elements

Periodic properties: Trends in groups and periods

(a) Oxides-nature (b) Halides-melding points (c) Carbonates and Sulphates-sikyvukutt.

The chemistry of s and p block elements, electronic configuration, general characteristic properties and oxidation states of the following:

Group 1 elements Alkali metals

Group 2 elements Alkaline earth metals

Group 3 elements Boron family

Group 4 elements Carbon family

Group 5 elements Nitrogen family

Group 6 elements Oxygen family

Group 7 elements Halogen family

Group 8 elements Noble gases and Hydrogen

Transition Metals including Lanthanides

Electronic configuration: General characteristic properties, oxidation states of transition metals.

First row transition metals and general properties of their compounds oxides, halides and sulphides.

General properties of second and third row transition elements (Groupwise discussion).

Preparation of Potassium dichromate, Potassium Permanganate.

Inner transition elements: General discussion with special reference to oxidation states and Lanthanide contraction.

Coordination Chemistry and Organo Metallics

Coordination compounds. Nomenclature : isomerism in coordination compounds; Bonding in coordination compounds; Stability of coordination compounds; application of coordination compounds; Compounds containing metal-carbon bond; Application of organometallics.

Nuclear Chemistry

Nature of radiation from radioactive substances. Nuclear structure and nuclear properties. Nuclear reactions; Radioactive disintegration series; Artificial transmutation of elements; Nuclear fission and Nuclear fusion; Isotopes and their uses; Radio carbon-dating; Synthetic elements.

Synthetic and Natural Polymers

Classification of Polymers, natural and synthetic polymers (with stress on their general methods of preparation) and important uses of the following:

Teflon, PVC, Polystyrene, Nylone-66, Terylene

Environmental pollution

Pollutants, services check and alternatives.

Surface chemistry

Surface Adsorption

Colloids

Preparation and general properties, Emulsions, Micelles.

Catalysis

Homogenous and heterogeneous, structure of catalyst.

Bio Molecules

Carbohydrates: Monosaccharide's, Disaccharides, Polysaccharides.

Amino Acids and Peptides: structure and classification.

Proteins and enzymes: Structure of proteins, role of enzymes.

Nucleic Acids: DNA and RNA

Biological functions of Nucleic acids: protein synthesis and replication.

Lipids: Structure, membranes and their functions.

Chemistry of biological process

Carbohydrates and their metabolism, Haemoglobin blood and respiration; Immune system; Vitamins and hormones. Simple idea of chemical evolution.

Chemistry in Action

Dyes, Chemicals in medicines, Rocket propellants.

(Structural formulae non-evaluative)

BIOLOGY (BOTANY & ZOOLOGY)

The Living World

Nature and scope of Biology. Methods of Biology. Our place in the universe. Laws that govern the universe and life. Level of organization. Cause and effect relationship.

Being alive. What does it mean? Present approach to understand life processes: molecular approach; life as an expression of energy; steady state and homeostasis; self duplication and survival, adaptation; death as a positive part of life. An attempt to define life in these points.

Origin of life and its maintenance. Origin and diversity of life. Physical and chemical principles that maintain life processes, the living crust and interdependence. The positive and negative aspects of progress in biological sciences. The future of the living world, identification of human responsibility in shaping our future.

Cell as a unit of life. Small biomolecules; water, minerals, mono and oligosaccharides, lipids, amino acids, nucleotides and their chemistry, cellular location and function. Macromolecules in cells, their chemistry, cellular location and functional significance, Polysaccharides, proteins and nucleic acids.

Enzymes; chemical nature, classification, mechanism in action-enzyme complex, allosteric modulation (brief), irreversible activation. Biomembranes, fluid mosaic model of membrane in transport recognition of external information (brief). Structural organisation of the cell; light and electron microscopic views of cell, its organelles and their functions; Nucleus mitochondria, chloroplast, endoplasmic reticulum. Golgi complex, Lysosomes, micro tubules, cell wall, cilia and flagella, cacuoles, cell inclusion. A general account of cellular respiration. Fermentation, biological oxidation (A cycle outline)., mitochondrial electron transport chain, high energy bonds and oxidative phosphorylation, cell reproduction, Process of mitosis and meiosis.

Diversity of Life

Introduction: The enormous variety of living things, the need of classification to cope with this variety; taxonomy and phylogeny; shortcoming of a two-kingdom classification as plants and animals; a five-kingdom classification. Monera, Protista, Plantae, Fungi and Animalia. The basic features of five kingdom classification; modes of obtaining nutrition-autorophs and heterotrophs. Life styles: Producers, consumers and decomposers, Unicellularity and multicellularity phylogenetic relationships. Concepts of species, taxon and categories hierarchical levels of classification; biomial nomenclature; principles of classification and nomenclature; identification and nature of viruses and bacteriophages and organisms kingdom Moera-archeabacteria life in extreme environments; Bacteria, actinomycetes, Cyanobacteris. Examples of illustrate autotrophic and heterotrophic life style; mineralizer-nitrogen fixers; Monera in cycling matter, symbiotic forms; disease producers. Kingdom Protista-Eucaryotic unicellular organisms; development of flagella and cilia; beginning of mitosis; syngamy and sex. Various life styles shown in the major phyla. Evolutionary precursors of complex life forms. Diatoms, dinoflagellates, slime moulds, protozons; symbiotic forms. Plant-kingdom complex autotrophs, red brown and green algae; conquest of land, bryophytes, ferns, gymnospherms and angiospherms. Vasculrization; development of flower, fruit and seed, Kingdom fungi-lower fungi (Zygomycetes) higher fungi; (Ascomycetes and Basidiomycetes); the importance of fungi, Decomposers; parasitic forms; lichens and mycorrhizae, animal kingdom-animal body patters and symmetry. The development of body cavity in invertebrate vertebrate physia. Salient features with reference to habitat and example of phylumporifera, coelenterata, helminthis, annelids, mollusca, arthropoda, ethindoerms; chordata-(Classes-fishes, amphibians, reptiles, birds and mammal) highlighting major characters.

Organism and Environment

Species: Origin and concept of species population; interaction between environment and populations; community, Biotic community, interaction between different species, biotic stability, changes in the community-succession, Ecosystem; interaction between biotic and abiotic components; major ecosystems, manmade ecosystem-Agroecosystem. Biosphere; flow of energy, trapping of solar energy, energy pathway, food chain, food web, biogeochemical cycles, calcium and sulphur, ecological imbalance and its consequences. Conservation of natural resources; renewable and non-renewable (in brief). Water and land management, wasteland development. Wild life and forest conservation; causes for the extinction of some wild life, steps taken to conserve the remaining species, concept of endangered species-Indian examples, conservation of forest; Indian forests, importance of forests, hazards of deforestation, afforestation. Environmental pollution; air and water pollution, sources, major pollutants of big cities of our country, their effects and methods of control, pollution due to nuclear fallout and waste disposal, effect and control, noise pollution; sources and effects.

Multicellularity: Structure and Function of Plant Life

Form and function: Tissue system in flowering plants; meristematic and permanent. Minerals nutrition-essential elements, major functions of different elements, passive and active uptake of minerals. Modes of nutrition, transport of solutes and water in plants, Photosynthesis; photochemical and biosynthetic phases, diversity in photosynthetic pathways, photosynthetic electron transport and photophosphorylation, photorespiration. Transportation and exchange of gases. Stomatal mechanism. Osmoregulation in plants; water relations in plant cells, water potential. Reproduction and development of male and female gametophytes in angiospersm, pollination, fertilization and development of endosperm, embryo seed and fruit. Differentiation and organ formation. Plant hormones and growth regulation; action of plant hormones in relation to seed dormancy and germination, apical dominance, senescence and abscission. Applications of synthetic growth regulators.

A brief account of growth and movement in plants. Photomorphogenesis in plants including a brief account of phytochrome.

Multicelluriarity: Structure and Function of Animal Life

Animal tissues, epithelial, connective, muscular, nerve. Animal nutrition; organs of digestion and digestive process, nutritional requirements for carbohydrates, proteins, fats, minerals and vitamins; nutritional imbalances and deficiency diseases. Gas exchange and transport: Pulmonary gas exchange and organs involved, transport of gases in blood, gas exchange in aqueous media. Circulation: closed and open vascular systems, structure and pumping action of heart, arterial blood pressure, lymph, excretion and osomoregulation. Ammonotelism,

Ureotelism, uricotelism, execretion of water and urea with special reference to man. Role of kidney in regulation of plasma, osmolarity on the basis of nephron structure, skin and lung in excretion. Hormonal coordination; hormones of mammals, role of hormones as messengers and regulators.

Nervous coordination : Central autonomic and peripheral nervous systems, receptors, effectors, reflex action, basic physiology of special types of skeletal muscles according to types of movement, basic aspects of human skeleton. Reproduction; human reproduction, female reproductive cycles. Embryonic development in mammals (upto three germs layers), growth, repair and ageing.

Continuity of Life

Heredity and Variation: Introduction, Mendel's experiments with peas and idea of factors. Mendel's law of inheritance. Genes: Packaging of heredity material in prokaryestes bacterial choromosome; plasmid and eukaryote chromosomes, extranuclear genes, viral genes, Linkage (genetic) maps. Sex determination and sex linkage. Genetic material and its replication, gene manipulation. Gene expression; genetic code, transcription, translation, gene regulation. Molecular basis of differentiation.

Origin and Evolution of Life

Origin of life: Living and non-living, chemical evolution, organic evolution, Oparin ideas, Miller-Urey experiments. Interelationship among living organisms and evidences of evolution: fossil records including geological time scale, Morphological evidence hemology, vestigial organs, embryological similarities and biogeographical evidence.

Darwin's two major contributions: Common origin of living organism and recombination as sources of variability, selection acts upon variation, adaptation (Lederberg's replica plating experiment for indirect selection of bacterial mutants), reproductive isolation, speciation. Role of selection change and drift in determining compostion of population. Selected examples: industrial melanism; drug resistance, mimicry, malaria in relation to G-6-PD deficiency and sickle cell disease.

Human evolution: Paleontological evidence, man's place among mammals. Brief idea of Dryopithecus, Austrapithecus, home erectus, H. neadnderthelenses. Cromagnon man and homo sapiens. Human chromosomes, similarity in different racial groups. Comparison with chromosomes of non-human primates to indicate common origin; Cultural vs. biological evolution Mutation their role in speciation. Their origin in speciation, their origin in organisms.

Paleontological evidence, man's place among mammals. Brief idea of Dryopithecus, Austrapithecus, home erectus, H. neadnderthelenses. Cromagnon man and homo sapiens.

Human chromosomes, similarity in different racial groups. Comparison with chromosomes of non-human primates to indicate common origin; Cultural vs. biological evolution Mutation their role in speciation. Their origin in speciation, their origin in organisms.

Application of Biology

Introduction, Role of Biology in the amelioration of human problems. Domestication of plants-a historical account, improvement of crop plants; principles of plant breeding and plant introduction. Use of fertilizers and economic and ecological aspects.

Use of pesticides: Advantages and hazards. Biological methods of pest control. Crops today. Current concerns, gene pools and genetic conservation. Underutilized crops with potential uses for oilseeds, medicines, beverages, spices, fodder, New crops-Leucaena (Subabbul), Jojoba, Guayule, winged bean etc. Biofertilisers-green manure, crop residues and nitrogen fixation (symbiotic, non symbiotic). Applications oftissue culture and genetic engineering in crops. Domestication and introduction of animals. Livestock, poultry, fisheries, (fresh water, marine, acquaculture). Improvement of animals; principles of animal breeding. Major animals diseases and their control. Insects and their products (silk, honey, wax and lac). Bioenergy-biomass, wood (combustion, gastification, ethanol). Cow dung cakes, 'gobar gas', plants as sources of hydrocarbons for producing petroleum, ethanol from starch and lignocellulose. Biotechnology, a brief historical account-manufacture of cheese, yogurt, alcohol, yeast, vitamins, organic acids, anti-biotics, steroids, dextrins. Scaling up laboratory findings to industrial production. Production of insulin, human growth hormones, interferon. Communicable disease including STD and diseases spread through blood transfusion (hepatitis, AIDS, etc.) immune response, vaccines and antisera. Allergies and inflammations. Inherited diseases and, sex-linked diseases, genetic incompatibilities, and genetic counselling, Cancer-major types, causes, diagnosis and treatment. Tissue and organ transplantation. Community health services and measures. Blood banks. Mental health, smoking, alcoholism and drug addiction-physiological symptoms and control measures. Industrial wastes, toxicology, pollution-related diseases. Biomedical engineering-spare parts for man, instruments for diagnosis of diseases and care. Human population related diseases. Human population growth problems and control, inequality between sexes-control measures; test-tube babies, amniocentesis. Future of Biology.