PPHT 2025-26

भौतिकी (Physics)

Units and dimensions, Dimensional analysis, S.I. Units, motion in two dimensions. Cases ofuniform velocity and uniform acceleration, General relation among position and velocity. Uniform circularmotion, Force and inertia, Newton"s laws of motion .conservation of momentum and energy Static and kineticfriction .

Work energy and power, Elastic collisions . Potential energy , Gravitational potential energy and itsangular conversion to kinetic energy. Potential energy of a spring . Rigid body rotation and conservation of itsmomentum, Moment of inertia, theorems of parallel and perpendicular axis, (Moment of inertia of uniformring, disc thin rod and cylinder only).

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

Hookes law, Young"s modulus, shear and bulk modulus, surface energy and surface tension, kinetictheory of gases, gas laws, kinetic energy and temperature.

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

Heat conduction in one dimension. convection and radiation. Stefan"s law and Newton"s law ofcooling.

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"seffect 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.

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, pnjunction as a rectifier.

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, Guass's law in simple geometricsElectrostatic potential, capacitance, parallel plate and spherical capacitors, capacitors in series andparallel, energy of a capacitor.

Electric current, Ohm"s law, Kirchoffs laws, resistances in series and parallel, temperature dependenceof resistance, wheat ston bridge, potentiometer.

Measurement of voltages and 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 soienoid.

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

Electromagnetic induction induced emfFaraday"s law. Lenz"s law, self and mutual inductance.

Alternating currents impedence and reactance growth and decay of current in L-R curcuit, elementary idea ofdynamo and transformer.

रसायन (CHEMISTRY)

GENERAL AND PHYSICAL CHEMISTRY

1. Structure of Atom : Constitution of nucleus : Bohr's atom model : quantum numbers aufbau

principle electronic configuration of elements (upto-kr) : de-Broblie relation, shapes of orbitals.

2. Chemical bond : Electrovalent covalent and co-ordinate bonds, hybridisation (sp): hydrogen

bond : shapes of molecules (VSEPR theory) : bond polarity resonance. Elements of VBT a

M.O.T.

3. Solutions: Modes of expressing concentrations of solutions : Types of solutions, Raoults law ofcoUigative properties, non-ideal solution, abnormal molecular weights.

4. Solid State : Crystal lattices, unit celts, Structure of ionic compounds close packed structure

Ionic radii, imperfections (Point defects) : properties of solids

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

6. Chemical equilibrium: Chemical equilibrium, Law of mass action Kp and Kc: Le-Chatelier

principle and its applications.

7. Ionic Equilibria in solutions, Solubility product, common ion effect, theories of acids and basehydrolysis of salts: pH: buffers.

8. Thermochemistry and Thermodynamics: Energy changes during a chemical reaction intrinsicenergy, enthalpy; First law of thermodynamics : Hess"s law Heats of reactions; Second law ofthermodynamics; entropy ; free energy; spontaneity of a chemical reaction, free energy changeand chemical equilibrium; free energy as energy available for useful work.

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

10. Electrochemistry: Oxidation, Oxidation number and ion-electron methods, Etectrolytic

conduction, Faraday's laws: voltaic cell, electrode potentials, electromotive force, Gibb's

energy and cell potentials. Nernest equation, commercial cells, fuel cell, electrochemical theoryof corrosion.

11. Surface chemistry, Colloids and Catalysis-, Adsorption, Colloids (types preparation and

properties), Emulsions, Micelles Catalysis: Types and characteristics.

INORGANIC CHEMISTRY:

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

13. Chemical periodicity: s,p,d. and f-block elements, periodic Table, periodicity, atomic and ionicradii valency, ionization energy, electron affinity, electronegavivily, metallic character.

14. Comparative study of elements: Comparative, study of the following families of elements: (i)Alkalimetals (ii) Alkaline earth metals (iii) Nitrogen family (iv) Oxygen family (v) Halogens

(vi) Noble gases.

15. Transition metals : Electronic configuration of 3rd-Metal ions, oxidation states, other generalcharacteristic properties, potassium permanganate, potassium dichromate.

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

bonding in organometallics.

17. Chemical analysis: Chemistry involved is simple inorganic qualitative analysis : calculationsbased on acid base titrimetry

ORGANIC CHEMISTRY

18. 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.

19. Preparation properties and uses of alkynes, alkynes and alkylnes , benzene petroleum, cracking,octane number, gasoline additives.

20. Nomenclature. Physical Chemical properties, correlation of physical properties with structuresproperties and uses of heloalkanes, halobenzenes, alcohols and phenols : General ideas ofsome polyhalogen compounds viz. dichloroethanes, dicholoroethers, chloroform, carbontetrachloride, D.D.T., benzene, hexachloride.

21. Nomenclature, methods of preparation, Chemical properties, correlations of physical propertieswith structures and uses of ethers, aldehydes, ketones, carboxylic acids and their derivatives.Brief account of the chemistry of Cyanides, isocyanides, amines and nitro compounds.

22. polymeys Classification : Preparation and uses of common natural and synthetic polymeys.

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

गणित (MATHEMATICS)

1. ALGEBRA: Algebra of complex numbers. Graphical representation complex numbers.

moduls and argument of complex numbers, conjugated of a complex number Triangle

inequality. Cube roots of unity. Arthmetic, geometric and harmonic progression Arithmetic

geometric and harmonic means between two numbers. Sum of squares and cubes of first

Natural numbers. Theory geometric equations relations between roots and coefficients.

Quadratic expressions, quadratic equations in one variable, permutations and combinations,

binomial Theorem (any index) exponential and logarithmics series. Determinants upto third

order and their order and their elementary properties Matrices types of matrices, adjoint and

inverse of matrix, elementary properties of matrices. Application in solving simultanceous

equationsupto three variables.

2. TRIGONOMETRY : Trigonometry functions and their graphs, addition and subtraction

Formula involving multiple and submultiples angles, general solutions of triangles equations,

Relations between sides and angles of a triangles. Solutions of triangles, inverse;

trigonometrical functions, height and distance (Simple Problems).

3. CO-ORDINATE GEOMETRY OF TWO DIMENSIONS : Rectangular Cartesian coordinates. Straight line pair to straight line, dislance of a point from a line angle between two

lines.Circle, tangents and normal system of circles.Conic section Payabola Ellipse and Hyperbola in standard forms with elementary.properties tangents and normals.

4. CO-ORDINATE GEOMETRY OF THREE DIMENSIONS : Rectangular co-ordinate

system, Direction cosines and direction ratios, equation of place in standard forms.Perpendicular distance from a point equation of a line angle between two lines.

5. VECTOR ALGEBRA :Definition of vector , addition of vectors. Components in threedimensional space. Scalar and vector products. Triple products. Simple application ingeometry and mechanics.

6. DIFFERENTIAL CALCULUS : function polynomial, rational trigonometric, logarithmic andexponential. Inverse function, Limit continuity and differentiability of functions, differentiationof rational. trigonometry and exponential functions. Application of derivative in elementaryproblems in mechanics increasing and decreasing functions. Maxima and Minima of functionof one variable. Roll's theorem and mean value theorem.

7. INTEGRAL CALCULUS : Integrations as the inverse process of differentiation. Integrationby parts. By substitution and by partial fraction. Definite integral. Areas under simple cures.

8. DIFFERENTIAL EQUATIONS : Formulation of differential equation, order and degree.Solution of differential equations by separation of variable method . Homogeneous form Lineardifferential equation of first order.

9. STATISTICS : Probability addition and multiplication laws. conditional probability. binomial

distribution Simple problems in correlation and regression.

10. NUMERICAL METHODS : Solution of equation by the methods of bisection, false-positionand Newton-Raphson. Numerical integration by trapezoided and Simpsons"s Rule.

11. LINEAR PROGRAMMING : Definition and formation of linear programming problems.Solution by graphical method.

जीवविज्ञान (BIOLOGY)

वनस्पतिविज्ञान (BOTANY) (भाग —1)

Structral Organisation of cell, theory : Light and Electron Microscopic view of cell Structure andfunctions of cell organelles : Nucleus, Mitochondria. Chloroplast. endoplasmic reticulum, Golgi complex,lysosome, micro bodies, microfilaments. Ribosomes.

Centrioles, and plasmids. Eukaryotic Chromosome(Morphology) cell and plasma membrane. Differences between plant and animal cell CellDivision , Cellcycle singnifice of Mitosis and Meiosis.

Mendel"s Laws of inheritance, Monohybrid and dihydrid cross; Linkagae and crossing over of geneticmaterial; DNA replication, genetic code, transcription, translation and gene regulation.

Difference between prokaryote and Eukaryotes; Stucture, reproduction and economic importance ofvirouses, Mycoplasma, Bacteriophage, Cynobacteria (Nostoc) and Bacteria.

Five kingdom classification; Binomial nomenclature; External morphology and life cycle of Spirogyra,Mucor, Funaria, Selaginella and pinus.

Elementary knowlege of Microsporogenesis, megasporogenesis, Fertilisation, endosperm and embryo

development in Angiosperms.

Tissue and tissue systems. Meristeniatic and permanent issue. Mineral nutritionessential elements andtheir functions. Uptake of minerals transport of water arid solutes. Transpiration Photosynthesis andRespiration-Importance, mechanism arid factors affecting these processes; photorespiration.

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

Ecosystem-Structures and function; Major ecosystems i.e. Lake and Forest; Food chain. Food Web andEnergy flow. Ecological crists-Role of man in Polluting Environment-Air, Water and Soil.

Role of plants in human welfare : A general knowledge of plant products of economic value-Drugs,Fibers, cereals(Wheat and Rice) Pulses (gram), Oil Seeds (Ground nut). Sugarcane, Coal and Petroleum.

Food preserevation Methods and importance.

principles of plant breeding and its role in improvement of crops. Biotechnology; scope and importancein Agriculture and Industries Manufacture of cheese, Yoghurt Alcohol Antibiotics

प्राणीशास्त्र (ZOOLOGY) (भाग–2)

Multicellularity-Structure And Functions of Animal Life :

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

- Histology of Mammalian organs- Stomach, Intestine, Liver Kidney, Lung, Testis and Ovary.

- Structure and physiology of different organ systems of Human body-skin, Digestive System,

Respiratory System, Circulatory System, Excretory system, Nervous system, Reproductive system.

- Skeleton, joints, Muscles on the basis of movement, Receptors.

- Endocrine system with special reference to various Endocrine glands of man and Hormonal coordination Vitamin & minerals (source and disorders due to deficiencies).

DEVELOPMENTAL BIOLOGY AND GENETICS:

- Female reproductive cycles in mammals. Gametogenesis alongwith structure of Sprerm and

ovum.

- Types of eggs. Fertilization, cleavage, types of cleavage and blastula. Development of mammalsuptothree germinal layers, Foetal membranes- Structure and functions in mammals.

- Growth, repair and ageing, amniocentesis.

- Chromosomes, types of chromosome, Human Karyotype and chromosomal abnormalities andsyndromes. Hormonal, Chromosomal and Genic balance theory of sex determination. Sex linkage andSex linked inheritance in Man.

- Blood Groups and their significance, Blood bank.

- Tissue culture, Genetic engineering (Brief idea). Mutation, gene mutation.

- Human population-Natality, Mortality, Sex ratio, Population explosion, dynamics Of human life withrespect to food supply, housing, health and standard of living impact of population, problems and theircontrol.

TAXONOMY EVOLUTION ECONOMIC ZOOLOGY:

- Classification-Bionomial and trionomial nomenclature, Basic features of classification.

- Classification of different animal phyla upto classes with characters and suitable examples.

- ORIGIN OF LIFE. Theories of Organic evolution-Darwin, Lamarck, Synthetic. Evidences of organicevolution. Human evolution.

- Economic Zoology' Sericulture, Apiculture, Lac culture, Poultry, fishery and peral industry.

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

- Cancer-types of cancer and cancer cell.

- Communicable diseases (Hepititis, AIDS) STD, Immune Response, Vaccines and antisera,

Allergies.

- Smoking, alcoholism and drug addiction, symptoms and control.

- Wild life conservation.

- pesticides-Uses, advantages and hazards.