

SYLLABUS FOR TET(HIGHER SECONDARY)
PAPER-II
OPTION-B
Total Marks- 100

(CANDIDATES CAN CHOOSE ANY TWO PARTS FROM THIS SYLLABUS)

PART I- PHYSICS (50 Marks)

- Unit 1:** Units of measurement; systems of units, fundamental and derived units, Dimensions of physical quantities. Vectors and scalars.
- Unit 2:** Motion in a straight line, Motion in a plane, projectile motion, Uniform circular motion.
- Unit 3:** Concept of force. Inertia, Newton's laws of motion; Law of conservation of linear momentum and its applications. Static and kinetic friction
- Unit 4:** Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power. Potential energy of a spring, conservative forces; conservation of mechanical energy, elastic and inelastic collisions in one and two dimensions.
- Unit 5:** Centre of mass of a two-particle system, Centre of mass of a rigid body; Moment of a force, torque, angular momentum, conservation of angular momentum. Rigid body rotation and equation of rotational motion, moment of inertia.
- Unit 6:** Kepler's laws of planetary motion. The universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth. Gravitational potential energy; gravitational potential. Escape velocity, orbital velocity of a satellite. Geostationary satellites.
- Unit 7:** Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity, Poisson's ratio; Pressure due to a fluid column; Pascal's law, Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow. Bernoulli's theorem and its applications. Surface energy and surface tension, angle of contact, capillary rise.
- Unit 8:** Heat, temperature, thermal expansion; thermal expansion of solids, liquids, and gases. Specific heat capacity: C_p , C_v , Calorimetry; change of state – latent heat. Heat transfer – conduction and thermal conductivity, convection and radiation. Black Body Radiation, Wein's displacement law, Newton's law of cooling and Stefan's law.
Thermal equilibrium and definition of temperature (zeroth law of Thermodynamics). Heat, work and internal energy. First law of thermodynamics. Isothermal and adiabatic processes. Second law of thermodynamics: Reversible and irreversible processes. Carnot engine.
- Unit 9:** Kinetic theory of gases: concept of pressure. Kinetic energy and temperature; *rms* speed of gas molecules; degrees of freedom, law of equipartition of energy.
- Unit 10:** Periodic motion –Periodic functions. Simple harmonic motion and its equation; oscillations of a spring, energy in SHM; simple pendulum, free, forced and damped oscillations, resonance. Wave motion. Longitudinal and transverse waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics. Beats. Doppler Effect.
- Unit 11:** Electric charges and their conservation. Coulomb's law. Electric field, electric field due to a point charge, electric field lines; electric dipole, electric field due to a dipole; torque on a dipole in a uniform electric field. Electric flux, Gauss's

theorem and its applications, uniformly charged thin spherical shell, capacitors and capacitance, combination of capacitors in series and in parallel, energy stored in a capacitor.

- Unit 12:** Electric current, flow of electric charges in a metallic conductor, drift velocity, Ohm's law, electrical resistance, electrical energy and power, series and parallel combinations of resistors; Kirchhoff's laws and simple applications. Wheatstone bridge.
- Unit 13:** Concept of magnetic field, Biot-Savart law and its application to current carrying circular loop. Ampere's law. Force on a moving charge in uniform magnetic and electric fields. Force on a current-carrying conductor in a uniform magnetic field. Force between two parallel current carrying conductors – definition of ampere. Torque experienced by a current loop in a magnetic field; moving coil galvanometer, conversion to ammeter and voltmeter. Earth's magnetic field and magnetic elements. Para-, dia- and ferro - magnetic substances, with examples.
- Unit 14:** Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance. Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance; AC generator and transformer.
- Unit 15:** Electromagnetic waves and their characteristics (qualitative ideas only). Electromagnetic spectrum.
- Unit 16:** Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Magnification, power of a lens, Refraction and dispersion of light through a prism. Human eye, defects of eyes. Microscopes and astronomical telescopes
Wave optics: Wave front and Huygens' principle, Interference, Young's double hole experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, Polarization, plane polarized light.
- Unit 17:** Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation – particle nature of light. Matter waves – wave nature of particles, de Broglie relation.
- Unit 18:** Alpha - particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum. Isotopes, isobars; isotones. Radioactivity – alpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.
- Unit 19:** Energy bands in solids, conductors, insulators and semiconductors; forward and reverse bias, diode as a rectifier; Junction transistor, transistor as an amplifier.

PART II : CHEMISTRY (50 Marks)

Unit 1 : Some Basic Concepts of Chemistry

SI units of measurements, Significant figures, Mole concept, simple calculations based on mole concept, Simple stoichiometric calculations.

Unit 2 : Atomic Structure

Bohr's model of hydrogen atom : Postulates, energy expression (no deduction), limitations, explanation of spectrum of hydrogen, Dual nature of matter, Heisenberg's uncertainty principle, Quantum mechanical model of atom : concepts of atomic orbitals & their shapes, quantum numbers, Ground state Orbital electronic configurations of atoms : Aufbau principle, Pauli exclusion principle, Hund's rule.

Unit 3 : Periodic classification of Elements and Periodicity in Properties

Modern periodic law, Classification of the elements in the periodic table : alkali metals, alkaline earth metals, halogens, noble gases, transition elements, Periodic properties : atomic size, ionic size, ionization enthalpy, electron gain enthalpy, electronegativity - their definitions, group and periodic variations.

Unit 4 : Chemical Bonding

Concept of electrovalent or ionic bond & covalent bonds : Lewis structure of NaCl, CaCl₂, CH₄, H₂O, C₂H₄ molecules

Concept of hybridization : predictions of shapes of BeCl₂, BCl₃, CH₄, NH₃, H₂O, C₂H₄, C₂H₂, molecules

Hydrogen bonding : Basic concepts of inter and intra molecular hydrogen bonding, their impact on melting point, boiling point, solubility, viscosity.

Unit 5 : Basic concepts of Thermodynamics

Concepts of system, surroundings, extensive & intensive properties, state & path functions, First law of thermodynamics : statement, concept of internal energy & enthalpy, Second law of thermodynamics : entropy statement, concept of entropy & Gibb' free energy : conditions for spontaneity.

Unit 6 : Equilibrium

Basic concepts of Lewis theory – classification of matter into acid and bases.

Concept of pH & pH scale.

Unit 7 : Basic concepts of states of matter

Types of intermolecular forces in gas, liquid & solids, Ideal gas laws : Boyle's law, Charles law, Avogadro's law, ideal gas equation (no mathematical derivations), Deviation from ideal behavior : causes, van der Waals equation, Surface tension of liquids : definition, SI unit,

consequences, Viscosity, co-efficient of viscosity : definition, SI unit, consequences, Examples of molecular, ionic, covalent & metallic solids, Concept of unit cell, cubic unit cell- primitive, bcc, and fcc & number of atoms per unit cell.

Unit 8 :Basic concepts of electrochemistry

Conductance in electrolytic solutions : definitions & SI units of specific and molar conductance, variations with concentration, Electrochemical cell : Galvanic cell – Daniell cell, its representation, emf, Standard electrode potential, Nernst equation

Unit 9 : Basic concepts of chemical kinetics

Concept of rate of reaction – average & instantaneous rates, Factors affecting rate of reaction : concentration, temperature, presence of catalyst, activation energy (elementary ideas), Rate law : concept of order and molecularity, expressions for differential & integrated rate laws and half life periods of zero, first order reactions (no derivation)

Unit 10 : s-,p- & d-block elements & their compounds

Hydrogen : Isotopes; hydrides (ionic, covalent, interstitial) with examples(preparation, properties not required); heavy water- general idea & uses,General electronic configurations, occurrence, oxidation states , trends in chemical reactivity of Gr 13 to Gr 17 elements, General electronic configurations, occurrence & uses of Gr 18 elements, Name and structures of oxoacids of nitrogen, phosphorous, sulphur and chlorine, Electronic configuration and oxidation states of 1st row transition series of elements.

Unit 11: IUPAC nomenclature, isomers of organic compounds, organic reagents, reaction intermediates (carbocation, carbanion and free radical- definition and example only).

IUPAC names of aliphatic and aromatic simple compounds having different functional groups, Structural isomerism : chain, position and functional group isomerism in compounds involving alcoholic –OH and >CO (carbonyl) groups.

Unit 12: BIOMOLECULES

Carbohydrates: Classification (aldoses and ketoses), monosaccharides (glucose and fructose), oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen); importance

Proteins ; Elementary idea of a – amino acids, peptide bond, polypeptides, protein, primary structure, secondary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins; enzymes

Vitamins : Classification and functions.

Nucleic Acids : DNA and RNA

POLYMERS: Classification: Natural synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers: natural and synthetic like polythene, nylon, polyesters, Bakelite, rubber

Unit 13 : Chemistry in everyday life

Example and therapeutic uses of antacids, analgesics and antibiotics,
Artificial sweetening agents– examples, Food preservatives–
examples, Basic difference between soap & detergents.

PART III BIOLOGY(50 Marks)

Unit 1 : Diversity of Living World

- A : Diversity and Classification of living organisms, binomial system of nomenclature -- fundamental idea.
- B : Salient features of Plants and animals
- C : Botanical gardens, herbaria. Zoological parks and museums.

Unit 2: Structural Organisation in Plants and Animals

- A : Tissues in plants and animals – elementary idea.
- B : Morphology, anatomy and function of different parts of flowering plants : Roots, stem, leaf, inflorescence, flower, fruits and seed. (fundamental ideas).
- C : Morphology, anatomy and function of different systems in annelid (earthworm) an insect (cockroach) and an amphibian (frog).

Unit-3 Cell Structures and Functions

- A : Cell : Structural differences between plant and animal cells.
- B : Cell Division : Mitosis, meiosis.
- C : Structure and function of Carbohydrates, proteins, lipids and nucleic acid.
- D : Enzymes : Types, properties and functions.

Unit-4 : Plant Physiology

- A : Movement of water, food, nutrients.
- B : Mineral nutrition
- C : Photosynthesis
- D : Respiration
- E : Plant growth and development

Unit-5 : Human Physiology

- A : Digestion and absorption
- B : Breathing and respiration
- C : Body fluids and circulation
- D : Excretory products and elimination
- E : Locomotion and movement
- F : Control and Coordination

UNIT-6: REPRODUCTION

A: Reproduction in Organisms :

Asexual Reproduction and Sexual Reproduction.

B: Sexual Reproduction in Flowering Plants:

Flower- A fascinating organ of Angiosperms; Pre-fertilization structures and events; Double Fertilization; Post –fertilization Events.

C: Human Reproduction :

The Male Reproductive System, The Female Reproductive System, Pregnancy and Embryonic Development, Parturition and lactation.

D: Reproductive Health.

Reproductive Health - Problems and Strategies, Population Explosion and Birth Control, Sexually Transmitted Diseases , infertility.

E: Principles of Genetics:

Mendel's laws of inheritance, Sex Determination, elementary ideas of mutation and genetic Disorders, DNA and RNA, replication, genetic code, Human Genome Project.

F: Evolution.

Origin of Life, Evolution of Life Forms – A Theory , Evidences for evolution, Origin and evolution of Man.

UNIT -7 BIOLOGY IN HUMAN WELFARE**A: Human Health and Diseases :**

Common Diseases in Human, Immunity.

B: Strategies for Enhancement in Food Production:

Animal Husbandry, Plant Breeding, Single Cell Proteins and Tissue Culture.

C: Microbes in Human welfare:

Microbes in Household Products and Industrial Products, Microbes in Production of Biogas, Microbes as Biocontrol Agents, Microbes as Biofertilisers.

UNIT-8: BIOTECHNOLOGY

Principles of Biotechnology, Tools and Process of Recombinant DNA Technology, applications of Biotechnology in Agriculture and Medicine, Transgenic plants and animals, Ethical Issues.

UNIT- 9 : ECOLOGY

A: Ecosystem – Structure and Function, Productivity, Decomposition, Energy Flow, Ecological Pyramids, Ecological succession.

B: Biodiversity and conservation, National park and Sanctuaries of Assam with special reference to conservation of endangered species.

C: Bioresources of Assam: Medicinal and Timber Yielding plants, Sericogenic Resources (Muga and Eri)

D: Environmental Issues : Air and water pollution and their Control, Solid Wastes , Agro Chemicals and their effects , Radioactive Wastes , Greenhouse Effect and Global Warming ,

PART IV MATHEMATICS (50 Marks)

Unit 1 : Quadratic Equations and Complex Numbers

Unit 2 : Arithmetic progression, geometric progression, Permutation and combination

Unit 3 : Trigonometric ratios of compound angle and deductions from them

Unit 4 : Equations of a line in different forms in two – dimensional coordinate geometry

Unit 5 : First order derivatives. Chain Rule. Derivatives of inverse circular functions, logarithmic functions, parametric functions

Unit 6 : Probability. Sample space and related terms.

$$P(E) + P(\bar{E}) = 1$$

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$

and their applications

- **Syllabus is of Higher Secondary standard.**

Sd/-

Member Secretary,

TET Empowered Committee

For Higher Secondary Education

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