PHYSICS

Test No.  Unit Covered/Topic Covered
01  Unit-1: BASIC MATHEMATICS USED IN PHYSICS

ALGEBRA: Quadratic Equation (Roots of quadratic equation, Solution by Factorization and by
Shridharacharya Formula, Properties of roots (real, equal, imaginary etc), Application of Quadratic
equation in physics), Binomial Theorem and binomial approximation, Logarithm and Exponents (Laws of
logarithms and exponents with applications / examples), Series (Arithmetic Progression and its
general term and Sum, Sum of first n Natural numbers, Geometrical Progression and its general
term and Sum, Sum of infinite GP ), Componendo & Dividendo rule.

TRIGONOMETRY: Angle & its measurement
(Sexagesimal and Circular system), Trigonometric-
ratios, Trigonometric identities, Four Quadrants &
ASTC rule, T-ratios for general angles, Addition/
subtraction Formulae, Small angle Approximation,
Ranges of T-functions.

CO-ORDINATE GEOMETRY: Define Origin, Axis or
Axes, Co-ordinates of a point in a plane or space (2D
or 3D), Distance Formula, Slope of a line and its
interpretation, Graphs of commonly used functions
(Straight line, Parabola, Circle, Ellipse, Hyperbola I
cluding rectangular hyperbola, Sinusoidal
functions (sine and cosine functions), Exponential
functions.

CALCULUS: Differential calculus (Average rate of
change and Instantaneous rate of change,
Differentiation of commonly used functions, Rules of
differentiation including Product and Quotient rules,
Application of derivatives: Increasing and Decreasing
nature, Maxima and Minima with geometrical /
graphical explanation), Integral calculus (Integration
is the reverse process of differentiation, Indefinite
and Definite Integration, Integration of commonly
used functions, Rules of Integration, Application of
Integral calculus: Area under a curve and Average
value of a continuous function in an interval).

VECTORS: Definition of scalar and vector quantities,
Graphical representation of vectors, Notation of
Vectors, Angle between two vectors, Types of Vectors
(Unit vector, Null vector, Equal vectors and equality of
vectors, opposite and Negative of a vector, Parallel
and anti-parallel vectors, Co-planar vectors, axial
vectors), Position and displacement vectors, 
Addition/subtraction of two vectors (Triangle law,
Parallelogram law), Addition of many vectors
(Polygon law). Unit vectors and their significance
(Representation of vector in terms of unit vector in
plane and in space), Resolution of a Vector into
components i.e. Cartesian Components in two and
three dimensions and Direction Cosines,
Multiplication or Division of a Vector by a Scalar (i.e.
Real number), Scalar (Dot) product of two Vectors and
component of a vector in the direction of another
vector, Vector (Cross) product of two Vectors with its
generical interpretation and Right hand rule for
direction.

UNIT, DIMENSIONS AND MEASUREMENTS

Classification of Physical Quantities according to their
dependency i.e. Fundamental (or Base) and Derived
quantities, Need for measurement (Units of
measurement), Systems of units (FPS, CGS, MKS, SI
system of units and Supplementary units,
fundamental and derived units, Some idea about
Practical and Improper units), Standards of Length,
mass and time measurements, Dimensions of
physical quantities, Dimensional Formulae of
important physical quantities, Dimensional analysis
and its applications & its limitations, SI prefixes and
general guidelines for using Symbols of SI units,
Errors in measurement (Systematic, Random and
Least count Errors), Accuracy and precision of
measuring instruments; Absolute Error, Relative
Error, Percentage Error and Combination of Errors,
Significant figures and its rules for Arithmetic
operations (i.e. addition, subtraction, multiplication
division), Rounding off the uncertain digits.

Unit-2: KINEMATICS

(Motion along a straight line and Motion in a Plane)
Motion and Rest with introduction of frame of reference, Variables of Translatory Motion (Position/Displacement / Path length(Distance), Velocity/Speed / Average Velocity / Average Speed, Acceleration / Average Acceleration), Relation among various variables of motion and their applications to variable acceleration, Equations of Motion with constant acceleration (scalar and vector forms), Motion along a straight line, velocity-time and position-time graphs for uniformly accelerated motion (graphical treatment), Motion under gravity, Free-fall, Motion in a plane with constant acceleration, Projectile Motion – Ground to Ground projection, Projection from a height (Horizontal projection), Relative Motion in one-dimensions, Relative Velocity in two dimensions (Rain-Man problem, River-Boat Problem & wind based questions)

Unit-3: LAWS OF MOTION AND FRICTION
Intuitive concept of force, Basic or Fundamental forces in nature, The law of Inertia, Newton's first law of motion, Momentum and Newton's second law of motion; Impulse, Newton's third law of motion, Common forces in mechanics-Weight, Normal reaction, Friction, Contact force, Tension in string, Free Body diagram, Equilibrium of concurrent forces-Lami's theorem, Motion of bodies in contact or connected by strings, Pulley systems, Frame of Reference-Inertial and Non Inertial Frames. Pseudo Force and its applications, Cause of Friction, Static and Kinetic friction, Laws of friction, Limiting Static and Kinetic friction coefficients, Angle of Friction, Angle of Repose, Rolling friction, Lubrication.

Unit-4: WORK, ENERGY, POWER
Work done by a constant force (use of dot product) and variable force(use of definite integration i.e. area under the curve), Kinetic energy, Work-energy theorem for a Constant and a Variable force, Concept of potential energy, conservative forces and non-conservative forces. Gravitational Potential Energy, Potential energy versus position graph and stable, unstable & neutral equilibrium, Spring force and Elastic Potential energy of a spring, Conservation of mechanical energy (kinetic and potential energies), Power (Instantaneous and Average power).

Unit-5: COLLISIONS AND CENTRE OF MASS
Impulse of a force and Impulse-Momentum theorem, Idea about Impulsive forces, Law of conservation of linear momentum and its applications, Elastic and inelastic collisions in one and two dimensions (Head-on and Oblique collisions), Coefficient of restitution and line of impact, Expression of loss in Kinetic energy in inelastic collision, Centre of mass of discrete system: two-particle system and n-particle system, Centre of mass of continuous system: General formula, Centre of mass of symmetrical rigid bodies; centre of mass of uniform rod, Centre of mass of composite and truncated bodies, Motion of centre of mass: Velocity, Acceleration and linear momentum vector of centre of mass of the system, Momentum conservation and centre of mass motion.

Unit-6: ROTATIONAL MOTION
Kinematics of Rotational Motion about a fixed axis: Comparison of linear and rotational motions, Moment of inertia, radius of gyration and its significance. Values of M.I. for simple geometrical objects (Ring, Rod and Disc with derivation and others with no derivation), Statement of parallel and perpendicular axes theorems and their applications, Moment of a force-torque, Equilibrium of rigid
bodies, Angular momentum, Relation between torque and Angular momentum, Conservation of angular momentum with some examples, Pure Rolling or rolling motion on a smooth/rough horizontal surface. Expression for Rotational Kinetic Energy, Rolling motion on an inclined plane, Expression for acceleration and minimum friction coefficient.

**Unit-7: THERMAL PHYSICS**

(Thermal Expansion, Calorimetry, Heat Transfer, KTG & Thermodynamics)

Temperature and Thermal Expansion: (Temperature, Temperature scales, Brief idea about thermometers, Thermal expansion; thermal expansion of solids, liquids, and gases. Anomalous expansion)

Calorimetry: (Heat, Heat capacity, Specific heat capacity, Molar heat capacity, Water Equivalent, Heat of transformation – latent heat, Principle of Calorimetry, Heating curve, Phase diagram)

Heat transfer


Kinetic theory of gases: Gas Laws, Equation of state of a perfect gas, Brief idea of van der Waals’ equation and Critical temperature, Assumptions, Concept of pressure. Different types of speeds of gas molecules, Maxwell’s velocity distribution curve, Kinetic energy and temperature; Degrees of freedom, Law of equipartition of energy (statement only) and application to specific heat capacities of gases; Concept of mean free path.

**Unit-8: PROPERTIES OF MATTER AND FLUID MECHANICS**

Elastic behavior, Stress-strain relationship, Hooke’s law, Young’s modulus, bulk modulus, shear modulus of rigidity, Poisson’s ratio; elastic energy. Pressure, Pascal’s law, Archimedes’ Principle and Buoyancy. Floatation and Translatory equilibrium, Variation of Pressure with Depth, Atmospheric pressure and Gauge Pressure, Hydraulic Machines, Streamline and turbulent flow, Critical velocity and Reynolds’s number, Principle of Continuity, Bernoulli’s theorem and its applications. Speed of Efflux: Torricelli’s law, Venturi-meter, Dynamic lift, Viscosity, Newton’s law of viscous force, Stokes’ law, terminal velocity, Surface energy and surface tension, angle of contact, excess of pressure, application of surface tension ideas to drops, bubbles and capillary rise. Detergent and surface tension.

**Unit-9: GRAVITATION**

The universal law of gravitation (Newton’s law of Gravitation), Gravitational Field and its Intensity, Brief idea about Inertial and Gravitational mass, Acceleration due to gravity and its variation with altitude and depth. Idea about variation in g due to Shape and Rotation of earth, Gravitational potential energy and gravitational potential, Kepler’s laws of planetary motion (The law of orbits, Areas and Periods), Motion of Planets and Satellites in Circular orbits, Orbital velocity of a satellite, Total Energy and Binding Energy of a satellite, Escape velocity and escape energy, Geostationary satellites, Idea about of polar satellites, Weightlessness.
Pre-Medical (NEET (UG), AIIMS)

[For both English/Hindi Medium Students]


Thermal expansion; thermal expansion of solids, Temperature scales, Brief idea about thermometers, & Thermodynamics)

Syllabus of Test # 5, 6 & 7

Expression for acceleration and minimum friction Energy, Rolling motion on an inclined plane, angular momentum with some examples, Pure torque and Angular momentum, Conservation of:

THERMAL PHYSICS

Varun Muppidi

AIR-6

Distance

NEET (UG) Result 2018

NURTURE

Test Series Syllabus

OSCILLATIONS

(SHM, damped and forced oscillations & Resonance)

Periodic (harmonic) motion and Oscillatory motion, Periodic motion-period, frequency, displacement as a function of time, Periodic functions, Simple harmonic motion (SHM) and its equation; Velocity, Acceleration and Phase, Oscillations of a spring-restoring force and force constant. Equivalent spring constant of Series and parallel combinations, Energy in SHM – Kinetic and Potential energies, Simple pendulum- derivation of expression for its time period, Superposition of two SHMs of Same Frequency in the same direction, Free, forced and damped oscillations (qualitative ideas only), resonance.

Unit-10: WAVE MOTION AND DOPPLER’S EFFECT


Syllabus of Test # 9 10, 11 & 12

Test No. 14 to 18 FULL Syllabus

CHEMISTRY

Test No. Unit Covered/Topic Covered

01 Unit-1: SOME BASIC CONCEPTS OF CHEMISTRY:

General Introduction: Importance and scope of chemistry. Laws of chemical combination, Dalton’s atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses. Mole concept and molar mass; percentage composition and empirical and molecular formula; chemical reactions, stoichiometry and calculations based on stoichiometry.

02 Unit-2: STRUCTURE OF ATOM:

Subatomic particles, Atomic models. Atomic number, isotopes and isobars. Concept of shells and subshells, dual nature of matter and light, de Broglie’s relationship, Heisenberg uncertainty principle, Bohr’s Model concept of orbital, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals-Aufbau principle, Pauli’s exclusion principles and Hund’s rule, electronic configuration of atoms, stability of half filled and completely filled orbitals.

03 Unit-3: CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES:

Why do we need to classify elements, Genesis of periodic classification. Modern periodic law and long form of periodic table, Nomenclature of elements with atomic number > 100, Electronic configuration of elements and types of elements. Periodic trends in properties of elements- atomic radii, ionic radii, ionization enthalpy, electron gain enthalpy, electronegativity, valency.

04 Syllabus of Test # 1, 2 & 3

05 Unit-4: CHEMICAL BONDING AND MOLECULAR STRUCTURE:


STATES OF MATTER:

Gases and Liquids: Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws of elucidating the concept of the molecule, Boyle’s law, Charle’s law, Gay Lussac’s law, Avogadro’s law, ideal behaviour of gases, empirical derivation of gas equation. Avogadro number, ideal gas equation.
Kinetic energy and molecular speeds (elementary idea), deviation from ideal behaviour, liquefaction of gases, critical temperature.

LIQUID STATE : Vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations).

06 **Unit-5: THERMODYNAMICS** : First law of thermodynamics-internal energy and enthalpy, heat capacity and specific heat, measurement of $\Delta U$ and $\Delta H$, Hess’s law of constant heat summation, enthalpy of : bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution. Introduction of entropy as state function, Second law of thermodynamics, Gibbs energy change for spontaneous and non-spontaneous process, criteria for equilibrium and spontaneity. Third law of thermodynamics-Brief introduction.

07 **Unit-6: EQUILIBRIUM** : Equilibrium in physical and chemical processes and applications, dynamic nature of equilibrium, law of chemical equilibrium, equilibrium constant, factors affecting equilibrium-Le Chatelier’s principle. Relationship between equilibrium constant $K$ and reaction Quotient $Q$.

Ionic equilibrium - ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of polybasic acids, acid strength, concept of $pH$, Hydrolysis of salts (elementary idea), buffer solutions, Henderson equation, solubility product, common ion effect (with illustrative examples).

08 **Syllabus of Test # 5, 6 & 7**

09 **Unit-7: REDOX REACTIONS** : Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions in terms of loss and gain of electron and change in oxidation numbers, application of oxidation number, equivalent concept of oxidising and reducing.

**HYDROGEN** : Position of Hydrogen in Periodic Table, Dihydrogen (H$_2$), Hydrides, Occurrence, isotopes, preparation, properties and uses of hydrogen; hydrides ionic, covalent and interstitial; physical and chemical properties of water, heavy water; hydrogen peroxide-preparation, reactions, uses and structure, Dihydrogen as a fuel.


07 **Unit-8: s–BLOCK ELEMENTS (Alkali and Alkaline Earth Metals)** : General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses. Preparation and Properties of some important Compounds: Sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate, biological importance of sodium and potassium. Anomalous behaviour of Be.

Industrial use of lime and limestone, biological importance of Mg and Ca. Some Important Compound of Calcium.


**Group 13 Elements** : General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group, Boron, some important compounds: borax, boric acids, boron hydrides. Aluminium: uses, reactions with acids and alkalies.

**Group 14 Elements** : General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of first element. Carbon, allotropic forms, physical and chemical properties: uses of some important compounds : (Carbon and Silicon) oxides, Important compounds of silicon and a few uses: silicon tetrachloride, silicones, silicates and zeolites & their uses.
Unit-10: HYDROCARBONS: Alkanes - Nomenclature, isomerism, conformations (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis.

Alkenes - Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation, chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov’s addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.

Alkynes - Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of hydrogen, halogens, hydrogen halides and water.

Aromatic Hydrocarbons - Introduction, IUPAC nomenclature; Benzene; resonance, aromaticity; chemical properties: mechanism of electrophilic substitution- Nitration sulphonation, halogenation, Friedel Craft’s alkylation and acylation; directive influence of functional group in mono-substituted benzene; carcinogenicity and toxicity.

ENVIRONMENTAL CHEMISTRY: Environmental pollution: Air, water and soil pollution, chemical reactions in atmosphere, smogs, major atmospheric pollutants, acid rain, ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming, pollution due to industrial wastes, green chemistry as an alternative tool for reducing pollution, strategy for control of environmental pollution.

Test No. 14 to 18 FULL Syllabus
transport; Plant – water relations – Imbibition, water potential, osmosis, plasmolysis; Long distance transport of water – Absorption, apoplast, symplast, transpiration pull, root pressure and guttation; Transpiration-Opening and closing of stomata; Uptake and translocation of mineral nutrients-Transport of food, phloem transport, Mass flow hypothesis; Diffusion of gases (brief mention).

**Mineral nutrition:** Essential minerals, macro and micronutrients and their role; Deficiency symptoms; Mineral toxicity; Elementary idea of Hydroponics as a method to study mineral nutrition; Nitrogen metabolism-Nitrogen cycle, biological nitrogen fixation.

**Respiration:** Exchange gases; Cellular respiration-glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); The respiratory balance sheet, Amphibolic pathways; Factors affecting photosynthesis.

**Plant growth and development:** Seed germination; Phases of Plant growth and plant growth rate; Conditions of growth; Differentiation, dedifferentiation and redifferentiation; Sequence of developmental process in a plant cell; Growth regulators-auxin, gibberellin, cytokinin, ethylene, ABA; Seed dormancy; Vernalisation; Photoperiodism.

**Enzymes:** types, properties, enzyme action, factors affecting enzyme action.

**Unit-8 : HUMAN PHYSIOLOGY - I : Digestion and absorption:** Alimentary canal and digestive glands; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; Caloric value of proteins, carbohydrates and fats; Egestion; Nutritional and digestive disorders – POM, indigestion, constipation, vomiting, jaundice, diarrhea, Vitamins.

**Locomotion and Movement:** Types of movement-ciliary, flagellar, muscular; Skeletal muscle- contractile proteins and muscle contraction; Skeletal system and its functions (To be dealt with the relevant practical of Practical syllabus); Joints; Disorders of muscular and skeletal system-Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.

**Unit-9 : HUMAN PHYSIOLOGY-II : Breathing And Respiration:** Respiratory organs in animals (recall only); Respiratory system in humans; Mechanism of breathing and its regulation in humans-Exchange of gases, transport of gases and regulation of respiration; Respiratory volumes; Disorders related to respiration-Asthma, Emphysema, Occupational respiratory disorders.


**Human circulatory system:** Structure of human heart and blood vessels; Cardiac cycle, cardiac output, ECG, Double circulation; Regulation of cardiac activity; Disorders of circulatory system- Hypertension, Coronary artery disease, Angina pectoris, Heart failure.

**Excretory products and their elimination:** Modes of excretion Ammonotely, ureotelism, uricotelism; Human excretory system structure and function; Urine formation, Osmoregulation; Regulation of kidney function-Renin-angiotensin, Atrial Natriuretic Factor, ADH and Diabetes insipidus; Role of other organs in excretion; Disorders; Uraemia, Renal failure, Renal calculi, Nephritis; Dialysis and artificial kidney.

**Unit-10 : HUMAN PHYSIOLOGY - III : Neural Control And Coordination:** Neuron and nerves; Nervous system in humans- central nervous system, peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; Reflex action; Sense organs; Elementary structure and function of eye and ear.

**Chemical coordination and regulation:** Endocrine glands and hormones; Human endocrine system- Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary Idea); Role of hormones as messengers and regulators, Hypo-and hyperactivity and related disorders (Common disorders e.g. Dwarfism, Acromegaly, Cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease).

**Syllabus of Test # 5, 6 & 7**

**Syllabus of Test # 9, 10, 11 & 12**

Test No. 14 to 18 FULL Syllabus