

PHYSICS

1. Units and measurement tools

- Distinguish between fundamental and derived quantities.
- Distinguish between different systems of unit and their use.
- Identify methods to be used for measuring lengths and distances of varying magnitudes.
- Check correctness of physical equations using dimensional analysis.
- Establish the relation between related physical quantities using dimensional analysis.
- Find conversion factors between the units of the same physical quantity in two different set of units.
- Identify different types of errors in measurement of physical quantities and estimate them.
- Identify the order of magnitude of a given quantity and the significant figures in them.
- Distinguish between scalar and vector quantities.
- Perform addition, subtraction and multiplication (scalar and vector product) of vectors.
- Determine the relative velocity between two objects.
- Obtain derivatives and integrals of simple functions.
- Obtain components of vectors.
- Apply mathematical tools to analyse physics problems.

2. Motion and Gravitation

- Visualise motions in daily life in one, two and three dimensions.
- Explain the necessity of Newton's first law of motion.
- Categorise various forces of nature into four fundamental forces.
- State various conservation principles and use these in daily life situations.
- Derive expressions and evaluate work done by a constant force and variable force.
- Organise/categorise the common principles between collisions and explosions.
- Explain the necessity of defining impulse and apply it to collisions, etc.
- Elaborate the limitations of Newton's laws of motion.
- Elaborate different types of mechanical equilibria with suitable examples.
- Apply the Kepler's laws of planetary motion to solar system.
- Elaborate Newton's law of gravitation.
- Calculate the values of acceleration due to gravity at any height above and depth below the earth's surface.
- Distinguish between different orbits of earth's satellite.
- Explain how escape velocity varies from planet.
- Explain weightlessness in a satellite.

3. Properties of Matter

- Explain the difference between elasticity and plasticity.
- Identify elastic limit for a given material.
- Differentiate between different types of elasticity modulus.
- Judge the suitability of materials for specific applications in daily life appliances.
- Identify the role of force of friction in daily life.
- Differentiate between good and bad conductors of heat.
- Relate underlying physics for use of specific materials for use in thermometers for specific applications.

4. Sound and Optics

- Apply and relate various parameters related to wave motion.
- Compare various types of waves with common features and distinguishing features.
- Analytically relate the factors on which the speed of sound and speed of light depends.
- Explain the essential factor to describe wave propagation and relate it with phase angle.
- Apply the laws of reflection to light.
- Mathematically describe the Doppler effect for sound waves.
- Apply the laws of refraction to common phenomena in daily life like, a mirage or rainbow.
- Identify the defects in images obtained by mirrors and lenses, with their cause and ways of reducing or eliminating them.
- Explain the construction and use of various optical instruments such as a microscope, a telescope, etc.
- Relate dispersion of light with colour and apply it analytically with the help of prisms.
- Describe dispersive power as a basic property of transparent materials and relate it with their refractive indices.
- Analyse the time taken to receive an echo and calculate distance to the reflecting objects.
- Explain reverberation and acoustic.

5. Electricity and Magnetism

- Distinguish between conductors and insulators.
- Apply coulomb's law and obtain the electric field due to a certain distribution of charges.
- Define dipole, obtain the dipolar field.
- Relate the drift of electrons in a conductor to resistivity.
- Calculate resistivity of various temperature.
- Connect resistors in series and parallel combination.
- Compare electric and magnetic fields.
- Draw electric and magnetic lines of force.
- Obtain magnetic parameters of the Earth.
- Solve numerical and analytical problems.

6. Communication and Semiconductors

- Explain the properties of an electromagnetic wave.
- Distinguish between mechanical waves and electromagnetic waves
- Identify different types of electromagnetic radiations from - rays to radio waves.
- Distinguish between different modes of propagation of EM waves through earth's atmosphere.
- Identify different elements of a communication system.
- Explain different types of modulation and identify the types of modulation needed in give situation.
- Distinguish between conductors, insulators and semiconductors based on band structure.
- Differentiate between p type and n type semiconductors and their uses.
- Explain working of forward and reverse biased junction.
- Explain the working of semiconductor diode.

CONTENT

Sr. No.	Title
1	Units and Measurement
2	Mathematical Methods
3	Motion in a plane
4	Laws of motion
5	Gravitation
6	Mechanical properties of solid
7	Thermal properties of matter
8	Sound
9	Optics
10	Electrostatics
11	Electric current through conductors
12	Magnetism
13	Electromagnetic waves and communication system
14	Semiconductors

BIOLOGY

1. Diversity in living world

- Analyse basic characteristics of living and non-living.
- Collect and analyse useful data by observing diversity of living organisms using different tools.
- Describe plants and animals in the surrounding on scientific basis and classify them using taxonomic hierarchy.
- Develop hobbies by watching and collecting the things (livings) and their conservation using databases.
- Classify different organisms based on cell structure, body organisation, mode of nutrition etc.
- Compare and analyse similarities and differences along with phylogeny amongst different groups of organisms.
- Recognise, analyse and compare structural similarities and differences and progressive evolutionary changes in different plants and animals.

2. Cell structure and functions

- Explain and draw the structure and functions of different cell organelles.
- Elaborate the role of nucleus in heredity and controlling characters with structure of chromosome.
- Compare cell division process and know their role in life cycle of organisms.
- Analyse and specify different biomolecules of cell with their role in structural and functional aspect of cell.

3. Structural organisation in organisms

- Explain basic morphology of dominant plant group of this era i.e. Angiosperms.
- Compare morphological features of different plant parts in different plant families.
- Draw floral parts and floral diagram.
- Identify economic importance of Angiosperms with respect to fruit and seeds.
- Compare morphological feature of two major classes of Angiosperms.
- Explain different types of tissues in plants and reasons for growth viz. primary and secondary.
- Analyse basic differences in anatomy of different plants like dicot and monocots with respect to root, stem and leaf.
- Elaborate different animal tissues and their role.
- Explain and draw mechanisms of different physiological process like digestion and excretion.

- Review the contribution of different scientists in systematics and taxonomy.

4. Plant physiology

- Explain the scientific reasons behind the various physiological activities based on relationship.
- Understand the relationship between chemical reactions of molecules in daily life and analyse them to solve various problems.
- . Review the contribution mode by different workers.
- Plan and implement programs about conservation of environment.
- Explain the importance of green energy and save energy in daily life.

5. Animal Physiology

- Explain the need and importance of various physiological processes.
- Explain the structural modifications, observed in various living organisms to carry out various physiological processes.
- Observe and correlate the histological structure of various organs with their function.
- Comprehend mechanisms by which these physiological processes help maintain homeostasis.
- Create memory maps, flow charts to depict major events in these processes.
- Develop insight about connection between life style/habits and physiology disorders.
- Collect information about latest diagnostic tools and treatments for various physiological disorders.
- Critically analyse given situational data and come up with rationale of possible physiological disorders suggest proper remedial measures.
- Perform various analytical tests to detect presence of certain components in food materials/waste products.

CONTENT

Sr. no.	Title
1	Living World
2	Systematics of living organisms
3	Kingdom plantae
4	Kingdom animalia
5	Cell structure and organisation
6	Biomolecules
7	Cell division
8	Plant tissue and anatomy
9	Morphology of flowering plants
10	Animal tissue
11	Study of animal type: Cockroach
12	Photosynthesis
13	Respiration and energy transfer
14	Human nutrition
15	Excretion and osmoregulation
16	Skeleton and movement

MATHEMATICS AND STATISTICS

PART-1

1. Angle and Its measurement

Topic: Angle

The student will be able to-

- understand angle of any measure.
- understand different systems of measurement of angle and relations between them.
- convert angle from one system to the other.

2. Trigonometric Functions

Topic: Trigonometric Functions

- understand definitions of trigonometric functions of angle of any measure.
- find the values of trigonometric functions of certain angles.
- draw graphs of trigonometric function.

3. Trigonometric Functions of compound angles and factorisation formulae

Topic: Trigonometric Functions of compound angles

- find the trigonometric functions of sum or difference of the angles.
- find the trigonometric functions of multiple and sub-multiple angles.
- express the sum or difference of two trigonometric functions as product.
- learn some rules of trigonometric ratios of angles of a triangle.

4. Determinants and Matrices

Topic: Determinant

- find value of a determinant.
- reduce determinant to simple form.
- solve linear equations in 2 or 3 variables.

- find area of triangle using determinants.

Topic: Matrices

- understand types of matrices
- Perform algebraic operations of the matrices

5. Straight Line

Topic: Straight Line

- understand locus and its equation.
- find equation of a straight line in different forms.
- find angle between given two straight lines and the distance of a point from given line.

6. Circle

Topic: Circle

- find equation of circle satisfying given conditions
- learn and use the properties of circle
- find the equation of tangent to the circle.

7. Conic Section

Topic: Parabola, Ellipse, Hyperbola

- find the equations of conic sections satisfying given conditions.
- learn and use the properties of conics
- find the equation of tangent to the conic

8. Measures of dispersion

Topic: Measures of dispersion

- calculate range, standard deviation and variance from given data

9. Probability

Topic: Probability

- calculate probability of an event and learn conditional probability
- learn and use Bayes theorem and its applications

PART-2

1. Complex numbers

Topic: Complex Numbers

The students will be able to -

- understand set of complex numbers and different ways of expressing complex numbers.
- perform algebraic operations on complex numbers
- simplify algebraic expressions involving complex numbers.

2. Sequences and Series

Topic: Sequences and Series

- Revise AP, learn GP and HP
- Find the general term and the sum of the first terms of these sequences.

3. Permutations and combinations

Topic: Permutations, Combinations

- count the number of arrangements of given objects satisfying specific conditions.
- count the number of possible selections of objects with certain conditions.

4. Method of Induction and Binomial theorem

Topic: Method of Induction

- understand the method of induction and approve it to verify mathematical statements.

Topic: Binomial Theorem

- expand binomial expressions and find its general term.
- simplify the binomial expression for negative index or fractional power.

5. Sets and relations

Topic: Sets

- work with sets and operations on sets.
- construct sets from given conditions
- solve problems on applications of set theory.

Topic: Relations

- identify the types of relations.
- study equivalence relations.

6. Functions

Topic: Functions

- work with function defined on different domains
- identify different types of functions
- carry out algebraic operations on functions.

7. Limits

Topic: Limits

- understand the concept of limit of a function.
- determine the limits of functions if they exist.

8. Continuity

Topic: Continuity

- Define and study the continuity of a function at a point and in an interval

9. Differentiation

Topic: Differentiation

- understand and study the differentiability of a function
- understand and study differentiation of various functions

<u>CONTENT</u>	
Sr. no.	Title
1	Angle and its measurement
2	Trigonometry-1
3	Trigonometry-2
4	Determinants and matrices
5	Straight line
6	Circle
7	Conic sections
8	Measures of dispersion
9	Probability

<u>CONTENT</u>	
Sr. no.	Title
1	Complex numbers
2	Sequence and series
3	Permutation and combination
4	Method of induction and binomial theorem
5	Sets and relations
6	Functions
7	Limits
8	Continuity
9	Differentiation

CHEMISTRY

1. General Chemistry

- Understand the SI unit of important fundamental scientific quantities
- Explain various fundamental laws of chemical combination, which are applied in day-to-day life.
- Relate basic concepts of number of moles and molecules
- Differentiate between quantitative and qualitative analysis
- Develop accuracy, precision, concentration ability in taking accurate reading
- Calculate empirical formula and molecular formula of compounds.
- Obtain information about different techniques to purify substance as well as separation of miscible solids and liquids
- Gain the information about various theories, principles, put up by eminent Scientists leading to atomic structure.
- Classify elements isotopes, isobars and isotones
- Understand the dual nature of electron
- Application of concept of quantum number in writing electronic configuration of various elements

2. Inorganic chemistry

- Inculcate social and scientific awareness by gaining knowledge of oxidation-reduction concept
- Evaluate oxidation number of elements and balance the redox reaction by different methods
- Categorise oxidizing and reducing agents with their applications
- Classify elements based on electronic configuration
- Understand co-relation between the various properties like atomic size, valency, oxidation state, ionization enthalpy and electronegativity in a group and in a period
- Recognize isoelectronic species
- Compare the trends in physical and chemical properties in group I and group II. Understand the diagonal relationship.
- Gain the knowledge of hydrogen from periodic table
- Develop interest in systematic study of elements present in Group 13, Group 14 and group 15.
- Learn anomalous behaviours of boron, carbon and nitrogen
- Draw the structures of some compounds of boron, carbon and nitrogen
- Elaborate information about various theories to explain nature of bonding in formation of molecules
- Inculcate skill to draw Lewis structure of molecules

- Assign the structures of various compounds with respect to geometry bond angle and types of bond

3. Physical Chemistry

- Generate environmental awareness by compiling concepts of adsorption phenomenon
- Learn science behind the fact about colloids in day to day life
- Interpret nature difference and relation of equilibrium constant
- Differentiate nuclear reactions with ordinary chemical reaction
- Design the suitable conditions to get more yield of the desired product
- Acquire knowledge of natural radioactivity and related terms like nuclear transmutation, nuclear fission, nuclear fusion
- Clarify the beneficial and harmful effects of radioactivity
- State the applications of radioactive elements like carbon dating, Nuclear reactor, generation of electricity and medicinal uses
- Develop mathematical skills in finding radioactive, decay constant, half life period and nuclear binding energy

4. Organic Chemistry

- Interpret the structure and functional group of organic compound
- IUPAC nomenclature of organic compounds.
- Understand the influence of electronic displacement and reactivity in organic molecules.
- Draw the formulae of various isomers of organic compounds
- Illustrate different methods of preparation and chemical properties of hydrocarbons
- Infer importance of hydrocarbon
- Gain information of medicinal properties of some chemical compounds and chemistry behind food quality and cleansing action

CONTENT

Sr. no.	Title
1	Some Basics concepts of chemistry
2	Introduction to analytical chemistry
3	Some analytical techniques
4	Structure of atom
5	Chemical bonding
6	Redox reaction
7	Modern periodic table
8	Elements of group 1 and 2
9	Elements of group 13, 14 and 15
10	States of matter
11	Adsorption and colloids
12	Chemical equilibrium
13	Nuclear chemistry and radioactivity
14	Basic principles of organic chemistry
15	Hydrocarbons
16	Chemistry in everyday life

COMPUTER SCIENCE

Paper - 1

1. Number System And Binary Arithmetic

- Binary numbers
- Decimal, Octal Hexadecimal numbers
- BCD
- Conversion from one number system to another
- ASCII code
- Binary addition, Subtraction by one's complement and two's complement
- Binary multiplication and division

2. Program Analysis

- Analysis of problem
- Pseudo code
- Design steps
- Flow charts
- Structured programming and Modular programming concepts
- Algorithms
- Searching and sorting

3. Introduction to C++

- Introduction to C++
- Key words
- Identifiers
- Data types
- User defined data types
- Derived data types
- Constants
- Type compatibility
- Declaration of variables
- Operators in C++
- Memory management operators
- Manipulators
- Control structures-if, switch, do-while, for
- Functions in C++
- Standard C++ library

- Reference, Return by reference
- Unformatted I/O operations
- Simple programs in C++

4. Visual Basic

- Introduction to Visual Basic
- Visual Basic Environment
 - Menu bar
 - Toolbar
 - Toolbox
 - Properties settings
 - Form layout
- Visual Basic Programming
 - Variables
 - Constants
 - Defining variables
 - Arrays
 - Relational operators
 - Control flow statements
 - Loop statements
 - Nesting of loops
 - Use of built in functions
 - Event driven programming
 - Simple VB project simple calculator

5. Introduction to Networking and Internet

- Networking Terms and Concepts
- Centralised Computing
- Distributed Computing
- Collaborative Computing
- Network Configurations
- Client /Server-Based Networking
- Peer to Peer Networking
- Local Area Networks(LANS)
- Wide Area Networks (WANS)
- Network Applications
 - E-mail
 - Voice mail
 - FTP
 - www
 - E-Commerce
 - BBS user group

Paper - II

6. Study of Components and Circuits

- Study of Components
 - Resistors, Capacitors, Inductors, Transformers
- Semiconductor components
 - Diodes, Transistors, Zener diodes, LED
- Transistor as a Switch
- Single stage Amplifier
- Regulated Power Supply
- Concept of SMPS Power Supply
- Logic Families-TTL and CMOS their Comparative study and input parameters

7. Logic Gates and Sequential Circuits

- Logic Gates
 - Study of Basic Gates
 - AND, OR, NOT their truth tables.
 - Study of NAND, NOR, XOR Gates
 - Basic building blocks
 - Simple combinational circuits
 - Half adder, Full adder
- Sequential circuits
 - Flip flop-RS, D. Toggle, JK Registers-shift registers, counters, multiplexers, Demultiplexers

8. Functional Hardware Parts of PC

-
- Study of System Board/Mother board layout
- Study of CPU properties with reference to pentium chip
- PC Memory-Types of Memory, conventional extended and expanded, semiconductor memory and its types
- Introduction to PC expansion Buses-What is Bus?
- Interrupts and direct memory access channels
- Features of EISA, PCI and USB buses
- What is Controller ? Video adapter
- floppy disk and hard disk controller

9. Peripheral Devices

-
- Video
 - Video Board Characteristics
- Resolution and color
 - Video monitor characteristics
- Dot pitch, Horizontal scan frequency
- Multisync
- Keyboard - keyboard working
- Mouse-Types
- Scanner-Their use and types
- Printer-Types, Dot Matrix, Ink Jet
- Drives-Floppy drives, Hard disk
- CD ROM drive
- Multimedia kits - Sound Boards
- Modem: Plug and play