

Physics Class 11 Syllabus

Course Structure

| Unit | Chapter / Topic | Marks | |
|------|--|-----------|----|
| I | Physical World and Measurement | 23 | |
| | Chapter–1: Physical World | | |
| | Chapter–2: Units and Measurements | | |
| II | Kinematics | | |
| | Chapter–3: Motion in a Straight Line | | |
| | Chapter–4: Motion in a Plane | | |
| III | Laws of Motion | | |
| | Chapter–5: Laws of Motion | | |
| IV | Work, Energy and Power | | 17 |
| | Chapter–6: Work, Energy and Power | | |
| V | Motion of System of Particles | | |
| | Chapter–7: System of Particles and Rotational Motion | | |
| VI | Gravitation | | |
| | Chapter–8: Gravitation | | |
| VII | Properties of Bulk Matter | | 20 |
| | Chapter–9: Mechanical Properties of Solids | | |
| | Chapter–10: Mechanical Properties of Fluids | | |
| | Chapter–11: Thermal Properties of Matter | | |
| VIII | Thermodynamics | | |
| | Chapter–12: Thermodynamics | | |
| IX | Kinetic Theory of Gases | | |
| | Chapter–13: Kinetic Theory | | |
| X | Oscillation & Waves | 10 | |
| | Chapter–14: Oscillations | | |
| | Chapter–15: Waves | | |
| | Total | 70 | |

Unit I: Physical World and Measurement

Chapter–1: Physical World

Physics - scope and excitement; nature of physical laws; Physics, technology and society.

Chapter–2: Units and Measurements

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures.

Dimensions of physical quantities, dimensional analysis and its applications.

Unit II: Kinematics

Chapter–3: Motion in a Straight Line

Frame of reference, Motion in a straight line: Position-time graph, speed and velocity.

Elementary concepts of differentiation and integration for describing motion. Uniform and non-uniform motion, average speed and instantaneous velocity. Uniformly accelerated motion, velocity time and position-time graphs.

Relations for uniformly accelerated motion (graphical treatment).

Chapter–4: Motion in a Plane

Scalar and vector quantities; Position and displacement vectors, general vectors and their notations; equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Relative velocity. Unit vector; Resolution of a vector in a plane - rectangular components. Scalar and Vector product of vectors.

Motion in a plane, cases of uniform velocity and uniform acceleration-projectile motion. Uniform circular motion.

Unit III: Laws of Motion

Chapter–5: Laws of Motion

Intuitive concept of force. Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion.

Law of conservation of linear momentum and its applications.

Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction, lubrication.

Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on banked road).

Unit IV: Work, Energy and Power

Chapter–6: Work, Engery and Power

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power.

Notion of potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); non-conservative forces: motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.

Unit V: Motion of System of Particles and Rigid Body

Chapter–7: System of Particles and Rotational Motion

Centre of mass of a two-particle system, momentum conservation and centre of mass motion.

Centre of mass of a rigid body; centre of mass of a uniform rod.

Moment of a force, torque, angular momentum, laws of conservation of angular momentum and its applications.

Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions.

Moment of inertia, radius of gyration. Values of moments of inertia, for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications.

Unit VI: Gravitation

Chapter–8: Gravitation

Keplar's laws of planetary motion. The universal law of gravitation.

Acceleration due to gravity and its variation with altitude and depth.

Gravitational potential energy and gravitational potential. Escape velocity. Orbital velocity of a satellite. Geo-stationary satellites.

Unit VII: Properties of Bulk Matter

Chapter–9: Mechanical Properties of Solids

Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity, Poisson's ratio; elastic energy.

Chapter–10: Mechanical Properties of Fluids

Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure.

Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, critical velocity. Bernoulli's theorem and its applications.

Surface energy and surface tension, angle of contact, excess of pressure across a curved surface, application of surface tension ideas to drops, bubbles and capillary rise.

Chapter–11: Thermal Properties of Matter

Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity; C_p , C_v - calorimetry; change of state - latent heat capacity.

Heat transfer-conduction, convection and radiation, thermal conductivity, Qualitative ideas of Blackbody radiation, Wein's displacement Law, Stefan's law, Green house effect.

Unit VIII: Thermodynamics

Chapter–12: Thermodynamics

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. Heat engine and refrigerator.

Unit IX: Behaviour of Perfect Gases and Kinetic Theory of Gases

Chapter–13: Kinetic Theory

Equation of state of a perfect gas, work done in compressing a gas.

Kinetic theory of gases - assumptions, concept of pressure. Kinetic interpretation of temperature; rms speed of gas molecules; degrees of freedom, law of equi-partition of energy (statement only) and application to specific heat capacities of gases; concept of mean free path, Avogadro's number.

Unit X: Oscillations and Waves

Chapter–14: Oscillations

Periodic motion - time period, frequency, displacement as a function of time. Periodic functions.

Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a spring-restoring force and force constant; energy in S.H.M. Kinetic and potential energies; simple pendulum derivation of expression for its time period.

Free, forced and damped oscillations (qualitative ideas only), resonance.

Chapter–15: Waves

Wave motion. Transverse and longitudinal 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.

Physical Education Class 11 Syllabus

Unit I. Changing Trends and Career in Physical Education

- Define Physical Education, its Aims and Objectives
- Development of Physical Education - Post Independence
- Concept and Principles of Integrated Physical Education
- Concept and Principles of Adaptive Physical Education
- Career Options in Physical Education

Unit II. Physical Fitness, Wellness and Lifestyle

- Meaning and importance of Physical Fitness, Wellness and Lifestyle
- Factors affecting Physical Fitness and Wellness
- Indicators of Health - Physical and Psychological
- Preventing Health Threats through Lifestyle Change
- Components of positive lifestyle

Unit III. Olympic Movement

- Ancient and Modern Olympics
- Olympic Symbols, Ideals, Objectives and Values
- International Olympic Committee
- Indian Olympic Association
- Dronacharya Award, Arjuna Award and Rajiv Gandhi Khel Ratna Award
- Organisational set-up of CBSE Sports and Chacha Nehru Sports Award

Unit IV. Yoga

- Meaning and Importance of Yoga
- Yoga as an Indian Heritage
- Elements of Yoga
- Introduction to - Asanas, Pranayam, Meditation and Yogic Kriyas
- Prevention and Management of Common Lifestyle Diseases; Obesity, Diabetes, Hyper-Tension and Back-Pain

Unit V. Doping

- Concept & classification of doping

- Prohibited substances and methods
- Athletes responsibilities
- Side effects of prohibited substances
- Ergogenic aids & doping in sports
- Doping control procedure

Unit VI. Physical Activity Environment

- Introduction to physical activity
- Concept & need of sports environment
- Essential elements of positive sports environment
- Principles of physical activity environment
- Components of health related fitness
- Behaviour change technique for physical activity
- Exercise Guidelines at different stages of growth

Unit VII. Test and Measurement in Sports

- Define Test and Measurement
- Importance of Test and Measurement in Sports
- Calculation of BMI and Waist - Hip Ratio
- Somato Types (Endomorphy, Mesomorphy and Ectomorphy)
- Procedures of Anthropometric Measurement - Height, Weight, Arm and Leg Length and Skin Fold

Unit VIII. Fundamentals of Anatomy and Physiology

- Define Anatomy, Physiology and its importance
- Function of skeleton system, Classification of bones and types of joints
- Function and structure of muscles
- Function and structure of Respiratory System
- Structure of Heart and introduction to Circulatory System
- Oxygen debt, second-wind

Unit IX. Biomechanics and Sports

- Meaning and Importance of Biomechanics in Physical Education and Sports
- Newton's Law of Motion and its application in sports
- Levers and its types and its application in Sports

- Equilibrium - Dynamic and Static and Centre of Gravity and its application in sports
- Force - Centrifugal and Centripetal and its application in Sports

Unit X. Psychology and Sports

- Definition and importance of Psychology in Physical Education and Sports
- Define and differentiate between 'Growth and Development'
- Developmental characteristics at different stage of development
- Adolescent problems and their management
- Define Learning, Laws of Learning and transfer of Learning
- Plateau & causes of plateau
- Emotion: Concept & controlling of emotion

Unit XI Training in Sports

- Meaning and Concept of Sports Training
- Principles of Sports Training
- Warming up and limbering down
- Load, Adaptation and Recovery
- Skill, Technique and Style
- Symptoms of Over-load & How to Overcome it

Practical: 30 Marks

1. Physical Fitness - 5 Marks
2. Athletics - Any two events - Sprints and Jumps - 5 Marks
3. Health and Fitness Activities - Medicine Ball/Thera Tube/Pilates/Rope Skipping (Any one) - 5 Marks
4. Skill of any one Individual Game of choice - 5 Marks
5. Viva - 5 Marks
6. Record File - 5 Marks

Mathematics Class 11 Syllabus

Course Structure

| Unit | Topic | Marks |
|------|----------------------------|------------|
| I. | Sets and Functions | 29 |
| II. | Algebra | 37 |
| III. | Co-ordinate Geometry | 13 |
| IV. | Calculus | 6 |
| V. | Mathematical Reasoning | 3 |
| VI. | Statistics and Probability | 12 |
| | Total | 100 |

Unit-I: Sets and Functions

1. Sets

Sets and their representations. Empty set. Finite and Infinite sets. Equal sets. Subsets. Subsets of a set of real numbers especially intervals (with notations). Power set. Universal set. Venn diagrams. Union and Intersection of sets. Difference of sets. Complement of a set. Properties of Complement Sets. Practical Problems based on sets.

2. Relations & Functions

Ordered pairs, Cartesian product of sets. Number of elements in the cartesian product of two finite sets. Cartesian product of the sets of real (upto $\mathbb{R} \times \mathbb{R}$). Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special kind of relation from one set to another. Pictorial representation of a function, domain, co-domain and range of a function. Real valued functions, domain and range of these functions: constant, identity, polynomial, rational, modulus, signum, exponential, logarithmic and greatest integer functions, with their graphs. Sum, difference, product and quotients of functions.

3. Trigonometric Functions

Positive and negative angles. Measuring angles in radians and in degrees and conversion of one into other. Definition of trigonometric functions with the

help of unit circle. Truth of the $\sin^2x+\cos^2x=1$, for all x . Signs of trigonometric functions. Domain and range of trigonometric functions and their graphs. Expressing $\sin(x\pm y)$ and $\cos(x\pm y)$ in terms of $\sin x$, $\sin y$, $\cos x$ & $\cos y$ and their simple application. Deducing identities like the following:

$$\tan(x\pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}, \cot(x\pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x}$$

$$\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}, \cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2},$$

$$\sin x - \sin y = 2 \cos \frac{x+y}{2} \sin \frac{x-y}{2}, \cos x - \cos y = -2 \sin \frac{x+y}{2} \sin \frac{x-y}{2}$$

Identities related to $\sin 2x$, $\cos 2x$, $\tan 2x$, $\sin 3x$, $\cos 3x$ and $\tan 3x$. General solution of trigonometric equations of the type $\sin y = \sin a$, $\cos y = \cos a$ and $\tan y = \tan a$.

Unit-II: Algebra

1. Principle of Mathematical Induction

Process of the proof by induction, motivating the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.

2. Complex Numbers and Quadratic Equations

Need for complex numbers, especially $\sqrt{-1}$, to be motivated by inability to solve some of the quadratic equations. Algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system. Square root of a complex number.

3. Linear Inequalities

Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Graphical solution of system of linear inequalities in two variables.

4. Permutations and Combinations

Fundamental principle of counting. Factorial n. (n!) Permutations and combinations, derivation of formulae and their connections, simple applications.

5. Binomial Theorem

History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, General and middle term in binomial expansion, simple applications.

6. Sequence and Series

Sequence and Series. Arithmetic Progression (A.P.). Arithmetic Mean (A.M.) Geometric Progression (G.P.), general term of a G.P., sum of n terms of a G.P., Arithmetic and Geometric series infinite G.P. and its sum, geometric mean (G.M.), relation between A.M. and G.M. Formula for the following special sum:

$$\sum_{k=1}^n k, \sum_{k=1}^n k^2 \text{ and } \sum_{k=1}^n k^3$$

Unit-III: Coordinate Geometry

1. Straight Lines

Brief recall of two dimensional geometry from earlier classes. Shifting of origin. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axis, point-slope form, slope-intercept form, two-point form, intercept form and normal form. General equation of a line. Equation of family of lines passing through the point of intersection of two lines. Distance of a point from a line.

2. Conic Sections

Sections of a cone: circles, ellipse, parabola, hyperbola; a point, a straight line and a pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.

3. Introduction to Three-dimensional Geometry

Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points and section formula.

Unit-IV: Calculus

1. Limits and Derivatives

Derivative introduced as rate of change both as that of distance function and geometrically.

Intuitive idea of limit. Limits of polynomials and rational functions, trigonometric, exponential and logarithmic functions. Definition of derivative, relate it to slope of tangent of a curve, derivative of sum, difference, product and quotient of functions. The derivative of polynomial and trigonometric functions.

Unit-V: Mathematical Reasoning

1. Mathematical Reasoning

Mathematically acceptable statements. Connecting words/ phrases - consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting words difference between contradiction, converse and contrapositive.

Unit-VI: Statistics and Probability

1. Statistics

Measures of dispersion; Range, mean deviation, variance and standard deviation of ungrouped/grouped data. Analysis of frequency distributions with equal means but different variances.

2. Probability

Random experiments; outcomes, sample spaces (set representation). Events; occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events, Axiomatic (set theoretic) probability, connections with the theories of earlier classes. Probability of an event, probability of 'not', 'and' and 'or' events.

English Core Class 11 Syllabus

Unit-wise Weightage

| Section | Area of Learning | Marks |
|---------|---|-------|
| A | Reading Skills | 20 |
| B | Writing Skills and Grammar | 30 |
| C | Literature & Long Reading Text | 30 |
| D | Assessment of Speaking & Listening Skills | 20 |

Section A: Reading Comprehension

Very short answer and MCQ types questions:

Two unseen passages (including poems) with a variety of questions including 4 marks for vocabulary such as word formation and inferring meaning. The total range of the 2 passages including a poem or a stanza, will be around 900-1000 words.

1. 550-600 words in length (for note-making and summarising)
2. 350-400 words in length (to test comprehension, interpretation and inference)

An unseen poem of about 28-35 lines

The passages could be of any one of the following types:

- Factual passages, e.g., illustrations, description, reports
- Discursive passages involving opinion, e.g., argumentative, persuasive
- Literary passages e.g. extracts from fiction, biography, autobiography, travelogue, etc. In the case of a poem, the text may be shorter than the prescribed word limit.

SECTION B: Writing Skills and Grammar

Writing

- Short Answer Questions: Based on notice/ poster/ advertisement
- Long Answer Questions: Letters based on verbal/visual input. It would cover all types of letters.

Letter types may include:

- a. business or official letters (for making enquiries, registering complaints, asking for and giving information, placing orders and sending replies)
 - b. letters to the editor (giving suggestions on an issue)
 - c. application for a job with a bio-data or resume
 - d. letter to the school or college authorities, regarding admissions, school issues, requirements /suitability of courses, etc.
- Very Long Answer Question: Composition in the form of article, speech, report writing or a narrative

Grammar

Different grammatical structures in meaningful contexts will be tested. Item types will include gap filling, sentence re-ordering, dialogue completion and sentence transformation. The grammar syllabus will include determiners, tenses, clauses, modals and Change of Voice. These grammar areas will be tested using the following **short answer type and MCQ type questions**:

- Error Correction, editing tasks
- Re-ordering of Sentences
- Transformation of sentences

Section C: Literature and Long Reading Texts

Questions to test comprehension at different levels: literal, inferential and evaluative

1. Hornbill: Textbook published by NCERT
2. Snapshots: Supplementary Reader published by NCERT

The following lessons have been deleted:

1. Landscape of the Soul
2. The Adventure
3. Silk Road
4. The Laburnum Top (Poetry)
5. The Ghat of the only World (Snapshots)

- Very Short Answer Questions - Based on an extract from poetry to test reference to context comprehension and appreciation.
- Short Answer Questions - Based on prose, poetry and plays from both the texts.
- Long Answer Question - Based on prescribed texts to test global comprehension and extrapolation beyond the texts to bring out the key messages and values.
- Long Answer Questions - Based on theme, plot, incidents or event from the prescribed novels.
- Long Answer Question - Based on understanding appreciation, analysis and interpretation of the characters.

Note: Values-based questions may be given as long answers in the writing or literature sections.

Long Reading Texts / Novels (either one)

With a view to inculcate the habit of reading among the students, CBSE has introduced compulsory reading of a Long Reading Text - Novel in the English Core Course and will be evaluated in the Term-end Assessments. Schools can opt for either one of the texts.

- i) The Canterville Ghost by Oscar Wilde (unabridged 1906 Edition)
- ii) Up from Slavery by Booker T. Washington (unabridged 2000 Edition)

Computer Science Class 11 Syllabus

Course Structure

| Unit | Title | Marks |
|------|-----------------------------|-----------|
| 1. | Computer Fundamentals | 10 |
| 2. | Programming Methodology | 12 |
| 3. | Introduction to Python/C++ | 18/14 |
| 4. | Programming with Python/C++ | 30/34 |
| | Total | 70 |

Unit 1: Computer Fundamentals

Classification of computers: basics of computer and its operation; functional components and their interconnections, concept of booting.

Software concepts: Types of Software - system software, utility software and application software

System Software: Operating system, compiler, interpreter and assembler

Operating System: Need for operating system, functions of operating system (processor management, memory management, file management and device management), types of operating system-interactive (GUI based), time sharing, real time and distributed, commonly used operating system: UNIX, LINUX, Windows, Solaris, BOSS (Bharat Operating System Solutions); Mobile OS –Android, Symbian.

Utility Software: Anti Virus, File Management tools, Compression tools and Disk Management tools (Disk Cleanup, Disk Defragmenter, Backup).

Open Source Concepts: Open source software, freeware, shareware, proprietary software.

Application Software: Office tools - word processor, presentation tool, spreadsheet package, database management system; domain specific tools - school management system, inventory management system, payroll system, financial accounting, hotel management, reservation system and weather forecasting system.

Number System: Binary, octal, decimal, hexadecimal and conversion between two different number systems.

Internal Storage encoding of Characters: ASCII, ISCII (Indian Scripts Standard Code for Information Interchange), and UNICODE (for multilingual computing)

Microprocessor: Basic concepts, Clock speed (MHz, GHz), 16 bit, 32 bit, 64 bit, 128 bit processors; Types - CISC Processors (Complex Instruction Set Computing), RISC Processors (Reduced Instruction Set Computing), and EPIC (Explicitly Parallel Instruction Computing).

Memory Concepts: Units: Byte, Kilo Byte, Mega Byte, Giga Byte, Tera Byte, Peta Byte, Exa Byte, Zetta Byte, Yotta Byte.

Primary Memory: Cache, RAM, ROM

Secondary Memory: Fixed and Removable storage - Hard Disk Drive, CD/DVD Drive, Pen Drive, Blue Ray Disk.

Input Output Ports/ Connections: Serial, Parallel and Universal Serial Bus, PS-2 port, Infrared port, Bluetooth, Firewire.

Unit 2: Programming Methodology

General Concepts: Clarity and simplicity of expressions, Use of proper names for identifiers, comments, indentation; documentation and program maintenance; running and debugging programs, syntax errors, run-time errors, logical errors

Problem solving methodologies: Understanding of the problem, solution for the problem, breaking down solution into simple steps (modular approach), identification of arithmetic and logical operations required for solution; control structure- conditional control and looping (finite and infinite).

Problem Solving: Introduction to algorithms/flowcharts.

Unit 3: Introduction to Python

Getting Started: Introduction to Python - an integrated high level language, interactive mode and script mode. Data types –Number (Integer - boolean,

decimal, octal, hexadecimal; Floating point; Complex), none, Sequence (String,Tuples, List) Sets, Mapping.

Mutable and Immutable Variables

Variables, Expressions and Statements: Values, Variables and keywords; Operators and Operands in Python: (Arithmetic, relational and logical operators), operator precedence, Expressions and Statements (Assignment statement); Taking input (using raw_input() and input()) and displaying output (print statement); Putting Comments.

Functions: Importing Modules (entire module or selected objects), invoking built in functions, functions from math module (for example, ceil, floor, fabs, exp, log, log10, pow, sqrt, cos, sin, tan, degrees, radians), using random() and randint() functions of random module to generate random numbers, composition.

Defining functions, invoking functions, passing parameters (default parameter values, keyword arguments), scope of variables, void functions and functions returning values, flow of execution

Conditional constructs and looping: if else statement while, for (range function), break, continue, else, pass, nested if, nested loops, use of compound expression in conditional and looping construct.

Unit 4: Programming with Python

Strings: Creating, initialising and accessing the elements; string operators: +, *, in, not in, range slice [n:m]; comparing strings using relational operators; String functions & methods: len, capitalize, find, isalnum, isalpha, isdigit, lower, islower, isupper, upper, lstrip, rstrip, isspace, istitle, partition, replace, join, split, count, decode, encode, swapcase, String constants, Regular Expressions and Pattern Matching

Lists: Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements, composition, lists as arguments

List operations: joining, slicing, + , * , in , not in

List functions and methods: len(), insert(), append(), extend(), sort(), remove(), reverse(), pop(), list(), count(), extend(), index(), cmp(), max(), min()

Dictionaries: Concept of key-value pair, creating, initialising and accessing the elements in a dictionary, traversing, appending updating and deleting elements

Dictionary Functions and methods: cmp(), len(), clear(), get(), has_key(), items(), key(), update(), values(), pop(), fromkeys(), dict()

Tuples: Immutable concept, creating, initialising and accessing elements in a tuple, Tuple assignment, Tuple slices, Tuple indexing,

Tuple Functions: cmp(), len(), max(), min(), tuple(), index(), count(), sum(), any(), all(), sorted(), reversed()

Unit 3: Introduction To C++

Getting Started: C++ character set, C++ Tokens (Identifiers, Keywords, Constants, Operators, Structure of a C++ Program (include files, main function), Header files – iostream.h, iomanip.h, cout, cin; use of I/O operators (<< and >>), Use of endl and setw (), Cascading of I/O operators, compilation, Error Messages; Use of editor, basic commands of editor, compilation, linking and execution.

Data Types, Variables and Constants: Concept of Data types; Built-in Data types: char, int, float and double; Constants: Integer Constants, Character constants - \n, \t, \b), Floating Point Constants, String Constants; Access modifier; Variables of built-in-datatypes, Declaration/Initialization of variables, Assignment statement, Type modifier: signed, unsigned, long

Operator and Expressions: Operators: Arithmetic operators (-, +, *, /, %), Assignment operator(=), C++ shorthands (+=, -=, *=, /=, %=) Unary operator (-), Increment(++) and Decrement (--) Operators, Relation operator (>, >=, <=, =, !=), Logical operators (!, &&, ||), Conditional operator; Precedence of Operators; Automatic type conversion in expressions, Type casting;

Unit 4: Programming In C++

Flow of control:

Conditional statements: if else, Nested if, switch..case..default, Nestedswitch..case, break statement (to be used in switch..case only); Loops: while, do - while, for and Nested loops

Inbuilt Functions

- Standard input/output functions - stdio.h: gets (), puts ()
- Character Functions - ctype.h: isalnum (), isalpha (),isdigit (), islower (), isupper (), tolower (), toupper ()
- String Function - string.h: strcpy (), strcat (), strlen (), strcmp (), strcmpi (), strcmp (), strlen (),strupur (), strlwr ()
- Mathematical Functions - math.h: fabs (), pow (), sgrt (), sin (), cos (), abs ()
- Other Functions - stdlib.h: randomize (), random ()

Introduction to user-defined function and its requirements.

Defining a function; function prototype, Invoking/calling a function, passing arguments to function, specifying argument data types, default argument, constant argument, call by value, call by reference, returning values from a function, scope rules; local and global variables.

Relating to Parameters and return type concepts in built-in functions.

Structured Data Type:

Arrays: Introduction to Array and its advantages.

One Dimensional Array: Declaration/initialization of One-dimensional array, inputting array elements, accessingarray elements, manipulation of array elements (sum of elements, product of elements, average of elements, linear search, finding maximum/minimum value)

Declaration / Initialization of a String, string manipulations (counting vowels/ consonants/ digits/ special characters, case conversion, reversing a string, reversing each word of a string)

Two-dimensional Array: Declaration/initialization of a two-dimensional array,inputting array elements accessing array elements, manipulationof array elements (sum of row element, column elements, diagonal elements, finding maximum / minimum values)

User-defined Data Types: Introduction to user defined data types.

Structure: Defining a Structure, declaring structure variables, accessing structure elements, passing structure to functions as value and reference, function returning structure, array of structure

Defining a symbol name using **typedef** keyword and defining a macro using **#define** preprocessor directive.

Chemistry Class 11 Syllabus

Course Structure

| Unit | Title | Marks |
|------|--|-----------|
| I | Basic Concepts of Chemistry | 11 |
| II | Structure of Atom | |
| III | Classification of Elements & Periodicity in Properties | 4 |
| IV | Chemical Bonding and Molecular Structure | 21 |
| V | States of Matter: Gases and Liquids | |
| VI | Thermodynamics | |
| VII | Equilibrium | |
| VIII | Redox Reactions | 16 |
| IX | Hydrogen | |
| X | s-Block Elements | |
| XI | Some p-Block Elements | |
| XII | Organic Chemistry: Basic Principles & Techniques | 18 |
| XIII | Hydrocarbons | |
| XIV | Environmental Chemistry | |
| | Total | 70 |

Unit I: Some Basic Concepts of Chemistry

General Introduction: Importance and scope of chemistry.

Nature of matter, 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, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry.

Unit II: Structure of Atom

Discovery of Electron, Proton and Neutron, atomic number, isotopes and isobars. Thomson's model and its limitations. Rutherford's model and its limitations, Bohr's model and its limitations, concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals - Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of atoms, stability of half filled and completely filled orbitals.

Unit III: Classification of Elements and Periodicity in Properties

Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements -atomic radii, ionic radii, inert gas radii Ionization enthalpy, electron gain enthalpy, electronegativity, valency. Nomenclature of elements with atomic number greater than 100.

Unit IV: Chemical Bonding and Molecular Structure

Valence electrons, ionic bond, covalent bond; bond parameters, Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridization, involving s,p and d orbitals and shapes of some simple molecules, molecular orbital theory of homonuclear diatomic molecules (qualitative idea only), hydrogen bond.

Unit V: States of Matter: Gases and Liquids

Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws in elucidating the concept of the molecule, Boyle's law, Charles law, Gay Lussac's law, Avogadro's law, ideal behaviour, empirical derivation of gas equation, Avogadro's number, ideal gas equation. Deviation from ideal behaviour, liquefaction of gases, critical temperature, kinetic energy and molecular speeds (elementary idea)Liquid State- vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations)

Unit VI: Chemical Thermodynamics

Concepts of System and types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions.

First law of thermodynamics -internal energy and enthalpy, heat capacity and specific heat, measurement of ΔU and ΔH , Hess's law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution. Second law of Thermodynamics (brief introduction)

Introduction of entropy as a state function, Gibb's energy change for spontaneous and non-spontaneous processes, criteria for equilibrium.

Third law of thermodynamics (brief introduction).

Unit VII: Equilibrium

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium - Le Chatelier's principle, ionic equilibrium-ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of poly basic acids, acid strength, concept of pH, Henderson Equation, hydrolysis of salts (elementary idea), buffer solution, solubility product, common ion effect (with illustrative examples).

Unit VIII: Redox Reaction

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and gain of electrons and change in oxidation number, applications of redox reactions.

Unit IX: Hydrogen

Position of hydrogen in periodic table, 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 and structure and use; hydrogen as a fuel.

Unit X: s -Block Elements (Alkali and Alkaline Earth Metals)

Group 1 and Group 2 Elements

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 Hydrogencarbonate, Biological importance of Sodium and Potassium. Calcium Oxide and Calcium Carbonate and their industrial uses, biological importance of Magnesium and Calcium.

Unit XI: Some p -Block Elements

General Introduction to p - Block Elements

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 - physical and chemical properties, some important compounds, Borax, Boric acid, Boron Hydrides, Aluminium: Reactions with acids and alkalies, uses.

Group 14 Elements: General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of first elements. Carbon-catenation, allotropic forms, physical and chemical properties; uses of some important compounds: oxides. Important compounds of Silicon and a few uses: Silicon Tetrachloride, Silicones, Silicates and Zeolites, their uses.

Unit XII: Organic Chemistry - Some Basic Principles and Technique

General introduction, methods of purification, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds. Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance and hyper conjugation. Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions, electrophiles and nucleophiles, types of organic reactions.

Unit XIII: Hydrocarbons

Classification of Hydrocarbons

Aliphatic Hydrocarbons:

Alkanes - Nomenclature, isomerism, conformation (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 (Markownikov'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 monosubstituted benzene. Carcinogenicity and toxicity.

Unit XIV: Environmental Chemistry

Environmental pollution - air, water and soil pollution, chemical reactions in atmosphere, smog, 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, strategies for control of environmental pollution.

Biology Class 11 Syllabus

Course Structure

| Unit | Title | Marks |
|------|---|-----------|
| 1. | Diversity of Living Organisms | 7 |
| 2. | Structural Organisation in Plants & Animals | 11 |
| 3. | Cell: Structure and Function | 15 |
| 4. | Plant Physiology | 17 |
| 5. | Human Physiology (A) - Section for OTBA | *10+10 |
| | Human Physiology (B) | |
| | Total | 70 |

*This section will be assessed through OTBA only.

Unit I: Diversity of Living Organism

Chapter-1: The Living World

What is living? Biodiversity; Need for classification; three domains of life; taxonomy and systematics; concept of species and taxonomical hierarchy; binomial nomenclature; tools for study of taxonomy-museums, zoological parks, herbaria, botanical gardens.

Chapter-2: Biological Classification

Five kingdom classification; Salient features and classification of Monera, Protista and Fungi into major groups: Lichens, Viruses and Viroids.

Chapter-3: Plant Kingdom

Salient features and classification of plants into major groups - Algae, Bryophyta, Pteridophyta, Gymnospermae and Angiospermae (three to five salient and distinguishing features and at least two examples of each category); Angiosperms - classification upto class, characteristic features and examples.

Chapter-4: Animal Kingdom

Salient features and classification of animals non chordates up to phyla level and chordates up to class level (three to five salient features and at least two examples of each category).

(No live animals or specimen should be displayed.)

Unit 2: Structural Organisation in Animals and Plants

Chapter-5: Morphology of Flowering Plants

Morphology and modifications: Tissues

Chapter-6: Anatomy of Flowering Plants

Anatomy and functions of different parts of flowering plants: root, stem, leaf, inflorescence, flower, fruit and seed (to be dealt along with the relevant practical of the Practical Syllabus).

Chapter-7: Structural Organisation in Animals

Animal tissues: Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (a brief account only)

Unit 3: Cell Structure and Function

Chapter-8: Cell-The Unit of Life

Cell theory and cell as the basic unit of life: Structure of prokaryotic and eukaryotic cells; Plant cell and animal cell; Cell envelope, cell membrane, cell wall; Cell organelles - structure and function; endomembrane system, endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, microbodies; cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); nucleus, nuclear membrane, chromatin, nucleolus.

Chapter-9: Biomolecules

Chemical constituents of living cells: biomolecules, structure and function of proteins, carbohydrates, lipids, nucleic acids, enzymes, types, properties, enzyme action.

Chapter-10: Cell Cycle and Cell Division

Cell cycle, mitosis, meiosis and their significance.

Unit 4: Plant Physiology

Chapter-11: Transport in Plants

Transport in plants; Movement of water, gases and nutrients; cell to cell transport, Diffusion, facilitated diffusion, active 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, massflow hypothesis; diffusion of gases.

Chapter-12: 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.

Chapter-13: Photosynthesis in Higher Plants

Photosynthesis as a mean of autotrophic nutrition; site of photosynthesis, pigments involved in photosynthesis (elementary idea); photochemical and biosynthetic phases of photosynthesis; cyclic and non cyclic photophosphorylation; chemiosmotic hypothesis; photorespiration; C₃ and C₄ pathways; factors affecting photosynthesis.

Chapter-14: Respiration in Plants

Exchange of gases; cellular respiration - glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations - number of ATP molecules generated; amphibolic pathways; respiratory quotient.

Chapter-15: Plant - Growth and Development

Seed germination; phases of plant growth and plant growth rate; conditions of growth; differentiation, dedifferentiation and redifferentiation; sequence of developmental processes in a plant cell; growth regulators - auxin,

gibberellin, cytokinin, ethylene, ABA; seed dormancy; vernalisation; photoperiodism.

Unit 5: Human Physiology (A)

Chapter-16: 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; calorific values of proteins, carbohydrates and fats; egestion; nutritional and digestive disorders - PEM, indigestion, constipation, vomiting, jaundice, diarrhoea.

Chapter-17: Breathing and Exchange of Gases

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 volume; disorders related to respiration - asthma, emphysema, occupational respiratory disorders.

Chapter-18: Body Fluids and Circulation

Composition of blood, blood groups, coagulation of blood; composition of lymph and its function; 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.

Human Physiology (B)

Chapter-19: Excretory Products and Their Elimination

Modes of excretion - ammonotelism, 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.

Chapter-20: Locomotion and Movement

Types of movement - ciliary, flagellar, muscular; skeletal muscle-contractile proteins and muscle contraction; skeletal system and its functions; joints; disorders of muscular and skeletal system - myasthenia gravis, tetany, muscular dystrophy, arthritis, osteoporosis, gout.

Chapter-21: 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; sensory perception; sense organs; elementary structure and functions of eye and ear.

Chapter-22: Chemical Coordination and Integration

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; dwarfism, acromegaly, cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease.