

**EXAM NOTICE FOR CET-2024-2025**

The tentative date for Common Entrance Test for UG Courses (B.Sc. Nursing, BPT, Paramedical - B.Sc. Medical Lab Technology, B.Sc. OT, Bachelor of Optometry, B.Sc. Radiography & Imaging Technology, B.Sc. Radiotherapy & B.Sc. Perfusion Technology), Post Basic B.Sc. Nursing, NPCC, M.Sc. Nursing and MPT in Government/Private Institutions affiliated to Pt. B.D. Sharma UHS, Rohtak for the Academic Session 2024-25, is as under:-

<b>Date of Common Entrance Examination for various courses</b>	<b>16.06.2024.</b>
<b>Syllabus</b>	<b>Enclosed</b>

**Note:-**

- Detailed Scheduled for Exam. / Counselling to be notified subsequently
- Please check the website [www.uhsr.ac.in](http://www.uhsr.ac.in) regularly for any update.

**Sd/-**  
**Dean Academic Affairs**

***SCHEME OF EXAMINATION FOR ADMISSION TO B.SC. NURSING, BPT AND  
OTHER PARAMEDICAL COURSES***

1. Date of Entrance Examination : To be notified on University Website  
i.e. [www.uhsr.ac.in](http://www.uhsr.ac.in)

**2. *Medium of Examination***

The medium of Entrance Examination will be English.

**3. *Scheme of Examination***

The Entrance examination shall consist of one paper of three hours duration-The paper will include objective type questions.

**4. *Number of questions and Maximum Marks***

(i) There will be total of 180 objective type questions (in the subject of Physics, Chemistry and Biology (Botany & Zoology) preferably equally distributed.

(ii) The paper shall carry a maximum of 180 Marks.

**(iii) *There will be No Negative Marking.***

**5. *Instructions for Question Booklet***

(i) Candidates will be given a Question Booklet and Answer Sheet immediately after taking seat They are advised to read and follow the instructions on front and back-page of the question Booklet carefully.

(ii) There is Question Booklet number and code (A or B or C or D) mentioned on the front page, which every candidate must carefully fill in the appropriate place on the Answer Sheet.

(iii) Candidate must sign on the front page of the Question Booklet at the appropriate place.

(IV) The Question Book let has paper seal pasted on it. Candidate should break the seal and open the Question Booklet only when they are asked to do so by the Invigilator.

(v) Candidate must check that Question Booklet has 180 questions immediately after breaking the seal. In case any mistake In the Question Booklet is found, Invigilator may be requested to change the same immediately.

(vi) The Question Booklet and the Answer Sheet must be returned to the Invigilator before leaving the Hall.

(vii) The candidate shall indicate the number of questions attempted in each section.

**6. *Instructions for Answer Sheet***

(i) A dummy sample of the Answer sheet is available in this Prospectus.

(ii) Use good quality ball pen (blue/black) strictly as directed on the Answer Sheet.

(iii) Do not fold or put any stray mark, nor do any rough work on the Answer Sheet.

(iv) Fill in the Roll No. and Question Booklet No. and Booklet Code printed on front page of the Question Booklet in the proper blocks as directed on the Answer Sheet.

(v) Sign at the appropriate place on the Answer Sheet with Ball pen(blue/black).

## 7. ***Rough Work***

The candidate should not do any rough work on the Answer-sheet. All rough work can be done on the last page of Question Booklet. **Do not mark or write anything elsewhere in the Question Booklet and OMR Answer Sheet.**

## 8. ***Procedure to be followed in the Examination***

- (i) No candidate shall be allowed to enter in Examination Hall after starting of examination.
- (ii) 10 minutes before the commencement of the examination each candidate will be given a sealed. Test Booklet and OMR answer-sheet.
- (iii) Immediately on receipt of the Test Book let the candidate will fill in the required particulars on cover page of the Test Booklet with Blue or Black ball pen only. But she/he will not open the Test Booklet until asked to do so by the invigilator.
- (iv) Books, papers, slide rule, log table, paper, cellular phone, pager, calculator, wrist watches or any other electronic gadget etc. are not allowed in the Examination Hall.
- (v) Complete videography/photography will be done of all the candidates.
- (vi) The examination will start exactly at the time mentioned in the Admit card and an announcement to this effect will be made by the Invigilator.
- (vii) During the examination the Invigilator will check 'Admit-Card' of the candidate and compare photographs to satisfy himself about the identity of each candidate. The invigilator will also put his signature in the place provided in the Answer-Sheet,
- (viii) The candidate shall bring his own black/blue Ball Pens.
- (ix) After completing the test and before handing over the Test Booklet and Answer-Sheet, the candidate should check again that all the particulars required in the Test booklet and the Answer Sheet have been correctly written.
- (x) A signal will be given at the beginning of the examination and at half time. A signal will also be given before the closing time when the candidates must stop marking responses.
- (xi) The candidate will be supplied OMR Answer Sheet which will be evaluated by Computer and is to be used carefully. Complete and accurate marking on this sheet is, extremely important.
- (xii) (a) To answer questions, the candidate will be required to darken in the circle by using blue/black ball Pen corresponding to the answer, she/he thinks to be correct against the serial number of the question.  
(b) It should be carefully noted that the circles should be darken properly and be filled in as complete as possible.
- (xiii) The test-booklet and the OMR Answer sheet are to be handed over to the Supervisor/Invigilator before leaving the hall. The candidate who does not hand over the test-booklet along with the OMR Sheet to the Supervisor/Invigilator, her/his candidature will stand cancelled besides facing action to be decided by the competent Authority.
- (xiv) "The candidates are required to furnish the 'Admit Card' at the time of (i) entry In to the Examination Hall and (ii) during the course of examination for necessary identification by the supervisory staff on duty. The candidates are, therefore, advised to keep the 'Admit Card' intact.
- (xv) There will be no revaluation/re-checking of OMR Answer sheets.

## 9. ***PUNISHMENT FOR USE OF UNFAIR MEANS***

If any candidate is found guilty of any breach of rules mentioned in the prospectus or guilty of using unfair means, she/he will be liable to be punished by the Competent Authority as per University rules.

**10. MEDICAL EXAMINATION**

- (a) The selected candidates at the time of counseling(s) will report to respective colleges for medical examination and fee deposition on the dates fixed by the Counseling Board. The standard of physical fitness required for admission will be determined by the said board. The candidature of CANDIDATES found medically unfit will be liable to cancellation.
- (b) Selected physically handicapped candidates will also have to appear before the Medical Board for assessment whether they are fit to carry out the duties despite being handicapped. The decision of the Board will be final.

**11. LEGAL JURISDICTION**

All disputes pertaining to the conduct of examination and admission shall fall within the jurisdiction of Rohtak only. The competent authority shall be the legal entity who may sue and be sued.

**12. Sample questions along with method of marking are given below**

Question: When a tuning fork vibrates with 1.0 m or 1.05 m long wire of a konometer, 5 beats per second are produced in Each Case. What will be the frequency of the tuning fork?

- (A). 195                                      (B).295                                      (C).205                                      (D).210



(c) being the correct answer has been darkened.

13. The candidate will be required to write Roll No. and other particulars on the OMR ANSWER SHEET as shown below in the example for Roll No.371206

Roll No. 371206

	3	7	1	2	0	6
1	0	0	●	0	0	0
2	0	0	0	●	0	0
3	●	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	●
7	0	●	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
0	0	0	0	0	●	0

## **DURATION OF COURSES**

- |   |   |  |
|---|---|--|
| 1. Bachelor of Physiotherapy (BPT)                  | : | Four & half academic years including six months compulsory rotating internship |
| 2. B.Sc.Nursing                                     | : | Four years   |
| 3. Post Basic B.Sc. Nursing                         | : | Two years  |
| 4. M.Sc. Nursing                                    | : | Two years  |
| 5. N.P.C.C.   | : | Two years  |
| 6. M.P.T.   | : | Two years  |
| 7. Bachelor of Optometry (B.Optom.)<br>Internship.  | : | Four years including one year compulsory                                       |
| 8. BSc. Medical Technology<br>Operation Theatre(OT) | : | Three academic years   |
| 9. BSc. Medical Lab Technology                      | : | Three years. The duration of training shall be of two years                    |
| 10. B.Sc. Radiotherapy Technology                   | : | Three academic years   |
| 11. B.Sc. Radiography & Imaging<br>Technology       | : | Three academic years   |
| 12. B.Sc. Perfusion Technology                      | : | Three academic years followed by six months<br>Compulsory internship training. |

**SYLLABUS FOR B.Sc. NURSING, BPT AND OTHER U.G. PARA MEDICAL COURSES FOR  
COMMON ENTRANCE EXAM FOR ACADEMIC SESSION 2021-22**

**PHYSICS**

S.No.	CLASS XI	CLASS XII
1.	Physical world and measurement	Electrostatics
2.	Kinematics	Current
3.	Laws of Motion	Electricity
4.	Work, Energy and Power	Magnetic Effects of Current and Magnetism
5.	Motion of System of Particles and Rigid Body	Electromagnetic Induction and Alternating Currents
6.	Gravitation	Electromagnetic Waves
7.	Properties of Bulk Matter	Optics
8.	Matter	Dual Nature of Matter and Radiation
9.	Thermodynamics	Atoms and Nuclei
10.	Behavior of Perfect Gas and Kinetic Theory	Electronic Devices
	Oscillations and Waves	

**CHEMISTRY**

S.No.	Class XI	Class XII
1.	Some Basic Concepts of Chemistry	Solid State
2.	Structure of Atom	Solutions
3.	Classification of Elements and Periodicity in Properties	Electrochemistry
4.	Chemical Bonding and Molecular Structure	Chemical Kinetics
5.	States of Matter Gases and Liquids	Surface Chemistry
6.	Thermodynamics	General Principles and Processes of Isolation of Elements
7.	Equilibrium	P-Block Elements
8.	Redox Reactions	d and f Block Elements
9.	Hydrogne	Coordination Compounds
10.	s-Block Element (Alkali and Alkaline earth Haloarences Metal)	Haloalkanes and
11.	Somep-Block Elements	Alcohols, Phenols and Ethers
12.	Organic Chemistry-Some Basic Principles and Acids Techniques	Aldehydes, Ketones and Carboxylic
13.	Hydrocarbons	Organic Compounds Containing Nitrogen
14.	Environmental Chemistry	Biomolecules
		Polymers Chemistry in everyday life

**BIOLOGY**

S.No.	ClassXI	Class XII
1.	Diversity in living world	Reproduction
2.	Structural Organization in Animals and Plants	Genetics and Evolution
3.	Cell Structure and function	Biology and Human welfare
4.	Plant Physiology	Biotechnology and its applications
5.	Human physiology	Ecology and environment

# PHYSICS

## CONTENTS CLASS XI SYLLABUS

### UNIT I: Physical World and Measurement

**Physics:** Scope and excitement; nature of physical laws; Physics, technology and society. *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

- Frame of reference, Motion in a straight line; Position-time graph, speed and velocity. Uniform and non-uniform motion, average speed and instantaneous velocity. Uniformly accelerated motion, velocity-time and position-time graphs, for uniformly accelerated motion (graphical treatment).
- Elementary concepts of differentiation and integration for describing motion. *Scalar and vector quantities:* Position and displacement vectors, general vectors, general vectors and notation, equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Relative velocity. Unit vectors. Resolution of a vector in a plane-rectangular components. Scalar and Vector products of Vectors. Motion in a plane. Cases of uniform velocity and uniform acceleration-projectile motion. Uniform circular motion.

### UNIT III: 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 level circular road, vehicle on banked road).

### UNIT IV: Work, Energy and Power

Work done by a constant force and 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

- 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 uniform rod.
- Moment of a force, torque, angular momentum, conservation of angular momentum with some examples.
- Equilibrium of rigid bodies, rigid body rotation and equation of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration. Values of M.I. for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications.

### UNIT VI: Gravitation

- 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; gravitation potential. Escape velocity, orbital velocity of a satellite. Geo stationary satellites.

### UNIT VII: Properties of Bulk Matter

- Elastic behavior, Stress-strain relationship. Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity, Poisson's ratio; elastic energy.
- Viscosity, Stokes' law, terminal velocity, Reynold's number, streamline and turbulent flow. Critical velocity, Bernoulli's theorem and its applications.
- Surface energy and surface tension, angle of contact, excess of pressure, application of surface tension in soap bubbles, capillary rise.
- Heat, temperature, thermal expansion; thermal expansion of solids, liquids, and gases. Anomalous expansion. Specific heat capacity:  $C_p$ ,  $C_v$ - calorimetry; change of state – latent heat. □ Heat transfer- conduction and thermal conductivity, convection and radiation. Qualitative ideas of Black Body Radiation, Wien's displacement law, and Green House effect.
- Newton's law of cooling and Stefan's law.

### UNIT VIII: 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 the thermodynamics:* Reversible and irreversible processes. Heat engines and refrigerators.

### UNIT IX: Behavior of Perfect Gas and Kinetic Theory

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

*Kinetic theory of gases:* Assumptions, concept of pressure. 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 X: Oscillations and Waves

- Periodic motion-period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (SHM) and its equation; phase; oscillations of a spring-restoring force and force constant; energy in SHM - Kinetic and potential energies; simple pendulum-derivation of expression for its time period; free, forced and damped oscillations (qualitative ideas only), 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.

## CONTENTS OF CLASS XII SYLLABUS

### UNIT I: Electrostatics

- Electric charges and their conservation. Coulomb's law-force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution.
- 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, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside)
- Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges: equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipoles in an electrostatic field.
- Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarization, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor, Van de Graaff generator.

### UNIT II: Current Electricity

- Electric current, flow of electric charges in a metallic conductor, drift velocity and mobility, and their relation with electric current; Ohm's law, electrical resistance,  $V-I$  characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity.
- Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors; temperature dependence of resistance.
- Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel. Kirchhoff's laws and simple applications. Wheatstone bridge, metre bridge. Potentiometer-principle and applications to measure potential difference, and for comparing emf of two cells; measurement of internal resistance of a cell.

### UNIT III: Magnetic Effects of Current and Magnetism

- Concept of magnetic field, Oersted's experiment. Biot-Savart law and its application to current carrying circular loop.
- Ampere's law and its applications to infinitely long straight wire, straight and toroidal solenoids. Force on a moving charge in uniform magnetic and electric fields. Cyclotron.
- 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-its current sensitivity and conversion to ammeter and voltmeter.
- Current loop as a magnetic dipole and its magnetic dipole moment. Magnetic dipole moment of a revolving electron. Magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis. Torque on a magnetic dipole (bar magnet) in a uniform magnetic field; bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements. Para-, dia- and ferro-magnetic substances, with examples. Electromagnetic and factors affecting their strengths. Permanent magnets.

### UNIT IV: Electromagnetic Induction and Alternating Currents

- 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; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits, wattless current. □ AC generator and transformer.



### UNIT V: Electromagnetic Waves

Need for displacement current.

Electromagnetic waves and their characteristics (qualitative ideas only). Transverse nature of electromagnetic waves.

- Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, x-rays, gamma rays) including elementary facts about their uses.

### UNIT VI: Optics

- Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Magnification, power of a lens, combination of thin lenses in contact combination of a lens and a mirror. Refraction and dispersion of light through prism.

Scattering of light- blue colour of the sky and reddish appearance of the sun at sunrise and sunset. *Optical instruments*: Human eye, image formation and accommodation, correction of eye defects (myopia and hypermetropia) using lenses.

Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. *Wave optics*: Wave front and Huygens' principle, reflection and refraction of plane wave at a plane surface using wave fronts.

Proof of laws of reflection and refraction using 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, width of central maximum.

Resolving power of microscopes and astronomical telescopes. Polarisation, plane polarized light; Brewster's law, uses of plane polarized light and Polaroids.

### UNIT VII: Dual Nature of Matter and Radiation

- Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation- particle nature of light.
- Matter waves- wave nature of particles, de Broglie relation. Davisson-Germer experiment (experimental details should be omitted; only conclusions should be explained).

### UNIT VIII: Atoms and Nuclei

- Alpha- particle scattering experiments; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars; isotones.
- Radioactivity- alpha, beta and gamma particles/ rays and their properties decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number, nuclear fission and fusion.

### UNIT IX: Electronic Devices

- Energy bands in solids (qualitative ideas only), conductors, insulators and semiconductors; semiconductor diode- *I-V* characteristics in forward and reverse bias, diode as a rectifier; *I-V* characteristics of LED, photodiode, solar cell, and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

## CHEMISTRY

### CONTENTS OF CLASS XI SYLLABUS

#### UNIT I: Some Basic Concepts of Chemistry

*General Introduction*: Important 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.

#### UNIT II: Structure of Atom

- Atomic number, isotopes and isobars. Concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbital, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals- Aufbau principle, Pauli exclusion principles 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

- Modern periodic law and long form of periodic table, periodic trends in properties of elements- atomic radii, ionic radii, ionization enthalpy, electron gain enthalpy, electronegativity, valence.

#### UNIT IV: Chemical Bonding and Molecular Structure

- Valence electrons, ionic bond, covalent bond, bond parameters, Lewis structure, polar character of covalent bond, valence bond theory, resonance, geometry of 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 of elucidating the concept of the molecule, Boyle's law, Charles's law, Gay Lussac's law, Avogadro's law, ideal behavior of gases, empirical derivation of gas equation. Avogadro number, ideal gas equation. Kinetic energy and molecular speeds (elementary idea), deviation from ideal behavior, liquefaction of gases, critical temperature.
- Liquid State- Vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations).

### UNIT VI: Thermodynamics

- First law of thermodynamics-internal energy and enthalpy, heat capacity and specific heat, measurement of  $U$  and  $H$ , 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.

### UNIT VII: Equilibrium

- Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of chemical equilibrium, 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 polybasic acids, acid strength, concept of pH., Hydrolysis of salts (elementary idea)., buffer solutions, Henderson equation, solubility product, common ion effect (with illustrative examples).

### UNIT VIII: 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.

### UNIT IX: Hydrogen

- 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;

### 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.

- Industrial use of lime and lime stone, biological importance of Mg and Ca.

### 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, some important compounds: borax, boric acids, boron hydrides. Aluminium: uses, reactions with acids and alkalis.

- *General 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: 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 Techniques

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

### UNIT XIII: 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.

### UNIT XIV: 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.

## CONTENTS OF CLASS XII SYLLABUS

### UNIT I: Solid State

- Classification of solids based on different binding forces; molecular, ionic covalent and metallic solids, amorphous and crystalline solids (elementary idea), unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, Band theory of metals, conductors, semiconductors and insulators.

### UNIT II: Solutions

- Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties- relative lowering of vapour pressure, Raoult's law, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties abnormal molecular mass. Van Hoffactor.

### UNIT III: Electrochemistry

- Redox reactions, conductance in electrolytic solutions, specific and molar conductivity variation of conductivity with concentration, Kohlrausch's Law, electrolysis and Laws of electrolysis (elementary idea), dry cell- electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion.

### UNIT IV: Chemical Kinetics

- Rate of a reaction (average and instantaneous), factors affecting rates of reaction; concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half life (only for zero and first order reactions); concept of collision theory ( elementary idea, no mathematical treatment). Activation energy, Arrhenius equation.

### UNIT V: Surface Chemistry

- Adsorption- physisorption and chemisorption; factors affecting adsorption of gases on solids, catalysis homogeneous and heterogeneous, activity and selectivity: enzyme catalysis; colloidal state: distinction between true solutions, colloids and suspensions; lyophilic, lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions- types of emulsions.

### UNIT VI: General Principles and Processes of Isolation of Elements

- Principles and methods of extraction- concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron.

### UNIT VII: p- Block Elements

- Group 15 elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; preparation and properties of ammonia and nitric acid, oxides of nitrogen (structure only); Phosphorous- allotropic forms; compounds of phosphorous: preparation and properties of phosphine, halides ( $PCl_3$ ,  $PCl_5$ ) and oxoacids (elementary idea only).
- Group 16 elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; dioxygen: preparation, properties and uses; classification of oxides; ozone. Sulphur - allotropic forms; compounds of sulphur: preparation, preparation, properties and uses of sulphur dioxide; sulphuric acid: industrial process of manufacture, properties and uses, oxoacids of sulphur (structures only).
- Group 17 elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens: preparation, properties and uses of chlorine and hydrochloric acid, inter halogen compounds oxo acids of halogens (structures only).
- Group 18 elements: General introduction, electronic configuration, occurrence, trends in physical and chemical properties, uses.

### UNIT VIII: d and f Block Elements

- General introduction, electronic configuration, characteristics of transition metals, general trends in properties of the first row transition metals- metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation. Preparation and properties of  $K_2Cr_2O_7$  and  $KMnO_4$ .
- Lanthanoids- electronic configuration, oxidation states, chemical reactivity, and lanthanoid contraction and its consequences.
- Actinoids: Electronic configuration, oxidation states and comparison with lanthanoids.

### UNIT IX: Coordination Compounds

- Coordination compounds: Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, isomerism (structural and stereo) bonding, Werner's theory VBT, CFT; importance of coordination compounds (in qualitative analysis, biological systems).

### UNIT X: Haloalkanes and Haloarenes

- *Haloalkanes*: Nomenclature, nature of C -X bond, physical and chemical properties, mechanism of substitution reactions. Optical rotation.
- *Haloarenes*: Nature of C-X bond, substitution reactions (directive influence of halogen for mono substituted compounds only).
- Uses and environment effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

### UNIT XI: Alcohols, Phenols and Ethers

- *Alcohols*: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only); identification of primary, secondary and tertiary alcohols; mechanism of dehydration, uses with special reference to methanol and ethanol.
- *Phenols*: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols.
- *Ethers*: Nomenclature, methods of preparation, physical and chemical properties uses.

### UNIT XII: Aldehydes, Ketones and Carboxylic Acids

- *Aldehydes and Ketones*: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties; and mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes; uses.
- *Carboxylic Acids*: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

### UNIT XIII: Organic Compounds Containing Nitrogen

- *Amines*: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary secondary and tertiary amines.  
*Cyanides and Isocyanides*- will be mentioned at relevant places.  
*Diazonium salts*: Preparation, chemical reactions and importance in synthetic organic chemistry.

### UNIT XIV: Biomolecules

- *Carbohydrates*- Classification (aldoses and ketoses), monosaccharide (glucose and fructose), D.L. configuration, oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen): importance.
- *Proteins*- Elementary idea of - amino acids, peptide bond, polypeptides, proteins, primary structure, secondary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins; enzymes.  
**Hormones**- Elementary idea (excluding structure).  
*Vitamins*- Classification and function.  
*Nucleic Acids*: DNA and RNA

### UNIT XV: Polymers

- *Classification*- Natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers: natural and synthetic like polyesters, bakelite; rubber, Biodegradable and non-biodegradable polymers.

### UNIT XVI: Chemistry in Everyday Life

- Chemicals in medicines- analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.  
Chemicals in food- preservatives, artificial sweetening agents, **elementary idea of antioxidants**.  
Cleansing agents- soaps and detergents, cleansing action.

## BIOLOGY

### CONTENTS OF CLASS XI SYLLABUS

#### UNIT I: Diversity in Living World

- What is living? ; Biodiversity; Need for classification; Three domains of life; Taxonomy & Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy - Museums, Zoos, Herbaria, Botanical gardens.
- Five kingdom classification; salient features and classification of Monera; Protista and Fungi into major groups; Lichens; Viruses and Viroids.
- Salient features and classification of plants into major groups- Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms (three to five salient and distinguishing features and at least two examples of each category); Angiosperms- classification up to class, characteristic features and examples).
- Salient features and classification of animals- non-chordate up to phyla level and chordate up to class level (three to five salient features and at least two examples).



## UNIT II: Structural Organisation in Animals and Plants

Morphology and modifications; Tissues; Anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence- cymose and racemose, flower, fruit and seed (To be dealt along with the relevant practical of the Practical Syllabus).

- || Animal tissues; Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (Brief account only)

## UNIT III: Cell Structure and Function

- Cell theory and cell as the basic unit of life; Structure of prokaryotic and eukaryotic cell; 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, micro bodies; Cytoskeleton, cilia, flagella, centrioles (ultra structure and function); Nucleus-nuclear membrane, chromatin, nucleolus.
- || Chemical constituents of living cells: Biomolecules-structure and function of proteins, carbohydrates, lipids, nucleic acids;  
Enzymes-types, properties, enzyme action.
- Cell division: Cell cycle, mitosis, meiosis and their significance.

## UNIT IV: Plant Physiology

- 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, 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.
- Photosynthesis: Photosynthesis as a means of Autotrophic nutrition; Site of photosynthesis take place; pigments involved in Photosynthesis (Elementary idea); Photochemical and biosynthetic phases of photosynthesis; Cyclic and non cyclic and photophosphorylation; Chemiosmotic hypothesis; Photorespiration C3 and C4 pathways; Factors affecting photosynthesis.
- Respiration: Exchange gases; Cellular respiration-glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); Energy relations-Number of ATP molecules generated; Amphibolic pathways; Respiratory quotient.
- 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.

## UNIT IV: Human Physiology

- 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 - PEM, indigestion, constipation, vomiting, jaundice, diarrhea.
- 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.
- 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.
- 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.
- 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.
- 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).

(Imp: Diseases and disorders mentioned above to be dealt in brief.)

## CONTENTS OF CLASS XII SYLLABUS

### UNIT I: Reproduction

- Reproduction in organisms: Reproduction, a characteristic feature of all organisms for continuation of species; Modes of reproduction - Asexual and sexual; Asexual reproduction; Modes-Binary fission, sporulation, budding, gemmule, fragmentation; vegetative propagation in plants.
- Sexual reproduction in flowering plants: Flower structure; Development of male and female gametophytes; Pollination- types, agencies and examples; Outbreeding devices; Pollen- Pistil interaction; Double fertilization; Post fertilization events- Development of endosperm and embryo, Development of seed and formation of fruit; Special modes-apomixis, parthenocarpy, polyembryony; Significance of seed and fruit formation.
- Human Reproduction: Male and female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis- spermatogenesis & oogenesis; Menstrual cycle; Fertilisation, embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementaryidea).
- Reproductive health: Need for reproductive health and prevention of sexually transmitted diseases (STD); Birth control- Need and Methods, Contraception and Medical Termination of Pregnancy (MTP); Amniocentesis; Infertility and assisted reproductive technologies - IVF, ZIFT, GIFT (Elementary idea for general awareness).

### UNIT II: Genetics and Evolution

- Heredity and variation: Mendelian Inheritance; Deviations from Mendelism-Incomplete dominance, Co-dominance, Multiple alleles and Inheritance of blood groups, Pleiotropy; Elementary idea of polygenic inheritance; Chromosome theory of inheritance; Chromosomes and genes; Sex determination-In humans, birds, honey bee; Linkage and crossing over; Sex linked inheritance-Haemophilia, Colour blindness; Mendelian disorders in humans- Thalassemia; Chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.
- Molecular basis of Inheritance: Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; Transcription, genetic code, translation; Gene expression and regulation-Lac Operon; Genome and human genome project; DNA finger printing.
- Evolution: Origin of life; Biological evolution and evidences for biological evolution from Paleontology, comparative anatomy, embryology and molecular evidence); Darwin's contribution, Modern Synthetic theory of Evolution; Mechanism of evolution-Variation (Mutation and Recombination) and Natural Selection with examples, types of natural selection; Gene flow and genetic drift; Hardy-Weinberg's principle; Adaptive Radiation; Human evolution.

### UNIT III: Biology and Human Welfare

- Health and Disease; Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology-vaccines; Cancer, HIV and AIDS; Adolescence, drug and alcohol abuse.
- Improvement in food production; Plant breeding, tissue culture, single cell protein, Biofortification; Apiculture and Animal husbandry.
- Microbes in human welfare: In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.

### UNIT IV: Biotechnology and Its Applications

- Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology).
- Application of Biotechnology in health and agriculture: Human insulin and vaccine production, gene therapy; Genetically modified organisms-Bt crops; Transgenic Animals; Biosafety issues-Biopiracy and patents.

### UNIT V: Ecology and environment

- Organisms and environment: Habitat and niche; Population and ecological adaptations; Population interactions-mutualism, competition, predation, parasitism; Population attributes- growth, birth rate and death rate, age distribution.
- Ecosystem: Patterns, components; productivity and decomposition; Energy flow; Pyramids of number, biomass, energy; Nutrient cycling (carbon and phosphorous); Ecological succession; Ecological Services- Carbon fixation, pollination, oxygen release.
- Biodiversity and its conservation: Concept of Biodiversity; Patterns of Biodiversity; Importance of Biodiversity; Loss of Biodiversity; Biodiversity conservation; Hotspots, endangered organisms, extinction, Red Data Book, biosphere reserves, National parks and sanctuaries.
- Environmental issues: Air pollution and its control; Water pollution and its control; Agrochemicals and their effects; Solid waste management; Radioactive waste management; Greenhouse effect and global warning; Ozone depletion; Deforestation; Any three case studies as success stories addressing environmental issues.