

Biology (56)

Std. XI and XII

Introduction

Higher secondary is the most crucial stage of education because at this juncture specialized disciplines of science are introduced. The present syllabus reinforces the concepts introduced in lower classes. Recently, the science of biology has undergone a paradigm shift that has transformed it from a collection of loosely related facts into a modern applied science.

Living organisms exhibit extremely complex functional system. Organisms seldom occur as isolated individuals. They are organized into populations and biological communities. Organisms, communities, ecosystems and environment constitute unique set of natural resources of great importance.

Knowledge of biology helps us to understand a common thread which holds all these components together. Understanding of biology will help in the sustainable development of the environment and will also ensure the existence of earth with all its amazing diversity.

This syllabus is designed to prepare students for various examinations conducted at state and national level. Hence it has been prepared in accordance with the guidelines shown in the final version of common core syllabi of COBSE, Delhi. Accordingly some additional topics from state Board syllabus have been deleted whereas the lacking topics have been added. The entire unit “Ecology and Environment” has now been added under Botany and Zoology sections.

Objectives

The prescribed syllabus is expected to

- Promote the inherent skill of observation.
- Assist to understand the underlying principles of biological sciences and thereby develop scientific attitude towards biological phenomena.
- Help students to understand the functioning of organisms.
- Make students aware of issues of global importance.
- Guide students to perform easy experiments for better understanding of biological principles and to develop experimental skills required in practical work.
- Create awareness about the contribution of biology to human welfare.

Std. – XI

Section I - Botany

Unit 1 Diversity in Living World:

Chapter 1- Diversity in organisms :

1. Diversity in living organisms-Brief idea.
2. Systematic and binomial system of nomenclature - meaning of the terms taxonomy, systematics, classification and nomenclature, Need of classification.

Three domains of life, Concept of species.

Taxonomic hierarchy with examples. Binomial nomenclature explanation, significance and examples.



3. Classification of living organisms (five Kingdom classification) – Major groups and principles of classification for each Kingdom with examples.
4. Lichens - Meaning, characters, examples and importance.
5. Viruses and viroids - Definitions, characters, types with examples, Economic importance and list of viral diseases.

Chapter 2 - Kingdom Plantae :

1. Salient features of major plant groups - Algae, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms (Dicotyledons and Monocotyledons). Three to five salient features and two examples of each category.
2. Botanical gardens and herbaria - Meaning, importance and list of gardens and herbaria in India.

Unit 2 Structure and function of cell :

Chapter 3 - Biochemistry of cell :

1. Basic chemical constituents of living bodies.
2. Structure and function of carbohydrates, proteins, lipids and nucleic acids in brief.
3. Enzymes - Definition, **Types**, general properties, **Enzyme action** and factors affecting enzyme activity in brief.

Chapter 4 Cell Division :

1. Cell cycle
2. Mitosis
3. Meiosis

Unit 3 Structural organization in plants

Chapter 5 - Morphology of Plants :

1. Morphology, anatomy and functions of different parts - Root, stem, leaf, inflorescence, flower, fruit and seed. **(To be dealt along with the relevant practicals of the practical syllabus)**
2. Plant tissues.

Unit 4 Plant Physiology

Chapter 6 - Plant Water Relations and Mineral Nutrition :

1. Movement of water, food, nutrients and gases - Absorption of water and minerals, **Apoplast and Symplast Pathways**. Active and passive absorption in brief.

2. Guttation

Ascent of sap, **root pressure concept** and cohesion - tension theory.

Translocation of sugars **through phloem** brief account.

Transpiration – structure of stomata, mechanism **of opening and closing of stomata, Role of K⁺ ions**

3. Role of water and minerals - macronutrients and micronutrients and their role. **Mineral deficiency symptoms, Mineral toxicity, Elementary idea of Hydroponics, Nitrogen Metabolism (nitrogen cycle, biological nitrogen fixation)**

Chapter 7 - Plant Growth and Development: Seed dormancy

Germination - Hypogeal, epigeal and viviparous.

Definition and characteristics of growth. Phases of growth, **Conditions of growth, Differentiation, de- differentiation, redifferentiation**

Sequence of developmental process in a plant cell

Growth regulators - auxins, gibberellins, cytokinins, ethylene and abscissic acid (role in brief) Photoperiodism, **Photomorphogenesis including brief account of Phytochromes (Elementary idea)**

Vernalization.



Std. - XI

Section II – Zoology

Unit 1 Diversity in Living World

Chapter 8 - Kingdom Animalia

1. Salient features of major phyla under kingdom Animalia. Classification of following phyla with three to five salient features and two examples of each category: Porifera, Coelenterata, Ctenophora, Platyhelminthes, Nematelminthes, Annelida, Arthropoda, Mollusca, Echinodermata and Hemichordata. Classification of phylum chordata upto class level with three to five salient features and two examples of each category: Urochordata, Cephalochordata, Cyclostomata, Chondrichthyes, Osteichthyes, Amphibia, Reptilia, Aves and Mammalia.
2. Zoological parks and Museums - General idea with list.

Unit 2 Structure and function of cell

Chapter 9 - Organization of Cell

1. Cell theory - brief account
2. Prokaryotic and eukaryotic cell - structure and examples.
3. Plant cell and animal cell.
4. Nuclear organization - Nucleus, nucleolus and nucleoplasm.
5. Cell wall and cell membrane - (fluid mosaic model).
6. Cell organelles: Plastids, Mitochondria, Golgi complex, Lysosomes, Endoplasmic reticulum, Vacuoles, Ribosome and Centrioles (**ultrstructure and functions**). Microbodies, cytoskeleton, cilia and flagella.

Unit 3 Structural organization in Animals:

Chapter 10- Study of Animal Tissues :

1. Animal tissues - types

- a) Epithelial tissues - simple epithelium (squamous, cuboidal, columnar, Ciliated, glandular). - compound epithelium (stratified).
- b) Connective tissue - (Areolar, Adipose, Tendons, Ligaments, Cartilage and Bone).
- c) Muscular tissue - (Smooth, striated and cardiac).
- d) Nervous tissue (Neurons, glial cells and types of neurons).

Chapter 11- Study of Animal Type

1. Morphology, anatomy and functions of digestive, **circulatory, respiratory, nervous, and reproductive** systems of cockroach (**Brief account only**)

Unit 4 Human Physiology

Chapter 12- Human Nutrition

- i) Digestive system in brief
- ii) Physiology of digestion, **gastrointestinal hormones, Peristalsis. Calorific value of proteins, carbohydrates and fats**
- iii) Absorption, assimilation **and egestion**
- iv) Nutritional and digestive disorders – PEM, indigestion, constipation, Jaundice, **vomiting and diarrhoea**

Chapter 13- Human Respiration

Respiratory organs in animals (Recall only)

- i) Respiratory system in brief
- ii) Breathing- inspiration and expiration.
- iii) Exchange of gases, transport of CO₂ and O₂ and tissue respiration.

Regulation of Respiration, Respiratory volumes.



- iv) Respiratory disorders- Asthma, **Emphysema** and occupational lung diseases.

Chapter 14 - Human skeleton and

Locomotion:

Brief account of human skeleton:

A] Axial Skeleton

B] Appendicular Skeleton

(Details to be dealt with the relevant practical)

Types of joints - synarthroses, amphiarthroses, and diarthroses.

Types of diarthroses - ball and socket, hinge, condyloid, pivot, saddle and gliding joints.

Types of Movement- Ciliary, Flagellar, Muscular

Mechanism of muscle movement: **Contractile proteins and Muscle contraction.** Skeletal and muscular disorders – **Myasthenia gravis**, Osteoporosis, arthritis, muscular dystrophy tetany and **gout**.

Std. XI - Biology Practicals Syllabus

(A) List of experiments:

1. Study of parts of compound microscope.
2. **Preparation of T. S. of dicot (sunflower) and monocot roots and stem** to study different plant tissues.
3. Study and describe three locally available flowering plants from the families- Solanaceae, Fabaceae and Liliaceae with respect to types of root-(tap and adventitious), stem (herbaceous and woody), leaf (arrangement, shape, venation, simple and compound) and floral characters.

4. Study of plasmolysis in epidermal peels.
5. Study of osmosis by Potato osmometer
6. Study of structure and distribution of stomata in upper and lower surface of leaf.
7. To test the presence of sugar, starch, proteins and fats from suitable plant and animal materials.
8. To study the digestion of starch by salivary amylase under different conditions of temperature and pH.

(B) Study/ Observation of the following (Spotting):

1. Study of specimens and identification with reasons:
Bacteria, Amoeba, Oscillatoria, Spirogyra, Rhizopus, yeast, Agaricus, Usnea, Riccia, Funaria, Nephrolepis, Cycas, sunflower and maize.
2. Comparative study of rates of transpiration in upper and lower surface of leaf.
3. Study of different modifications of root (fusiform root, parasitic root, epiphytic root and pneumatophores).
4. Study of different modifications of stem (stem tuber, runner, and tendril).
5. Study of different modifications of leaf (leaflet and stipular tendril), leaf Spines, phyllode).
- 6.. Study of imbibition of seeds/raisins.
7. Study and identification of different types of inflorescence.
8. **Study of tissues and diversity in shapes and sizes of plant and animal cells- palisade cells, guard cells, parenchyma, collenchyma, sclerenchyma, xylem, phloem, squamous epithelium, muscle fibres, mammalian blood smear, through temporary or permanent slides.**



9. Observation and comments on experimental set up on:
 - a) Phototropism
 - b) Suction due to transpiration.
 - c) Apical bud removal
10. Study of specimens and their identification with reasons – *Sycon*, *Hydra*, *Pleurobrachia*, Liverfluke, *Ascaris*, Leech, Earthworm, **Prawn, Silkworm, Honey bee**, Snail, Star-fish, *Balanoglossus*, Shark, Rohu, Frog, Lizard, Pigeon and Rat.
11. Study of human skeleton (except skull, hand bones and foot bones) and **different types of joints (synovial, cartilaginous and fibrous joints with one suitable example)**.
12. Study of external morphology of earthworm, cockroach and frog through models.
13. **Study of mitosis** in onion root tips and animal cells (**grasshopper**) from permanent slides.

Std. - XII Biology

Section I – BOTANY

Unit 1: Genetics and Evolution :

Chapter 1 - Genetic Basis of Inheritance:

Mendelian inheritance. Deviations from Mendelian ratio (gene interaction-incomplete dominance, co-dominance, multiple alleles **and Inheritance of blood groups**), **Pleiotropy**, **Elementary idea of polygenic inheritance**.

Chapter 2 - Gene: its nature, expression and regulation:

Modern concept of gene in brief-cistron, muton and recon. **DNA as genetic**

material, structure of DNA as given by Watson and Crick's model, **DNA Packaging**, semi conservative replication of eukaryotic DNA.

RNA: General structure, types and functions.

Protein Synthesis; central dogma, Transcription; Translation-Genetic Code, Gene Expression and Gene Regulation (The *Lac* operon as a typical model of gene regulation).

Unit 2: Biotechnology and its application:

Chapter 3 - Biotechnology: Process and Application :

Genetic engineering (Recombinant DNA technology):

Transposons, Plasmids, Bacteriophages; Producing Restriction Fragments, Preparing and cloning a DNA Library, Gene Amplification (PCR).

Application of Biotechnology in Agriculture – BT crops

Biosafety Issues (Biopiracy and patents)

Unit 3: Biology and Human Welfare :

Chapter 4 - Enhancement in Food Production

Plant Breeding

Tissue Culture: Concept of Cellular Totipotency,

Requirements of Tissue Culture (in brief), Callus Culture, Suspension Culture.

Single Cell Protein. **Biofortification**.

Chapter 5 - Microbes in Human Welfare:

Microbes in Household food processing.

Microbes in Industrial Production.

Microbes in Sewage Treatment.

Microbes in Biogas (energy) Production.

Microbes as Biocontrol Agents.

Microbes as Biofertilizers.



Unit 4: Plant Physiology :**Chapter 6 - Photosynthesis**

Autotrophic nutrition

Site of Photosynthesis

Photosynthetic Pigments and their role.

Light-Dependent Reactions (Cyclic and non-cyclic photophosphorylation)

Light-Independent Reactions (C3 and C4 Pathways)

Chemiosmotic hypothesis, Photorespiration, Factors affecting Photosynthesis.

Law of limiting factors.

Chapter 7 - Respiration

ATP as currency of Energy

Mechanism of Aerobic (Glycolysis, **TCA Cycle and Electron Transport System**) and Anaerobic Respiration. **Fermentation**

Exchange of gases

Amphibolic pathway. Respiratory quotient of Nutrients.

Significance of Respiration.

Unit 5: Reproduction in Organisms :**Chapter 8 - Reproduction in Plants**

Modes of Reproduction (Asexual and Sexual).

Asexual reproduction; uniparental modes-vegetative propagation, micropropagation

Sexual Reproduction: **structure of flower**

Development of male gametophyte,

Structure of anatropous ovule.

Development of female Gametophyte.

Pollination: Types and Agencies.

Outbreeding devices; pollen-pistil interaction.

Double Fertilization: Process and Significance.

Post-fertilization changes (development of endosperm and embryo, development of seed and formation of fruit)

Special modes-apomixis, parthenocarpy, polyembryony. Significance of seed and fruit formation.

Unit 6: Ecology and Environment**Chapter 9: Organisms and Environment -I : Habitat and Niche**

Ecosystems: 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. Environmental issues: agrochemicals and their effects, solid waste management, Green house effect and global warming, ozone depletion, deforestation, case studies (any two).

Std. - XII Biology**Section II - ZOOLOGY****Unit 1: Genetics and Evolution :****Chapter 10 - Origin and the Evolution of Life :**

Origin of Life: Early Earth, Spontaneous, assembly of organic compounds,

Evolution: Darwin's contribution, Modern Synthetic Theory of evolution, Biological Evidences, **Mechanism of evolution; Gene flow and genetic drift; Hardy-Weinberg principle; Adaptive radiation.**

Origin and Evolution of Human being.

Chapter 11 - Chromosomal Basis of Inheritance

The Chromosomal Theory.

Chromosomes.

Linkage and Crossing Over.

Sex-linked Inheritance (Haemophilia and colour blindness).



Sex Determination in Human being, **birds, honey bee.** **Mendelian disorders in humans-Thalassemia. Chromosomal disorders in human: Down's syndrome, Turner's syndrome and Klinefelter's syndrome.**

Unit 2: Biotechnology and its application:

Chapter 12- Genetic Engineering and Genomics

DNA Finger Printing.

Genomics and Human Genome Project.

Biotechnological Applications in Health:

Human insulin and vaccine production,

Gene Therapy. **Transgenic animals.**

Unit 3: Biology and Human Welfare

Chapter 13- Human Health and Diseases

Concepts of Immunology: Immunity Types, **Vaccines,**

Structure of Antibody, Antigen-Antibody Complex, Antigens on blood cells.

Pathogens and Parasites (Amoebiasis, Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, Common cold and ring worm).

Adolescence, drug and alcohol abuse.

Cancer and AIDS.

Chapter 14- Animal Husbandry

Management of Farms and Farm Animals.

Dairy.

Poultry.

Animal Breeding.

Bee-Keeping.

Fisheries.

Sericulture

Lac culture

Unit 4: Human Physiology :

Chapter 15- Circulation

Blood composition and coagulation, **Blood groups.**

Structure and pumping action of Heart.

Blood Vessels.

Pulmonary and Systemic Circulation.

Heart beat and Pulse. Rhythmicity of Heart beat. **Cardiac output, Regulation of cardiac activity.**

Blood related disorders: Hypertension, coronary artery disease, angina pectoris, and heart failure.

ECG, Lymphatic System (Brief idea):

Composition of lymph and its functions.

Chapter 16- Excretion and osmoregulation

Modes of excretion-Ammonotelism, ureotelism, uricotelism.

Excretory System.

Composition and formation of urine.

Role of Kidney in Osmoregulation.

Regulation of kidney function: renin-angiotensin, atrial natriuretic factor, ADH and Diabetes insipidus, role of other organs in excretion.

Disorders; Kidney failure, Dialysis, Kidney stone (renal calculi). Transplantation.

Uraemia, nephritis.

Chapter 17- Control and Co-ordination

Nervous System

Structure and functions of brain and

Spinal cord, brief idea about PNS and ANS.

Transmission of nerve impulse.

Reflex action.

Sensory receptors (eye and ear), **Sensory perception, general idea of other sense organs.**

Endocrine System

Endocrine glands

Hormones and their functions

Mechanism of hormone action.

Hormones as messengers and regulators.

Hormonal imbalance and diseases:



Common disorders (Dwarfism, Acromegaly, cretinism, goiter, exophthalmic goiter, Diabetes mellitus, Addison's disease)

Unit 5: Reproduction in Organisms :

Chapter 18- Human Reproduction

Reproductive system in male and female.

Histology of testis and ovary.

Reproductive cycle.

Production of gametes, fertilization, implantation.

Embryo development up to three germinal layers.

Pregnancy, placenta, parturition and **lactation** (Elementary idea).

Reproductive health-birth control,

Contraception and sexually transmitted diseases. **MTP, Amniocentesis; Infertility and assisted reproductive technologies-IVE, ZIFT, GIFT (elementary idea for general awareness).**

Unit 6: Ecology and Environment :

Chapter 19-Organisms and

Environment-II :

Population and ecological adaptations: population interactions-mutualism, competition, predation, parasitism, population attributes- growth, birth rate and death rate, age distribution.

Biodiversity and its conservation- Biodiversity- concept, patterns, importance, loss. Threats to and need for 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 and radioactive waste management. (Case studies any two)

Std. XII

(Upgraded) Biology Practicals Experiments

1. Dissect the given flower and display different whorls. Dissect anther and ovary to show number of chambers.
2. Study pollen germination on a slide.
3. Collect and study soil from at least two different sites and study them for texture, moisture content, pH and water holding capacity of soil. Correlate with the kinds of plants found in them.
4. Study of plant population density and **frequency** by quadrat method.
5. Prepare a temporary mount of onion root tip to study mitosis.
6. Separation of plant pigments by paper chromatography.
- 7 A) To study the rate of respiration in flower buds/leaf tissue and germinating seeds.
B) Demonstration of anaerobic respiration.
8. Study the presence of suspended particulate matter in air at the two widely different Sites.
9. Collect water from two different water bodies around you and study them for pH, clarity and presence of any living organisms.
10. To test the presence of urea and sugar in urine.
11. To test the presence of albumin and bile salts in urine.

Study/observation of the following (Spotting):

- 1 Study of flowers adapted to pollination by different agencies (wind, insect)



2. Study of pollen germination on stigma through a permanent slide.
3. To Study Mendelian inheritance using seeds of different colour/size of any plant.
4. Exercise on controlled pollination - Emasculation, tagging and bagging.
5. Study meiosis in onion bud cell or grass hopper testis through permanent slides.
6. Study of plants found in xerophytic and aquatic conditions with respect to their morphological adaptations.(Two plants each)
7. Study and identify stages of gamete development, i.e. T.S. of testis and T.S. ovary through permanent slides (from any mammal).
8. Study of V.S. of blastula through permanent slide.
9. To study prepared pedigree charts of genetic traits such as rolling of tongue, Blood groups, widow's peak, colour blindness.
10. To identify common disease causing organisms like *Plasmodium*, *Entamoeba*, *Ascaris* and ring worm through permanent slides or specimens. Comment on symptoms of diseases that they cause.
11. Study of animals found in xeric (desert) and aquatic conditions with respect to their morphological adaptations. (Two animals each)



Chemistry (55)

Introduction

According to NCF 2005, the new and updated curriculum is introduced at +2 stage. There is a need to provide the sufficient conceptual background of chemistry which will help the students to appear for different common entrance test at the state level and the national level. This new syllabus will make them competent to meet the challenges of academic and professional courses like medicine, engineering, technology, etc, after the +2 stage. The syllabus is comparable to the international level.

The syllabus contains areas like physical, organic, inorganic, industrial, analytical and polymer chemistry. The upgraded syllabus has taken care of new formulations and nomenclature of elements, compounds and IUPAC units of physical quantities. New nomenclature, symbols and formulations, fundamental concepts, modern techniques are given importance.

Objectives :

The broad objectives of teaching Chemistry at Higher Secondary stage are to help the learners :

- 1) To promote understanding of basic facts and concepts in chemistry while retaining the excitement of chemistry.
- 2) To make students capable of studying chemistry in academic and professional courses (such as medicine, engineering, technology) at tertiary level.

- 3) To expose the students to various emerging new areas of chemistry and apprise them with their relevance in their future studies and their applications in various spheres of chemical sciences and technology.
- 4) To equip students to face various changes related to health, nutrition, environment, population, weather, industries and agriculture.
- 5) To develop problem solving skills in students.
- 6) To expose the students to different processes used in industries and their technological applications.
- 7) To apprise students with interface of chemistry with other disciplines of science such as physics, biology, geology, engineering, etc.

Std. XI (Theory)

Unit 1: Some Basic Concepts of Chemistry

General Introduction: Importance and scope of chemistry. Historical approach to particulate 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 : Avogadro's law and Avogadro number, percentage composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry.



Unit 2 : States of matter : Gases and liquids

Three states of matter. Intermolecular interactions, type of bonding. Role of gas laws in elucidating the concept of the molecule, Boyle's law, Charles law, Gay Lussac's law. Ideal behaviour, empirical derivation of gas equation. 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 3 : Structure of atom

Discovery of electron, proton and neutron; atomic number, isotopes and isobars. 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's 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 4 : Periodic table

Significance of classification, brief history of the development of periodic table, modern periodic law and present form of periodic table, periodic trends in properties of elements atomic radii, ionic radii. Inert gas radii nomenclature of elements with atomic number greater than 100. Enthalpy: Explanation and definition of term. Ionization enthalpy, electron gain enthalpy,

electronegativity, valence.

Unit 5: Redox reactions

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.

Unit 6: Chemical 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 polybasic acids, acid strength, concept of pH. Hydrolysis of salts (elementary idea). Buffer solutions, solubility product, common ion effect (with illustrative examples.) Handerson equation.

Unit 7 : Surface chemistry

Adsorption – physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis : homogenous 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; emulsion – types of emulsions. Elementary idea of nanomaterials.

Unit 8 : Nature of chemical bond

Valence electrons, ionic bond, Born Haber cycle : covalent 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 9 : 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, properties and structure; hydrogen as a fuel. Uses of hydrogen peroxide.

Unit 10: 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 hydroxide and sodium hydrogen carbonate, biological importance of sodium and potassium. Calcium oxide and calcium carbonate and industrial uses of lime and limestone, biological importance of Magnesium and Calcium.

Unit 11 : p-Block elements

Group 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 acids, boron hydrides. Aluminium; uses, reactions with acids and alkalies.

Group 14 elements :

General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behavior of first element. Carbon – catenation, allotropic forms, physical and chemical properties; uses of some important compounds; oxides. Important compounds of silicon and their uses: silicon tetrachloride, silicones, silicates and zeolites and structure of silicates.

Unit 12: Basic principles and techniques in organic chemistry

General introduction, methods of qualitative and quantitative analysis, Classification and IUPAC nomenclature of organic compounds. Melting point and boiling point. 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 13 : Alkanes

Classification of hydrocarbons – Nomenclature, isomerism, conformations (ethane only), physical properties, chemical reactions including free radical mechanism



of halogenation, combustion and pyrolysis.

Unit 14 : Alkenes

Nomenclature, structure of double bond (ethane), geometrical isomerism, physical properties, methods of preparation. Chemical reactions; addition of hydrogen, halogen, water, hydrogen halides (Markovnikoff's addition and peroxide effect) ozonolysis, oxidation, mechanism of electrophilic addition.

Unit 15: Alkynes

Nomenclature, structure of triple bond (ethylene), physical properties. Methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of – hydrogen, halogens, hydrogen halides, water.

Unit 16 : Aromatic compounds

Introduction, IUPAC nomenclature; benzene; resonance aromaticity; chemical properties; mechanism of electrophilic substitution. – nitration, sulphonation, halogenation, Friedel Craft alkylation and acylation; Carcinogenicity and toxicity.

UNIT-17: 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, green house effect and global warming. Pollution due to industrial wastes, green chemistry as an alternative tool for reducing pollution, strategy for control of environmental pollution.

Practical Syllabus - Std. XI

A. Basic laboratory techniques

1. Cutting glass tube and glass rod

2. Bending glass tube
3. Drawing out a glass jet
4. Study of burner
5. Operating pinch cork

B. Characterization and purification of chemical substances

1. Determination of melting point of an organic compound. (p-toluidine, naphthalene, oxalic acid, β -naphthol, resorcinol, benzoic acid.)
2. Determination of boiling point of an organic compound. (acetone, methyl acetate, acetic acid, xylene (o,m,p), water)
3. Crystallization of impure sample of any one of the following compounds. Alum, copper sulphate, benzoic acid.

C. Surface chemistry

- (a) Preparation of one lyophilic and one lyophobic sol: Lyophilic sol-starch and gum.
Lyophobic sol–aluminium hydroxide, ferric hydroxide, arseneous sulphide.
- (b) Study of the role of emulsifying agents in stabilizing the emulsion of oil.

D. Chemical equilibrium

Any one of the following experiments:

- (a) Study the shift in equilibrium between ferric ions and thiocyanate ions by changing the concentration of either ion.
- (b) Study the shift in equilibrium between $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ and chloride ions by changing the concentration of either of the ions.

E. Experiments related to pH change

- (a) Any one of the following experiments:
 - Determination of pH of some solutions obtained from fruit juices, varied concentrations of acids, bases and salts using pH paper or universal indicator.
 - Comparing the pH solutions of strong and



weak acid of same concentration.

- Study the pH change in the titration of a strong base using universal indicator.
- (b) Study of pH change by common ion effect in case of weak acids and bases.

F. Quantitative estimation

- Using a chemical balance.
- Preparation of standard solution of oxalic acid.
- Determination of strength of a given solution of sodium hydroxide by titrating it against standard solution of oxalic acid.
- Preparation of standard solution of sodium carbonate.
- Determination of strength of a given solution of hydrochloric acid by titrating it against standard sodium carbonate solution.

G. Qualitative analysis

Determination of one cation and one anion in a given salt:

Cations – Pb^{2+} , Cu^{2+} , Al^{3+} , Fe^{3+} , Mn^{2+} , Ni^{2+} , Zn^{2+} , Co^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , Mg^{2+} , NH_4^+

Anions – CO_3^{2-} , SO_3^{2-} , SO_4^{2-} , NO_2^- , NO_3^- , Cl^- , Br^- , I^- , PO_4^{3-} , $\text{C}_2\text{O}_4^{2-}$, CH_3COO^-

(Note: Insoluble salts excluded)

H. Detection of nitrogen, sulphur, chlorine, bromine and iodine in an organic compound.

PROJECT

Scientific investigations involving laboratory testing and collecting information from other sources.

A few suggested Projects

1. Checking the bacterial contamination in drinking water by testing sulphide ion.
2. Study of the methods of purification of water.
3. Testing the hardness, presence of iron,

fluoride, chloride etc. depending upon the regional variation in drinking water and the study of causes of presence of these ions above permissible limit (if any).

4. Investigation of the foaming capacity of different washing soaps and the effect of addition of sodium carbonate on them.
5. Study of the acidity of different samples of the tea leaves.
6. Determination of the rate of evaporation of different liquids.
7. Study of the effect of acids and bases on the tensile strength of fibers.
8. Analysis of fruit and vegetable juices for their acidity.

Note:

Any other investigatory project can be chosen with the approval of the teacher.

Std. XII (Theory)

Unit 1: Solid State

Classification of solids based on different 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, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, **Band theory of metals, conductors and semiconductors and insulators and n and p type semiconductors.**

Unit 2 : Solutions and colligative properties

Types of solutions, expression of concentration of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties –relative lowering



of vapor 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't Hoff factor and calculations involving it.**

Unit 3 :Chemical thermodynamics and energetic

Concepts of system, types of systems, surroundings. Work, heat, energy, extensive and intensive properties, state functions. First law of thermodynamics – internal energy and enthalpy, Hess' law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomization, sublimation. Phase transition, ionization and solution **and dilution** Introduction of entropy as a state function, free energy change for spontaneous and non spontaneous processes, and equilibrium constant. **Second and third law of thermodynamics**

Unit 4: Electrochemistry

Redox reactions, conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell –electrolytic and galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, fuel cells; corrosion. **Relation between Gibb's energy change and emf of a cell.**

Unit 5: Chemical kinetics

Rate of reaction (average and instantaneous), factors affecting rate 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 6 :General principles and processes of isolation of elements

Principles and methods of extraction – concentration, oxidation, reduction electrolytic method and refining; occurrence and principle of extraction of aluminium, copper, zinc and iron

Unit 7: p-Block elements

Group 15 elements:

General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen – preparation, properties and uses; compounds of nitrogen; 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 ($\text{PCl}_3, \text{PCl}_5$) 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**, simple oxides; Ozone.

Sulphur – allotropic forms; compounds of sulphur; 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, interhalogen compounds, oxoacids of halogens (structure only).

Group 18 elements:

General introduction, electronic configuration. Occurrence, trends in physical and chemical properties, uses.

Unit 8 : d and f Block Elements

d-Block Elements -

General introduction, electronic configuration, occurrence and 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 $KMnO_4$.

f-Block elements-

Lanthanoids – Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction **and its consequences**. **Actinoids** – Electronic configuration, oxidation states.

Comparison with lanthanoids.

Unit 9: Coordination compounds

Coordination compounds – Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, bonding; **Werner's theory**,

VBT, CFT. isomerism, **(structural and stereo)** importance of coordination compounds (in qualitative analysis, extraction of metals and biological systems).

Unit 10 : Halogen derivatives of alkanes (and arenes)

Haloalkanes :

Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of substitution reactions.

Stability of carbocations, R-S and d-l configuration

Haloarenes :

Nature of C-X bond, substitution reactions (directive influence of halogen for monosubstituted compounds only) **stability of carbocations, R-S and d-l configurations**. Uses and environmental effects of – dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

Unit 11 : 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 of 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 12 : Aldehydes, ketones and



carboxylic acids**Aldehydes and ketones :**

Nomenclature, nature of carbonyl group, methods of preparation. Physical and chemical properties, 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 13: Organic compounds containing nitrogen

Nitro compounds-General methods of preparation and chemical reactions

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 in context.

Diazonium salts:

Preparation, chemical reactions and importance in synthetic organic chemistry.

Unit 14: Biomolecules**Carbohydrates:**

Classification (aldoses and ketoses), monosaccharides **d-l configuration** (glucose and fructose), oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen), importance.

Proteins:

Elementary idea of α -amino acids, peptide, linkage, polypeptides, proteins; structure of amines-primary, secondary, tertiary structure and quaternary structures (qualitative idea only), denaturation of

proteins; enzymes.

Lipids and hormones (elementary idea) excluding structure, their classification and functions.

Vitamins: Classification and functions.

Nucleic acids: DNA and RNA

Unit 15: Polymers

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

Unit 16: Chemistry in everyday life :

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

Practical Syllabus - Std. XII**A. Chemical Kinetics**

(Any one of the following) :

- Effect of concentration and temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid.
- Study of reaction rate of any one of the following:
 - Reaction of iodide ion with hydrogen peroxide at room temperature using different concentration of iodide ions.
 - Reaction between potassium iodate, KIO_3 and sodium sulphite (Na_2SO_3)



using starch solution as indicator (clock reaction).

(c) Acid hydrolysis of ethyl acetate.

B. Thermochemistry

Any one of the following experiments:

- i] Enthalpy of dissolution of copper sulphate or potassium nitrate.
- ii] Enthalpy of neutralization of strong acid (HCl) and strong base (NaOH).
- iii] Determination of enthalpy change during interaction (hydrogen bond formation) between acetone and chloroform.
- iv] Heat of displacement of Cu from CuSO_4 by Zn.

C. Electrochemistry

Variation of cell potential in $\text{Zn}|\text{Zn}^{2+}||\text{Cu}^{2+}|\text{Cu}$ with change in concentration of electrolytes (CuSO_4 or ZnSO_4) at room temperature (demonstration).

D. Chromatography (demonstration)

- (i) Separation of pigments from extracts of leaves and flowers by paper chromatography and determination of R_f values.
- (ii) Separation of constituents present in an inorganic mixture containing two cations only (constituents having large difference in R_f values to be provided).

E. Preparation of Inorganic Compounds

- (i) Preparation of double salt of ferrous ammonium sulphate or potash alum.
- (ii) Preparation of potassium ferric oxalate.

F. Preparation of Organic Compounds

- (i) p-Nitroacetanilide
- (ii) Aniline yellow or 2-Naphthol aniline dye.
- (iii) Iodoform
- (iv) Phthalic or succinic anhydride.
- (v) Di-benzal acetone

G. Tests for the functional groups present in organic compounds

Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino (primary) groups.

H. Characteristic tests of carbohydrates, fats and proteins in pure samples and their detection in given food stuffs.

I. Determination of concentration/molarity of KMnO_4 solution by titrating it against a standard solution of:

- (i) Oxalic acid
- (ii) Ferrous ammonium sulphate (Students will be required to prepare standard solutions by weighing themselves).

J. Qualitative analysis

- 1) Determination of two cations from a given mixture of salts.
- 2) Determination of two anions from a given mixture of salts.

Cations – Pb^{2+} , Cu^{2+} , As^{3+} , Al^{3+} , Fe^{3+} , Mn^{2+} , Zn^{2+} , Co^{2+} , Ni^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , Mg^{2+} , NH_4^+ ,

Anions – CO_3^{2-} , SO_3^{2-} , SO_4^{2-} , NO_2^- , NO_3^- , Cl^- , Br^- , I^- , PO_4^{3-} , $\text{C}_2\text{O}_4^{2-}$, CH_3COO^-
(Note : Insoluble salts excluded.)

PROJECT

Scientific investigations involving laboratory testing and collecting information from other sources.

A few suggested Projects:

- 1 Study of presence of oxalate ions in guava fruit at different stages of ripening.
- 2 Study of quantity of casein present in different samples of milk.
- 3 Preparation of soyabean milk and its comparison with the natural milk with



- respect to curd formation, effect of temperature, etc.
- 4 Study of the effect of potassium bisulphate as food preservative under various conditions (temperature, concentration, time etc).
 - 5 Study of digestion of starch by salivary amylase and, effect of pH and temperature on it.
 - 6 Comparative study of the rate of fermentation of following materials: wheat flour, gram flour, potato juice, carrot juice, etc.
 - 7 Extraction of essential oils present in Saunf (aniseed), Ajwain (carum), Illaichi (cardamom).
 - 8 Study of common food adulterants in fat, butter, sugar, turmeric powder, chilli powder and pepper.
- Note :** Any investigatory project, can be chosen with the approval of the teacher.





(A) Compulsory Subjects

English (01)

Introduction

The curriculum for the subject of English at Std. XI and Std. XII has been prepared bearing in mind the curriculum of English for the classes I to X in Maharashtra, the National Curriculum Framework & State Curriculum Framework, the curriculums of English in the other states of India, current thinking in curriculum development and curriculum implementation, and the views/opinions expressed by teachers on the existing curriculum frame work.

Characteristic Features of the new curriculum

1. In pursuance of the existing policy of the State Government, a common course in the subject of English has been designed for the learners from the English medium and the Non-English medium schools.
2. The course offers opportunities for remediation, consolidation and extension of the language skills already learnt.
3. The course endeavors to meet the functional (communicative), literary (aesthetic) and cultural (integrative) needs of the learner.
4. The course provides opportunities for meeting the linguistic needs of the vocational as well as the academic stream. It aims at preparing the learner linguistically to undertake different professional courses like Medicine, Engineering and to pursue different types of undergraduate courses in various streams such as Science, Law, Commerce, Humanities, Agriculture, etc. It also aims at helping the learner to face the wider world of work.
5. The National Curriculum Framework, the State Curriculum Framework and the policy of the State Government underscore the need of making education learner-centered and adopting the constructivist model of education. The role of the learner is that of an active participant and the role of the teacher is that of a facilitator of learning. The focus is on the process of learning. The learner is expected to 'discover' and 'construct' his/her learning.
6. The major thrust of this curriculum is on the development of communication skills. Along with the basic language skills of Listening, Speaking, Reading and Writing, the skills such as narrating, describing, reporting, summarizing, persuading, note-taking, note-making, etc. have also been focused.
7. The course makes a conscious effort of helping the learner to sharpen his/her literary sensibility, by offering him/her opportunities to read and discuss a variety of literary texts.
8. In view of the developments in the field of Information and Communication Technology, the Board recommends increasing use of technology for effective implementation of the curriculum of English.



General Objectives

To enable the student to

1. develop his/her language skills to a fair degree of proficiency.
2. acquire communication skills in English useful in real life situations.
3. enrich his/her vocabulary.
4. use English in appropriate grammatical forms.
5. develop reference skills and inculcate self-study habits.
6. use English not only as a library language but also as an important language of communication.
7. cultivate a broad human and cultural outlook.

Specific Objectives

Listening Skill

To enable the student to

1. enjoy and appreciate the rhythmic beauty of various types of poems read out by the teacher in the class.
2. listen with fair comprehension to spoken English dealing with ordinary or specialized topics in known and unknown vocabulary.
3. acquire a global understanding of a variety of texts of a reasonable length read out/played on a cassette/C.D.
4. listen to passages of a reasonable length read out/recorded for getting specific information and to answer questions based on them.
5. listen to speeches or passages for the purpose of taking notes.
6. listen to oral instructions in order to perform a given task.
7. understand read out or recorded stories,

narrations, descriptions, pieces of information of a reasonable length so as to ask pertinent questions on them.

8. identify relevant/irrelevant points in the passages, speeches after listening to them.
9. infer a speaker's attitude/intention and grasp the message given in the speech.
10. listen to, comprehend and enjoy live as well as recorded presentations like skits and plays and notice the sequence of incidents in them.
11. understand oral communication without face to face interaction (e.g. telephonic conversation or messages).
12. listen with comprehension to lectures, talks, conversation, news-bulletins and interviews.
13. understand nuances conveyed through stress and intonation.
14. enjoy and appreciate various literary forms to get sensitized to literary language and experiences.
15. identify the genre and register of a text after listening to it.
16. apply listening skill to other activities like discussions, debates, reading and writing.

Speaking Skill

To enable the student to

1. enjoy reciting poems with proper accent, rhythm and intonation.
2. speak in syntactically acceptable forms/patterns.
3. speak with acceptable pronunciation and play variety of roles in different contexts.
4. speak coherently, fluently, confidently and intelligibly on a given topic for a reasonable period of time with appropriate body language.



5. answer questions orally showing clear understanding of subject matter.
6. frame oral instructions, ask for and offer directions, advise, persuade, express intentions, etc.
7. converse appropriately in formal and informal contexts, considering the role-relationship, the topic and the situation.
8. make oral presentation on a given topic for a reasonable span of time in an ordered manner.
9. present oral reports on planned events, projects, etc.
10. compere programmes, narrate incidents and experiences.
11. take part in group discussions, interviews, debates and elocution competitions.
12. cope with distance communication, telephonic conversation, effectively.
13. comment on the writer's point of view.
14. prepare for other need based functional activities requiring oral communication.
15. communicate nuances through stress and intonation.
9. understand grammatical sentences and their implications.
10. read brochures, reviews, reports, news items to get information.
11. read silently to find out the suggestive meaning in a poem and a prose text.
12. distinguish the main ideas from the subsidiary information.
13. read extensively so as to develop interest in different forms of literature and styles of writing.
14. read so as to make notes, to summarize and to classify.
15. use the information given in the text to respond to e.g. advertisements.
16. understand and appreciate features of literary style.

Reading Skill

To enable the student to

1. improve the speed of reading.
2. read in order to find the intention and attitude and bias of the writer.
3. read aloud and appreciate the rhythm of a poem.
4. adopt different reading strategies depending on the type of texts and the purpose of reading.
5. skim as well as scan the text.
6. read and predict the events to come.
7. read in order to infer through the context.
8. read non-verbal presentations such as railway time-table, graphs, charts, etc.

Writing Skill

To enable the student to

1. acquire the mechanics of writing including handwriting, the use of punctuation marks, capital letters and correct spellings.
2. write correctly and neatly, using appropriate vocabulary and grammar.
3. write answers to the questions on textual and non-textual reading material showing his/her acquisition of sub skills of reading.
4. write coherently on a given topic using appropriate discourse features.
5. write expository, argumentative essays of about 250 to 300 words.
6. write formal and informal letters for various purposes.
7. acquire ability to draft notices, leaflets, announcements.
8. prepare short write-ups for school magazines/newspapers and wall-papers.
9. develop a draft of a dialogue.



10. write short reports on news, interviews, visits and functions.
11. write notices, agendas and minutes of meetings.
12. develop advertisements, with the help of clues given.
13. make notes based on the given text leading to summarizing.
14. prepare a write-up showing his/her understanding of the information given in non-verbal forms and vice versa.
15. convey in writing his/her understanding and appreciation of different literary forms.
16. write curriculum vitae.

Vocabulary

Development of vocabulary has its importance in language learning. Learners need to be helped in the consolidation and extension of their vocabulary. Learners need to learn how to understand meanings of words with the help of context and how to use words in an effective way. The coursebooks and other materials will offer necessary guidance in this regard.

Grammar

Grammar has an important role to play in the teaching and learning of English. However, our focus has to be not so much on the rules of grammar but on the use of grammar. The knowledge of grammar should lead to an effective use/application of the skills of listening, speaking, reading and writing. Therefore, the focus has to be on the functional aspects of grammar and not on the formal ones.

Std. XI		
a) A Coursebook in English (Yuvabharati)		
1. For Detailed Study		
i) Prose : About 80 pages of literary and non-literary (informative) texts/passages (excluding notes, illustrations, tasks, etc.)		
ii) Poetry : About 200-250 lines		
2. For Non-detailed study		
A selection of literary and non-literary texts (Longer Pieces) : About 40 pages.		
b) Grammar		
Sr. No.	Items	Specification
	Revision of the items learned up to Std X.	
1	The Tenses	Revision of the tenses learned upto Std. X. Advanced level of the above items.



2.	Types of sentences	Simple, Compound, Complex, Relative clauses.
3.	Clauses	Proper usage and synthesis.
4	Verbs of perception	Uses of see, hear, smell, feel, taste and know, have, own think, etc.
5.	Voice	Statements, questions, indirect objects, object + object complement, negatives. (Advanced level) (Conversion)
6.	Reported Speech	Advanced level, continuous short paragraph consisting of three to four connected sentences.
7	Collocation	The co-occurrence of lexical items.
8	Uses of 'too' and 'enough'	Conversion and synthesis.
9.	Modal Auxiliaries	Will, shall, can, could
10.	Articles	Uses and omission of 'a', 'an', 'the'
11	Prepositions	Indicating time, place and direction.
12.	Linking words/discourse markers	Use of linking words in sentences and in larger units.
13.	Word formation	Changing word forms-nouns, verbs, adverbs, adjectives
14.	Infinitives, Gerunds and Participles	Usage and synthesis

Std. XII

a)	A Coursebook in English (Yuvabharati)	
1.	For Detailed Study	
	i) Prose : About 80 pages of literary and non-literary (informative) texts passages (excluding notes, illustrations, tasks, etc.)	
	ii) Poetry : About 200-250 lines	
2.	For Non-detailed study	
	A selection of literary and non-literary texts (Longer Pieces) : About 40 pages.	
b)	Grammar	
Sr. No.	Items	Specification
	Revision of the items learned up to Std XI.	
1	The Tenses	Advanced level of the tenses learned upto Std XI.Sequence of Tenses.



2.	Types of sentences	Simple, Compound, Complex, Relative clauses.
3.	Clauses	Proper usage and synthesis.
4.	Voice	Statements, questions, indirect objects, object + object complement, negatives. (Advanced level) (Conversion)
5.	Reported Speech	Advanced level, continuous short paragraph consisting of three to four connected sentences.
6.	Uses of 'too' and 'enough'	Conversion and synthesis.
7.	Modal Auxiliaries	may, might, must, etc.
8.	Articles	Uses and omission of 'a', 'an', 'the'
9.	Prepositions	Indicating time, place and direction.
10.	Linking words/ discourse markers	Use of linking words in sentences and in larger units.
11.	Word formation	Changing word forms-nouns, verbs, adverbs, adjectives
12.	Infinitives, Gerunds and Participles	Usage and synthesis

Weightage to be given at Std. XI and XII

The following weightage is to be given to the various aspects of the syllabus.

1	Reading Skill (Textual and non-textual)	40%
2	Grammar	15%
3	Writing skill	25%
4	Oral test	20%





Environment Education

The Environmental Education Syllabus for Higher Secondary Stage is based on the recommendations of the National Focus Group on Habitat and Learning and the National Curriculum Framework-2005 (NCF-2005).

Students pursue a common curriculum up to class X and would have developed a substantive understanding of the environmental issues from the perspective of both natural and social sciences.

At the higher secondary stage, that is, in classes XI and XII, they pursue many different academic streams drawn from languages, sciences, mathematics, social sciences, commerce, arts and physical education or vocational courses intended to help learners become skilful, [productive and efficient workers. It is important that the students further strengthen their knowledge and understanding of various aspects of environment and its problems and acquire attitudes and behaviours desirable for environmental improvement, safety management, and sustainable development.

By the time students enter class XI they will be mature enough to effectively participate in formulation, planning and implementation of projects and investigative studies pertaining to environmental problems.

In this course, the Environment is treated as an interconnected system of a variety of components including people, institutions, knowledge, artefacts, geosphere (atmosphere, hydrosphere, lithosphere), biosphere (ecosystems, biological populations), energy,

material, and information flows. An attempt has been made to illustrate the manifold environmental impacts that cascade through such interconnected systems and bring about continual processes of environmental change.

Std. XI

1. People and Environment

- 1.1 Humans as an integral part of the environment
- 1.2 Growth in human numbers over historical times
- 1.3 Migrations of people
- 1.4 Dispersion of human populations
- 1.5 Rural and urban settlements
- 1.6 Environment and health
- 1.7 Gender and environment

2. Institutions (Social, Economic, Political, Legal, Cultural) and Environment

- 2.1 Evolution of technology, social, economic and political organisation, and growing resource demands
- 2.2 Impact of economic growth on environment
- 2.3 Inequitable economic growth, poverty and environment
- 2.4 India as a country where many different modes of resource co-exist
- 2.5 Open access, community controlled, private and state management of resources
- 2.6 Evolution of environmental concerns in different societies over the course of history



- 2.7 India's manifold traditions of conservation and sustainable use
- 2.8 Shift of environmental regulation from nature worship, customary law to Wildlife Act, Forest Conservation Act, Environmental Impact Assessment and Biological Diversity Act, etc.
- 2.9 Tools of environmental management, efficiency of resource use, sustaining harvests, pollution control
- 2.10 Concept of sustainable development
- 2.11 Concept of sustainable consumption
- 2.12 Ecological footprints
- 2.13. International economic regimes, forces of globalisation
- 2.14 International regimes of environmental regulation, Framework Convention on Climate Change, Law of Sea, Trans-boundary Movement of Hazardous Wastes, etc.

3. Knowledge, Science, Technology and Environment

- 3.1 Growth of knowledge and human colonisation of new environments
- 3.2 Growth of knowledge and use of newer resources
- 3.3 Growth of knowledge, control of diseases and population growth
- 3.4 Implications of intellectual property rights for environment
- 3.5 Biotechnology, agriculture, health and environment
- 3.6 Intellectual property rights over living organisms
- 3.7 Traditional indigenous knowledge, its implication for environment

4. Man-made Artefacts and Environment

- 4.1 Technological advances and ever

accelerating pace of manufacture of artefacts

- 4.2 Impact of agriculture, animal husbandry, aquaculture
- 4.3 Impact of agrochemicals on environment
- 4.4 Impact of industry, mining, transport
- 4.5 Generation and provision of energy, water and other natural resources
- 4.6 Impact of synthetic chemicals
- 4.7 Life cycle analysis of: Newspaper, household consumables, house construction, transport, personal computer, cell phones, etc.

Std. XII

1. Exosphere (Atmosphere, Hydrosphere, Lithosphere)

- 1.1 Sustainable and non-sustainable use of renewable and non-renewable natural resources, such as water and minerals
- 1.2 Changing patterns of land use and land cover
- 1.3 Management of gaseous, solid, liquid and hazardous wastes
- 1.4 Air, water (fresh and marine), soil pollution – sources and consequences
- 1.5 Noise and radiation pollution – sources and consequences
- 1.6 Ozone layer depletion and its effect
- 1.7 Greenhouse effect; global warming and climatic change and its effects
- 1.8 Disasters - natural (earthquakes, droughts, floods, cyclones, landslides) and man-made (technological and industrial); their impact on the environment; prevention, control and mitigation
- 1.9 Strategies for reducing pollution and improving the environment



2. Biosphere (Ecosystems and Biological Population)

- 2.1 Sustainable and non-sustainable use of biological populations
- 2.2 Sustainable agriculture
- 2.3 Impact of Genetically Modified Organisms
- 2.4 Deforestation, overgrazing, over fishing
- 2.5 Concept and value of biodiversity
- 2.6 Components of biodiversity – genes, species, and ecosystems
- 2.7 Landscape ecology
- 2.8 India as a mega diversity nation
- 2.9 Economic potential of biodiversity
- 2.10 Loss of biodiversity - threatened, endangered and extinct species
- 2.11 Strategies for conservation of biodiversity – *in situ* and *ex situ*
- 2.12 Mitigating the people-wildlife conflict

3. Energy, Material, Information Flows

- 3.1 Changing global patterns of energy and water consumption - from ancient to

modern times

- 3.2 Energy and water consumption and quality of life
- 3.3 Rising demand for energy, and water, gap between demand and supply (Indian context)
- 3.4 Conventional and non-conventional energy sources - potential (Indian context) and limitations of each source, methods of harnessing and environmental consequences of their use with special reference to Indian context
- 3.5 Energy conservation - efficiency in production, transportation and utilisation of energy
- 3.6 Planning and management of energy; future sources of energy - hydrogen, alcohol, fuel cells
- 3.7 Enhancing efficiency of devices and optimising energy utilisation
- 3.8 Modern Information Communication Technology Revolution and environment.



According to the Supreme Court directive dated December 2010, NCERT is the nodal agency for the subject Environment Education. The syllabus designed and finalized and prepared by NCERT for std. 11 & 12th has to be followed by the state after adapting it according to their local specific needs.

Maharashtra state has adapted the syllabus of Environment Education prepared by NCERT and taking into consideration the local specificity the education material is prepared accordingly.

Separate text books have been prepared for std. 11 & 12th. Local specific examples have been included so as to make the book student friendly. Various activities have been included to make the book and overall Environment Education activity based. Journal assignments are also included to make the assessment process easy for students and teachers as well.

An attempt has been made to make Environment Education interesting as far as possible and in accordance with the local needs and national needs as well.



Geography (39)

Introduction

The 10+2 stage in the educational pattern is an important link in the chain of curricular work, where in it is insisted that the students should switch off for the branch of knowledge best suited for them, on the basis of the foundations laid in the first 10 years of schooling, devoted to general education. Accordingly, it would be necessary at this stage to broaden and deepen the students basic knowledge in geography, so that it may develop a keen and profound interest in the subject that is so useful in their everyday life as well as in their areas of specialization. Moreover, geography being a subject of interdisciplinary nature, it helps in the study of natural sciences and social sciences.

The course is based on the guidelines provided in NCF2005 and SCF 2010. Core elements such as protection of environment and inculcation of scientific temper as mentioned in NPE and POA have also been reflected in the course content of geography. The theoretical study of geography is complemented by practical work have been made a part of curriculum for 10+2 stage.

For 10+2, the geography course has complements of theory and practical work. The course is designed in such a way that students will be acquiring knowledge of the world as a whole with the new technologies the world is shrinking and new patterns of regional co-operations are emerging. At the same time world as a whole is facing problems like, global warming and climate changes. Different regions in the world having varied

physiographic and social personalities are expected to respond to these global problems in different ways. Hence, it is necessary that the students understand the strengths and weaknesses of each region to face these problems.

Though regions have different personalities, none remains in isolation and they complement each other in different ways.

With the study of world as an entity and understanding the problems, will promote students to accept the concept of world as a home of man and to realize the need for conserving their home.

Field visits and practical work will be useful in developing necessary geographical skills.

Objective

The course in Geography will help learners to

1. understand the terms, key concepts and basic principles of Geography.
2. recognize and understand the processes and patterns of the spatial arrangement of natural as well as human features and phenomena on the earth's surface.
3. understand and analyse the inter-relationship between physical and human environment and their impact.
4. know about the scarcity of minerals and power resources and to understand the importance of its conservation and use of non-conventional power resources.
5. understand the causes of environmental pollution and its impact on life on the earth.



6. apply geographical knowledge and method of enquiry to new situations or problems at different levels : local, regional, national and global.
7. understand major types of human activities as influenced by geographical factors.
 1. develop geographical skills relating to collection, processing and analysis of data or information including graphics and use of computers wherever possible and preparation of a report.
 2. understand the effects of natural hazards and prepare them to help the affected persons.

Std. XI

World Geography – Physical

Unit 1: Physiography

- 1.1 Mountains
- 1.2 Plateaus
- 1.3 Plains

Unit 2: Movements of the earth

- 2.1 Rocks
- 2.2 Earthquakes
- 2.2 Volcanoes

Unit 3: Climate

- 3.1 Temperature
- 3.2 Pressure
- 3.3 Precipitation

Unit 4: Drainage System & Water resources

- 4.1 Main rivers
- 4.2 Lakes
- 4.3 Availability of water
- 4.4 Usage
- 4.5 Water scarcity

Unit 5: Oceans & Marine eco system

- 5.1 Structure of ocean floor

- 5.2 Archipelago group of Island
- 5.3 Marine eco system
- 5.4 Ocean resources

Unit 6: Natural Vegetation

- 6.1 Distribution
- 6.2 Importance of forests
- 6.3 Deforestation

Unit 7: Biomes and Biodiversity

- 7.1 Types of Biomes
- 7.2 Biodiversity

Unit 8 : Disaster

- 8.1 Natural disaster
- 8.2 Manmade disaster

Practicals

Unit 1: Projection

- 1.1 Types of projection

Unit 2: Methods of representing relief features & Slopes on a map

Unit 3: Topographical Map

- 3.1 Map reading (1:50,000)

Unit 4 : Remote Sensing – Aerial Photographs

Unit 5: Weather Charts

- 5.1 Reading
- 5.2 Weather instruments

Unit 6: Field study

Std. XII

Geography of World – Human

Unit 1 : Population

- 1.1 Growth, density, distribution
- 1.2 Sex ratio Literacy
- 1.3 Race, religion and Language

Unit 2 : Migration

- 2.1 Migration

Unit 3 : Agriculture

- 3.1 Types of agriculture
- 3.2 Crop distribution



Unit 4 : Minerals and energy resources

- 4.1 Distribution

Unit 5 : Industries

- 5.1 Agro-based
- 5.2 Mineral based
- 5.3 Other industries
- 5.4 Distribution

Unit 6 : Trade

- 6.1 International trade
- 6.2 International trade organisation

Unit 7 : Transportation and Communications

- 7.1 Types of Transportation
- 7.2 Modes of Communications

Unit 8 : Economic developments

- 8.1 Global situation
- 8.2 Human development

Geography : Practical - Part II :**Unit 1 : Map Scale**

Types

Unit 2 : Graphs

- 2.1 Line graph
- 2.2 Bar graph
- 2.3 Two dimensional diagrams
- 2.4 Three dimensional diagrams

Unit 3 : Thematic Maps

- 3.1 Distributional map

Unit 4 : Surveying

- 4.1 Chain and Tape survey
- 4.2 Plane Table



हिंदी (०४)

महाराष्ट्र राज्य माध्यमिक व उच्च माध्यमिक शिक्षण मंडळ तथा एन.सी.एफ. २००५ के अनुसार उच्च माध्यमिक हिंदी पाठ्यक्रम निश्चित किया गया है।

उच्च माध्यमिक स्तर के छात्रों को सामाजिक समस्याओं का निराकरण करने के उपाय, वैज्ञानिक सोच, व्यावहारिक तथा व्यावसायिक कौशल, राजनीतिक, साहित्यिक तथा सामाजिक गतिविधियाँ आदि के प्रति सचेत करने की दृष्टि से पाठ्यक्रम में कुछ नूतन उद्भावनाएँ की गई हैं। छात्रों को जनसंचार माध्यमों से परिचित कराते हुए हिंदी भाषा के अनुप्रयोग के प्रति सचेत करने के लिए कुछ उपक्रम भी सुझाए गए हैं।

इस स्तर पर केवल हिंदी भाषा पढ़ाना उद्देश्य नहीं है बल्कि शील-संपन्न नागरिक निर्माण करने हेतु विविध वैयक्तिक, सामाजिक, राजनीतिक मूल्यों का परिचय कराना भी महत्वपूर्ण होता है अतः साहित्य तथा पाठों के माध्यम से मूल्य संस्कार का उद्देश्य सफल हो सकता है। प्रस्तुत स्तर के पाठ्यक्रम के उद्देश्य निम्नलिखित हैं।

- १) हिंदी भाषा की संरचना तथा व्याकरण के मूलतत्त्वों के ज्ञान को विस्तृत करना।
- २) हिंदी के शब्दभंडार की अभिवृद्धि तथा उसके अनुप्रयोग की योग्यता का विकास करना।
- ३) भाषा की मौखिक एवं लिखित अभिव्यक्ति में कुशलता प्राप्त करके छात्र की निजी स्वतंत्र शैली का विकास करना।
- ४) वाक् प्रतियोगिता, भाषण, कलामंच-संचालन, संवाद आदि से परिचित करना।
- ५) साहित्य पाठों के माध्यम से छात्रों में सौंदर्यबोध तथा कलात्मक बोध का विकास करना।
- ६) भारत की सांस्कृतिक विशेषताओं का परिचय देते हुए समता, राष्ट्रीयता, बंधुता, वैश्विक एकता आदि भावों का पोषण करना।
- ७) साहित्य की विविध विधाओं के माध्यम से संबंधित साहित्यकारों तथा उनकी विभिन्न शैलियों का परिचय देना। हिंदी साहित्य के इतिहास का स्थूल परिचय देना।

- ८) वैश्वीकीकरण के परिप्रेक्ष्य में अनूदित साहित्य का परिचय कराना। साथ ही छात्रों में अनुवाद की क्षमता विकसित करना।
- ९) राजभाषा के रूप में हिंदी के शासकीय तथा व्यावहारिक रूप का परिचय देना।
- १०) जनसंचार माध्यमों की भाषा के रूप में हिंदी की विविध प्रयुक्तियों का ज्ञान देना। सी.डी., डि.व्ही.डी., इंटरनेट पर प्रस्तुत पूरक साहित्य का परिचय देना।

कक्षा ११वीं

१. गद्य :	१२ पाठ :	८० पृष्ठ
कहानियाँ		७
निबंध		२
एकांकी		१
हास्य, व्यंग्य/संस्मरण		-
विज्ञान/पर्यावरण/रेखाचित्र		२
जीवनी आदि		
		१५

२. पद्य - १० कविताएँ/२५० तक पद्य पंक्तियाँ	
मध्ययुगीन :	४ ३
आधुनिक :	१० ७
	१४

३. पूरक पठन : कुल ७ पाठ हास्य-व्यंग्य रचनाएँ	
वैज्ञानिक/औद्योगिक आदि	७
हास्य व्यंग्य रचनाएँ	
	७

४. रचना विभाग -
 - निबंध - २०० शब्दों तक करना।
 - चित्र वर्णन
 - सारांश लेखन -
 - पत्रलेखन ● व्यावसायिक/कार्यालयीन पत्र
 - साक्षात्कार/ भेंटवार्ता



• पारिभाषिक शब्दावली

कक्षा १२ वीं

*अनुवाद

५. व्याकरण

- १) कालपरिवर्तन : सामान्य, पूर्ण, अपूर्ण
- २) वाक्यों के भेद : सरल, संयुक्त, मिश्र
- ३) अव्यय पहचानना : क्रियाविशेषण, संबंध-
सूचक समुच्चय बोधक,
विस्मयादि बोधक
- ४) मुहावरे
वाक्य शुद्धीकरण = मात्रा, लिंग, वचन,
कारक क्रिया
सूचना के अनुसार काल परिवर्तन

६. संवाद कौशल

१. गद्य : १२ पाठ : ८० पृष्ठ

कहानियाँ	७	६
निबंध	४	२
हास्य-व्यंग्य	२	२
विज्ञान/पर्यावरण	१	२
संस्मरण/रेखाचित्र आदि	१५	१२

२. पद्य - १० पद्य पंक्तियाँ २५०

मध्ययुगीन :	४
आर्वाचीन :	१०
	१४



३. पूरक पठन : कुल हिंदी विविधा पाठ - ६
हिंदी विविधा - विविध विधाओंके ६ पाठ

४. रचना विभाग -

निबंध -	२०० शब्दों तक
अपठित गद्य खंड का आकलन	
सारांशलेखन -	
पत्रलेखन -	व्यावसायिक / कार्यालयीन साक्षात्कार / भेंटवार्ता पारिभाषिक शब्दावली, वृत्तांतलेखन, विज्ञापन। अनुवाद / चित्रवर्णन

५. व्याकरण

- १) वाक्य भेद - सरल, संयुक्त, मिश्र
- २) कालपरिवर्तन : सामान्य, पूर्ण, अपूर्ण
- ३) वाक्य शुद्धीकरण, मात्रा, लिंग, वचन, कारक
क्रिया
- ४) मुहावरे



Information Technology-Science (97)

Introduction

Government has to visualize Schools which will concentrate on a balanced development of students in intellectual, emotional and physical terms, with a view to developing a technology literate, creative, and critically thinking class of students to open the doors to the world of knowledge.

The curriculum has been devised to integrate a wide variety of knowledge, language, value elements and skills such as creative and critical thinking, personal, social, scientific, mathematical, and environmental and knowledge acquisition.

In order to execute these dreams we have to develop the relevant infrastructure. We should carry out a substantial reinvention and re-engineering of educational sector. Our existing curricula in educational institution in respect of computer courses have to be thoroughly revamped. Internet connectivity should be provided to all Schools. Recognized aided and unaided Educational Institutions should ensure that the entire student community, irrespective of subject chosen should become computer literate. IT should be the integral part of education system.

Objectives

The student should be able to

1. acquire basic knowledge of Computers.
2. acquire basic knowledge of Information Technology.
3. understand E-Commerce and related concepts.
4. understand concepts in Multimedia.
5. develop capabilities to access Information using Internet.
6. learn the basic concepts of Computer Networking.
7. develop an understanding of principles based on visual environment.
8. acquire skills for creation of Basic Web Pages.
9. acquaint with basic techniques and knowledge required for computing applications.
10. get aware about cyber laws and ethics.

Std. XI

1 Introduction to Information Technology

- 1.1 Information Technology: Definition, Introduction, Information Systems, Software, Data
- 1.2 IT in Business, Industry, Home, Play, Education, Training, Science and Engineering.
- 1.3 Computers in Hiding

2 Office Suite

- 2.1 Word Processor- Microsoft Word and its main features
- 2.2 Spreadsheets – Microsoft Excel and its main features
- 2.3 Presentations – Microsoft PowerPoint

3 Multimedia

- 3.1 Multimedia-Definition, Communication, Components, Building Blocks, Scope, Uses, Application purposes



- 3.2 Overview of Computer Images
- 3.3 Digital Audio
- 3.4 Overview of Video
- 3.5 Flash – Overview and Introduction
- 3.6 Multimedia Design and Future Directions
- 4 Web Browsers, E-mail Clients and Messenger Utilities**
 - 4.1 Overview, Working of the Internet and WWW
 - 4.2 Role of Web Servers, Clients
 - 4.3 Web Browsers and their use, Popular Web Browsers
 - 4.4 E-Mail Servers and Protocols
 - 4.5 E-mail Clients and Web Based Mail Access using Browser
 - 4.6 Messenger Services and Clients
 - 4.7 FTP
- 5 Introduction to Networking**
 - 5.1 Communication and Network Technologies
 - 5.2 Internet, Network Communication and Protocols
 - 5.3 Transmission Media, Communication over Wires and Cables, Wireless Communication and Standards
 - 5.4 Network Architecture, Relationships and Features
 - 5.5 Cable Topologies
 - 5.6 Network Hardware
- 6 Visual Basic.net**
 - 6.1 Introduction to .NET framework
 - 6.2 Introduction to the Visual Studio/ Visual Basic IDE
 - 6.3 Console and Windows applications
 - 6.4 Introduction to Visual Basic.net Syntax
 - 6.5 Selection and Iteration Statements
- 6.6 Arrays and enumerations
- 6.7 Introduction to Windows forms, MessageBox and InputBox
- 6.8 Handling keyboard and mouse events
- 6.9 The Control Class Controls
- 6.10 Library functions
- 6.11 Simple programs based on all the above
- 7 HTML**
 - 7.1 Uses, Features, Properties and Limitations.
 - 7.2 Tags and Attributes, Basic Tags Paragraph and Heading Tags, Comments
 - 7.3 Ordered and Unordered Lists and Related Tags, Nested Lists
 - 7.4 Anchor Tag and Hyperlinks in HTML
 - 7.5 Division and Physical Style Tags, working with Fonts, font types, sizes and colours.
 - 7.6 Body background colour, text colour and hyperlink colours, Pre-formatting, Line Break, and Horizontal Rules, Displaying special characters in HTML
 - 7.7 Images in HTML, related tags and attributes, features of BMP, JPG and GIF Raster image formats.
 - 7.8 Tables in HTML and related tags.
 - 7.9 Marquee
 - 7.10 Java Applets
- 8 Introduction to JavaScript**
 - 8.1 Limitations of plain HTML
 - 8.2 Difference between Java and JavaScript, JavaScript as a scripting language
 - 8.3 JavaScript Basic Syntax
 - 8.4 Insertion of JavaScript in HTML
 - 8.5 JavaScript built-in function



- 8.6 Selection and Iteration in JavaScript.
- 8.7 Built in Object Properties and methods related to Array
- 8.8 Strings Math and Date
- 8.9 Simple HTML programs using JavaScript

Std. XI

Practical List

1. Identification of Computer Systems and understanding LAB setup.
2. Exercise on Windows, Start Menu and Accessories.
3. Creating Documents, page formatting, use of fonts and colour and printing using Word
4. Mail merge and envelope printing using Word
5. Study of Spreadsheet using Excel
6. Microsoft Access: Creation of a Simple Table having at least 8 different types of fields and creation of Form to fill up data in the same.
7. Practical on simple Flash based animation
8. Study of a Web Browser for browsing different websites
9. Acquisition of e-mail ID on free web-based e-mail servers; sending and receiving emails with and without attachments.
10. Study and use of search engines and messengers.
11. Downloading and saving Web page content and images as files.
12. Simple Visual Basic. NET Program using Toolbox
13. Use of built in functions and event driven programming in Visual Basic. NET
14. Create a simple WEB page using basic

HTML tags.

15. Creation of WEB page containing graphics and table.
16. Use of Hyperlinks on WEB pages.
17. Simple Practical in JavaScript using Selection Structure
18. Simple Practical in JavaScript using Iteration Structures
19. Simple exercise in JavaScript– to create an interactive Web Page using JavaScript.

Std. XII

1 Web Publishing

- 1.1 HTML Page Frames
- 1.2 Image Mapping
- 1.3 Forms and Form Objects
- 1.4 Inserting Sound and Video
- 1.5 Use of Unicode and Indian Language Fonts
- 1.6 Cross-Browser Testing
- 1.7 Introduction to CSS
- 1.8 Web Server

2 Cyber Laws and Ethics

- 2.1 Moral, Ethics and Law
- 2.2 Ethics Culture and ethics for computer users, professionals and business
- 2.3 Information Service
- 2.4 Code and guidelines of ethics
- 2.5 Introduction to cyber laws and IT Act of India 2000
- 2.6 Digital Signature, Electronic Records- Attribution, acknowledgement and dispatch.
- 2.7 Ten Commandments of Computing
- 2.8 Security, Privacy and Control.
- 2.9 Intellectual Property Rights

3 E-Commerce

- 3.1 Electronic Commerce-Scope, Definition



- 3.2 Trade Cycle
- 3.3 Electronic market - Usage, Advantages and Disadvantages, Future
- 3.4 Electronic Data Interchange- Definition, Benefits
- 3.5 Internet Commerce, e-Commerce in Perspective
- 3.6 EDI Security
- 4 Client Side Scripting using JavaScript**
 - 4.1 Difference in Client and Server Side Scripting
 - 4.2 JavaScript as universal Client Side scripting language.
 - 4.3 The Document Object Model
 - 4.4 JavaScript events and event handling
 - 4.5 Simple JavaScript programs
- 5 ASP.NET (using Visual Basic.NET)**
 - 5.1 Introduction and Use of Web Applications, introduction to .net framework
 - 5.2 Introduction to ASP.net
 - 5.3 Introduction to the Visual Studio 2008/ 2010 IDE and Source View Control Class
 - 5.4 Web Server Controls
 - 5.5 HTML Server Controls
 - 5.6 Validation Server Controls
 - 5.7 Components and Applications
 - 5.8 Introduction to Applications and State Management.
- 6 Database Concepts and interaction with ASP.NET**
 - 6.1 Microsoft Access Table Relationships, Queries and Query types
 - 6.2 Introduction to Reports

- 6.3 Introduction to SQL and comparison with Access.
- 6.4 Introduction to data Access with ASP.NET
- 6.5 Connected Data Access and Disconnected Data Architecture, ADO.NET Objects
- 6.6 The AccessDataSource Control, its properties and use.

Std. XII - Practical List

1. Creation of a Website
2. Creation of a Website with Frames and CSS
3. Hyperlinks on a Web Page using Client Side Image Mapping
4. Hyperlinks on a Web Page using Server Side Image Mapping
5. Use of Audio and Animation on Web Pages
6. Use of Video on Web Pages
7. Creation and Publishing a Website using FTP
8. Cross Browser Testing and Differences in Rendering
9. Creation of Webpage in Devnagri Script (Marathi or Hindi) using UNICODE. Use MS-Word with BarahaIME and Save as html
10. ASP.NET code to display a report of client IP Address, Browser etc.
11. ASP.NET code to display Server Side Time along with client-side script to display Client Side Time.
12. ASP.NET code to calculate the number of days a person has lived on basis of the Date of Birth/the number of days left before the next occurrence of select dates



13. ASP.NET code to display contents from a Text File
14. ASP.NET code to display Hit Counter/ Number of Votes cast
15. ASP.NET code that accepts data, and puts the same into a Database/ that verifies username and password from a Database
16. Creation of a database and ASP.NET code that allows a user to view relevant information from the same/ Use of database and ASP.NET code that allows a user to view as well as edit information
17. Use of Event Driven Client Side JavaScript
18. Use of JavaScript for Validation of Amount and Pin code/Telephone number
19. Use of JavaScript for Validation of Username and Password
20. Use of JavaScript for Validation of Date/ E-mail address

Note:

The practicals mentioned above must be strictly carried out by students as per Practical Slips prepared and printed by the Board for the Subject of Information Technology – Science. Colleges must obtain a set of the slips from the Divisional Board Office.



Modern Indian Languages

मराठी (०२)

प्रास्ताविक

वर्तमान युगास अनुरूप असे शिक्षण विद्यार्थ्यांना द्यावे, असा मराठी अभ्यास मंडळाचा विचार आहे. सध्या मराठी भाषेच्या उपयोजनाची विविध क्षेत्रे अस्तित्वात आहेत. उदा. शासकीय, अशासकीय कार्यालयातील कामकाज, उद्योग आणि व्यापार, जाहिरात संस्था, नभोवाणी, दूरचित्रवाणी, चित्रपट, प्रसारमाध्यमे, विज्ञान व तंत्रज्ञान, संगणक या विविध क्षेत्रात मराठी भाषेच्या उपयोजनाचे स्वरूप कसे आहे व कसे असावे, याचे मार्गदर्शन विद्यार्थ्यांना व्हावे, या दृष्टीने नव्या पाठ्यपुस्तकाची आवश्यकता आहे; असे मराठी अभ्यास मंडळाला वाटते.

मराठी विषयाचे अध्ययन केल्यानंतर विद्यार्थ्यांना उपजीविकेचे साधन मिळविण्याच्या दृष्टीने साह्य व्हावे, हेही उद्दिष्ट या अभ्यासक्रमाच्या मागे आहे. तसेच, या विद्यार्थ्यांचा मराठी साहित्याशी असलेला अनुबंधही कायम राहील, असे वेचे अभ्यासक्रमासाठी निवडले जातील. उदा. विविध प्रकारचे पत्रव्यवहार, मुलाखती, माहितीवर आधारित लेख, वार्तापत्र, वृत्तसंकलन इ.

मराठीच्या विकासासाठी इतर भाषांतून ज्ञान-विज्ञानविषयक ग्रंथ मराठीत आणावेत, अशी शासनाची भूमिका आहे. त्यासाठी हा अभ्यासक्रम अत्यंत उपयुक्त आहे. यातून विद्यार्थ्यांना आवश्यक त्या परिभाषेची ओळख होईल. उदा. न्यायालयीन कामकाजाची भाषा, बँक व्यवहाराची भाषा. दैनंदिन व्यवहारात मराठीचा उपयोग वाढावा, अशी शासनाची भूमिका आहे. या अभ्यासक्रमामुळे सर्व व्यवहारांसाठी मराठी भाषेचा वापर करण्याची सवय विद्यार्थ्यांना व पर्यायाने समाजाला लागेल, अशी अभ्यास मंडळाची धारणा आहे.

उद्दिष्टे

१. भाषेच्या व्याकरणाचे महत्त्व ठसविणे.
२. भाषांतराची कौशल्ये रुजविणे.
३. प्रसारमाध्यमांसाठी लेखन-वाचन करण्याचे कौशल्य प्राप्त करून देणे.

४. परिसरातील व दैनंदिन प्रश्नांच्या सोडवणुकीसाठी भाषेचा उपयोग करण्याचा सराव करून घेणे.
५. संगणकावर मराठीचा उपयोग करण्यास प्रोत्साहन देणे.
६. सर्वत्र राजभाषा मराठीचा सन्मान करणारा नागरिक निर्माण करणे.

इयत्ता अकरावी

- १) व्याकरण
- २) भाषांतरकौशल्य
- ३) जाहिरातलेखन
- ४) सारांशलेखन
- ५) आकलन
- ६) इंटरनेटची ओळख (ई-पत्रव्यवहार, ब्लॉग (अनुदिनी), संकेतस्थळे (वेबसाइट्स), ऑनलाइन वर्तमानपत्रे, युनिकोड (भारतीय भाषा)
- ७) वृत्तपत्रीय लेखन (बातमी, स्तंभलेखन)
- ८) परिभाषेची व कोशवाङ्मयाची जुजबी ओळख
- ९) औपचारिक पत्रव्यवहार
- १०) परिसरातील प्रश्नांशी निगडित संवादकौशल्य (ग्रामपंचायत, जिल्हा परिषद, महानगरपालिका, राज्यशासन)
- ११) भाषेचे वाङ्मयीन उपयोजन व प्रातिनिधिक नमुने.

इयत्ता बारावी

- १) व्याकरण
- २) भाषांतरकौशल्य
- ३) वृत्तपत्रीय लेखन (लेख व अग्रलेख)
- ४) दूरचित्रवाणी व आकाशवाणीसाठी भाषेचे उपयोजन
- ५) मुलाखत तंत्र (तोंडी व लेखी)
- ६) संगणक -इंटरनेट, संकेतस्थळे, ओपन ऑफिस, फॉस (Free Open Source Software)
- ७) भाषेचे वाङ्मयीन उपयोजन व प्रातिनिधिक नमुने.
- ८) सृजनशील लेखन (Creative writing)



Physics (54)

Introduction

According to NCF 2005, the curriculum of the subject Physics is upgraded for higher secondary stage. This curriculum is comparable to the international standards which are useful for the students in Maharashtra State for different types of competitive examinations conducted in India. All the units of the subject from NCERT curriculum are divided into two years conveniently in Maharashtra State. Continuity in the curriculum is maintained in Std. XI & XII, which is not in NCERT curriculum. All the students appear for the competitive examinations only after +2 stage throughout India.

This syllabus has been designed in accordance with the guidelines shown in the final version of common core syllabii of COBSE, Delhi. Accordingly few additional sub units have been added.

Objectives

1. Emphasis on basic conceptual understanding of the content.
2. Emphasis on use of SI units, symbols, nomenclature of physical quantities and formulations as per international standards.
3. Providing logical sequencing of units of the subject matter and proper placement of concepts with their linkage for better learning.
4. Reducing the curriculum load by eliminating overlapping of concepts/content within the discipline and other disciplines.
5. Promotion of process-skills, problem-solving abilities and applications of Physics concepts.
6. Strengthen the concepts developed at the secondary stage to provide firm foundation for further learning in the subject.
7. Expose the learners to different processes used in Physics-related industrial and technological applications.
8. Develop process-skills and experimental, observational, manipulative, decision making and investigatory skills in the learners.
9. Promote problem solving abilities and creative thinking in learners.
10. Develop conceptual competence in the learners and make them realize and appreciate the interface of Physics with other disciplines.

Std. XI

1. Measurements

Introduction, Need for measurement, Units for measurement, System of Units, S.I. Units, Fundamental and derived units, Dimensional analysis, Order of magnitude and significant figures, Accuracy and errors in measurement.

2. Scalars and Vectors

Addition and subtraction of vectors, Product of vectors.

3. Projectile motion

Uniformly accelerated motion along straight line, Non uniform motion, Position



- time graph and velocity-time graph, Equation of a projectile path, Time of flight, Horizontal range, Maximum height of a projectile, Relative velocity.
4. **Force**
Types of forces, General idea of gravitation, electromagnetic and nuclear forces, Law of conservation of momentum, Work done by a variable force. Work-energy theorem, Elastic and inelastic collisions in one and two dimensions, Inertial and non-inertial frames, Moment of force, Couple and properties of couple, Centre of mass, Centre of gravity, Conditions of equilibrium of a rigid body.
 5. **Friction in solids and liquids**
Origin and nature of frictional forces, Laws of static friction, Laws of kinetic friction, Pressure due to fluid column, Pascal's Law and its applications, Effect of gravity on fluid pressure, Viscosity, Streamline flow, Turbulent flow, Viscous force, Newton's formula, Stokes' law, Equation for terminal velocity, Raynold's number, Bernoulli's principle and its applications.
 6. **Sound Waves**
Waves and oscillations, Progressive waves, Characteristics of transverse waves, Characteristics of longitudinal waves, Sound as longitudinal wave motion, Relation between v , f and, λ Newton's formula for velocity of sound, Laplace's correction.
 7. **Thermal properties of matter**
Temperature and heat, Measurement of temperature, Ideal-gas equation and absolute temperature, Thermal expansion, Specific heat capacity, Calorimetry, Change of state, Latent heat, Heat transfer.
 8. **Refraction of Light**
Refraction of monochromatic light, Snell's law, Total internal reflection, Critical angle, Optical fibre, Dispersion of light, Prism formula, Angular dispersion and dispersive power, Rainbow, Scattering of light, Blue colour of sky, Colour of sun at sunrise and sunset. Elementary idea of Raman effect.
 9. **Ray optics**
Reflection of light by spherical mirrors, Refraction at single curved surface, Lens maker's equation, Combination of thin lenses in contact, Concept of conjugate foci, Correction of eye defects, Magnifying power of simple microscope, Magnifying power of compound microscope, Magnifying power of telescope, Reflecting telescope - schematic diagram with explanation.
 10. **Electrostatics**
Frictional electricity, Charges and their conservation, Coulomb's law and dielectric constant, Forces between multiple electric charges, Superposition principle of forces, Continuous distribution of charges, Concept of charge density, Electric field intensity, Potential energy, Electric potential due to point charge, Relation between electric field intensity and potential, Potential difference, Volt and electron volt, Electric dipole and dipole moment, Electric lines of force. Equipotential surfaces, P.E. of single charge and system of charges.
 11. **Current electricity**
Ohm's law, Resistance, Specific resistance, Temperature dependence of resistance, Colour code of carbon resistor, Series and parallel combination of resistors, E.M.F.



and internal resistance of cell, Work done by electric current, Power in electric circuit, Cells in series and in parallel, Elementary idea of secondary cells.

12. Magnetic effect of electric current

Oersted's experiment, Biot Savart's law, Right hand rule, Magnetic induction at the centre of circular coil carrying current, Magnetic induction at a point along the axis of a coil carrying current, Fleming's left hand rule, Force between two infinitely long current carrying parallel conductors, Definition of Ampere, Force acting on a conductor carrying current in magnetic field, Torque on a current loop in magnetic field.

13. Magnetism

Origin of magnetism due to moving charges, Equivalence between magnetic dipole and circular coil carrying current, Definition of magnetic dipole moment and its unit, Torque acting on a magnet in uniform magnetic induction, Bar magnet as an equivalent solenoid, Magnetic field lines, Magnetic induction due to bar magnet at a point along the axis and at a point along equator, Earth's magnetic field and magnetic elements, Electromagnets and factors affecting their strength.

14. Electromagnetic waves

Electromagnetic waves and their characteristics, Transverse nature of electromagnetic waves, Electromagnetic spectrum, Space communication, Propagation of electromagnetic waves in atmosphere.

List of Practicals - Std. XI

1. Use of Vernier Callipers.
2. Use of Screw gauge.

3. To determine radius of curvature of a given spherical surface by a spherometer.
4. To find the weight of a given body using parallelogram law of vectors.
5. To study the relationship between force of limiting friction and normal reaction and to find co-efficient of friction between a block and a horizontal surface.
6. To determine resistance per cm of a given wire by plotting a graph of potential difference versus current.
7. To find the value of 'v' for different values of 'u' in case of a 'concave mirror' and to find the focal length.
8. To find the focal length of a convex lens by plotting graphs between 'u' and 'v' or between '1/u' and '1/v'.
9. To find the focal length of a convex mirror, using a convex lens.
10. To find the focal length of a concave lens, using a convex lens.
11. To determine angle of minimum deviation for a given prism by plotting a graph between angle of incidence and angle of deviation.
12. To determine refractive index of a glass using a travelling microscope.
13. To find refractive index of a liquid by using (i) concave mirror, (ii) convex lens and plane mirror.
14. To determine specific heat capacity of a given (i) liquid (ii) solid, by method of mixtures.

List of Activities - Std. XI

1. To make a paper scale of given least count, e.g. 0.2 cm, 0.5 cm.
2. To determine mass of a given body using a meter scale by principle of moments.
3. To plot a graph for a given set of data,



with proper choice of scales and error bars.

4. To measure the force of limiting friction for rolling of a roller on a horizontal plane.
5. To study the variation in range of a jet of water with angle of projection.
6. To measure resistance, voltage (AC/DC), current (AC) and check continuity of a given circuit using multimeter.
7. To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab.
8. To study the nature and size of image formed by (i) convex lens (ii) concave mirror, on a screen by using a candle and a screen (for different distances of the candle from the lens/mirror).
9. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.
10. To note the change in level of liquid in a container on heating and interpret the observations.

Std. XII

1. Circular motion

Angular displacement, Angular velocity and angular acceleration, Relation between linear velocity and angular velocity, Uniform circular motion, Radial acceleration, Centripetal and centrifugal forces, Banking of roads, Vertical circular motion due to earth's gravitation, Equation for velocity and energy at different positions of vertical circular motion. Kinematical equations for circular motion in analogy with linear motion.

2. Gravitation

Newton's law of gravitation, Projection of satellite, Periodic time, Statement of Kepler's laws of motion, Binding energy and escape velocity of a satellite, Weightlessness condition in orbit, Variation of 'g' due to altitude, latitude, depth and motion, Communication satellite and its uses.

3. Rotational motion

Definition of M.I., K.E. of rotating body, Rolling motion, Physical significance of M.I., Radius of gyration, Torque, Principle of parallel and perpendicular axes, M.I. of some regular shaped bodies about specific axes, Angular momentum and its conservation.

4. Oscillations

Explanation of periodic motion, S.H.M., Differential equation of linear S.H.M. Projection of U.C.M. on any diameter, Phase of S.H.M., K.E. and P.E. in S.H.M., Composition of two S.H.M.'s having same period and along same line, Simple pendulum, Damped S.H.M.

5. Elasticity

General explanation of elastic property, Plasticity, Deformation, Definition of stress and strain, Hooke's law, Poisson's ratio, Elastic energy, Elastic constants and their relation, Determination of 'Y', Behaviour of metal wire under increasing load, Applications of elastic behaviour of materials.

6. Surface tension

Surface tension on the basis of molecular theory, Surface energy, Surface tension, Angle of contact, Capillarity and capillary action, Effect of impurity and temperature on surface tension.



7. Wave motion

Simple harmonic progressive waves, Reflection of transverse and longitudinal waves, Change of phase, Superposition of waves, Formation of beats, Doppler effect in sound.

8. Stationary waves

Study of vibrations in a finite medium, Formation of stationary waves on string, Study of vibrations of air columns, Free and Forced vibrations, Resonance.

9. Kinetic theory of gases and Radiation

Concept of an ideal gas, Assumptions of kinetic theory, Mean free path, Derivation for pressure of a gas, Degrees of freedom, Derivation of Boyle's law, Thermodynamics- Thermal equilibrium and definition of temperature, 1st law of thermodynamics, 2nd law of thermodynamics, Heat engines and refrigerators, Qualitative idea of black body radiation, Wein's displacement law, Green house effect, Stefan's law, Maxwell distribution, Law of equipartition of energy and application to Specific heat capacities of gases.

10. Wave theory of light

Wave theory of light, Huygens' Principle, Construction of plane and spherical wave front, Wave front and wave normal, Reflection at plane surface, Refraction at plane surface, Polarisation, Polaroids, Plane polarised light, Brewster's law, Doppler effect in light.

11. Interference and diffraction

Interference of light, Conditions for producing steady interference pattern, Young's experiment, Analytical treatment of interference bands, Measurement of

wavelength by biprism experiment, Diffraction due to single slit, Rayleigh's criterion, Resolving power of a microscope and telescope, Difference between interference and diffraction.

12. Electrostatics

Gauss' theorem proof and applications, Mechanical force on unit area of a charged conductor, Energy density of a medium, Dielectrics and electric polarisation, Concept of condenser, Capacity of parallel plate condenser, Effect of dielectric on capacity, Energy of charged condenser, Condensers in series and parallel, van-de-Graaff generator.

13. Current electricity

Kirchhoff's law, Wheatstone's bridge, Meter bridge, Potentiometer.

14. Magnetic effects of electric current

Ampere's law and its applications, Moving coil galvanometer, Ammeter, Voltmeter, Sensitivity of moving coil galvanometer, Cyclotron.

15. Magnetism

Circular current loop as a magnetic dipole, Magnetic dipole moment of revolving electron, Magnetisation and magnetic intensity, Diamagnetism, Paramagnetism, Ferromagnetism on the basis of domain theory, Curie temperature.

16. Electromagnetic inductions

Laws of electromagnetic induction, proof of, $\epsilon = - \frac{d\Phi}{dt}$

Eddy currents, Self induction and mutual induction, Need for displacement current, Transformer, Coil rotating in uniform magnetic induction, Alternating currents, Reactance and impedance, LC oscillations



(qualitative treatment only) Power in a.c circuit with resistance, inductance and capacitance, Resonant circuit, Wattless current, AC generator.

17 Electrons and photons

Photoelectric effect, Hertz and Lenard's observations, Einstein's equation, Particle nature of light.

18 Atoms, Molecules and Nuclei

Alpha particle scattering experiment, Rutherford's model of atom. Bohr's model, Hydrogen spectrum, Composition and size of nucleus, Radioactivity, Decay law, mass-energy relation, mass defect, B.E. per nucleon and its variation with mass number, Nuclear fission and fusion, de Broglie hypothesis, Matter waves – wave nature of particles, Wavelength of an electron, Davisson and Germer experiment, Continuous and characteristics X-rays.

19 Semiconductors

Energy bands in solids, Intrinsic and extrinsic semiconductors, P-type and N-type semiconductor, P-N junction diode, I-V characteristics in forward and reverse bias, Rectifiers, Zener diode as a voltage regulator, Photodiode, Solar cell, I-V characteristics of LED, Transistor action and its characteristics, Transistor as an amplifier (CE mode), Transistor as a switch, Oscillators and Logic gates (OR, AND, NOT, NAND, NOR)

20 Communication systems

Elements of communication system, bandwidth of signals, bandwidth of transmission medium, Need for modulation, Production and detection of an amplitude modulated wave, space

communication, Propagation of electromagnetic waves in atmosphere.

List of Practicals - Std. XII

1. To determine Young's modulus of elasticity of the material of a given wire.
2. To find the force constant and effective mass of helical spring by plotting T^2 - m graph using method of oscillations.
3. To determine the surface tension of water by capillary rise method.
4. To study the relationship between the temperature of a hot body and time by plotting a cooling curve.
5. To study the relation between frequency and length of a given wire under constant tension using sonometer.
6. To study the relation between the length of a given wire and tension for constant frequency using sonometer.
7. To find the speed of sound in air at room temperature using a resonance tube.
8. To find resistance of given wire using metre bridge and hence determine the specific resistance of its material.
9. To verify the laws of combination (series/parallel) of resistances using a metre bridge.
10. To compare the emf of two given cells using potentiometer.
11. To determine the internal resistance of given cell using potentiometer.
12. To determine resistance of galvanometer using metre bridge.
13. To draw the I-V characteristic curves of a p-n junction diode in forward bias and reverse bias.



14. To study the characteristics of a common-emitter npn or pnp transistor and to find out the values of current and voltage gains.
15. To draw the characteristic curve of a zener diode and to determine its reverse break down voltage.

List of Activities - Std. XII

1. To study dissipation of energy of a simple pendulum by plotting a graph between square of amplitude and time.
2. To study the effect of detergent on surface tension by observing capillary rise.
3. To study the factors affecting the rate of loss of heat of a liquid.
4. To study the effect of load on depression of a suitably clamped meter scale loaded (i) at its end (ii) in the middle.
5. To measure the resistance and impedance of an inductor with or without iron core.
6. To study the variation in potential drop with length of a wire for a steady current.
7. To draw the diagram of a given open circuit comprising at least a battery, resistor/ rheostat, key, ammeter and voltmeter. Mark the components that are not connected in proper order and correct the circuit and also the circuit diagram.
8. To study effect of intensity of light (by varying distance of the source) on an L.D.R.
9. To identify a diode, an LED, a transistor, and IC, a resistor and a capacitor from mixed collection of such items.
10. Use of multimeter to (i) identify base of transistor (ii) distinguish between npn and pnp type transistors, (iii) see the unidirectional flow of current in case of a diode and an LED (iv) check whether a given electronic component (e.g. diode, transistor or IC) is in working order.
11. To observe polarization of light using two polaroids.
12. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source.



Mathematics & Statistics (40)

(For Arts and Science)

Std. XI & XII

Introduction

Mathematics is the language of all sciences and is perhaps the only subject which merits this distinction. Mathematics is the backbone of all sciences and it is an inseparable part of human life.

Higher Secondary is a launching stage from where students would go to either for academic education in Mathematics or professional courses like Engineering and Computer Technology, Physical and Biological Sciences. Hence to fulfil the needs of students, it is utmost important to make the study of Mathematics more meaningful by acquainting the student with many branches of mathematics. This will help them in developing Mathematical tools to be used in the professional education. Apart from motivating topics from real life situations and other subject areas, major thrust is also on application of various concepts.

The proposed syllabus has been designed in accordance with National Curriculum Framework 2005 and as per guidelines given in Focus Group on Teaching of Mathematics 2005 which is to meet the emerging needs of all categories of students.

Objectives

To enable the students

- 1) to acquire knowledge and critical understanding, particularly by way of motivation and visualization of basic concepts, terms, principles, symbols and

mastering the underlying processes and skills.

- 2) to apply the knowledge and skills in Mathematics and related problems from other subjects, by more than one method.
- 3) to develop positive attitude to think, analyze and articulate logically.
- 4) to develop interest in Mathematics by participating in various related competitions and self-learning.
- 5) to acquaint students with different aspects of Mathematics used in real life.
- 6) to develop an interest in students to study Mathematics as a discipline.
- 7) to develop awareness of the need for national integration, protection of an environment, removal of social barriers, elimination of sex biases and observance of small family norm.
- 8) to develop reverence and respect towards great mathematicians for their contribution to the field of Mathematics.
- 9) to develop interest in the subject by participating in related competitions.

Std. XI - PART – 1

1. Measurement of Angles

Need & concept, Revision of directed angle (+ve and -ve angles), zero angle, straight angle, angles in standard position, coterminal angles, angles in quadrant &



quadrantal angles. Sexagesimal system, circular system, relation between degree measure and radian measure. **Theorem:** Radian is a constant angle. Length of an arc of a circle ($s = r \cdot \theta$, θ is in radians) (without proof). Area of the sector of a circle $A = \frac{1}{2} r^2 \cdot \theta$, θ is in radians (without proof).

2. Trigonometric functions

Need & concept, Trigonometric functions with the help of standard unit circle, signs of trigonometric functions in different quadrants, trigonometric functions of particular angles (0° , 30° , 45° , 60° , 90° , 180° , 270° , 360°), domain and range of trigonometric functions, periodicity of functions, fundamental identities, graphs of trigonometric functions, Graph of $y = a \sin bx$, $y = a \cos bx$, trigonometric functions of negative angles.

3. Trigonometric functions of compound angles

Introduction, trigonometric functions of sum and difference, trigonometric functions of multiple angles (upto double and triple angles only), trigonometric functions of half angles.

4. Factorization Formulae

Introduction, Formulae for conversion of sum or difference into products, formulae for conversion of product into sum or difference, trigonometric functions of angles of a triangle.

5. Locus

Introduction, Definition and equation of locus, points of locus, shift of the origin.

6. Straight Line

Revision. Inclination of a line, slope of a line, equation of lines parallel to co-

ordinate axes, intercepts of a line, revision of different forms of equations of a line, slope-point form, slope-intercept form, two point form, double intercept form, other forms of equations of a line, parametric form, normal form, general form, **Theorem 1 :** A general linear equation $Ax + By + C = 0$, provided A and B are not both zero, simultaneously, always represents straight line. **Theorem 2 :** Every straight line has an equation of the form $Ax + By + C = 0$, where A, B and C are constants (without proof), Reduction of general equation of a line into normal form, intersection of two lines, parallel lines, perpendicular lines, identical lines, condition for concurrency of three lines, angle between lines, distance of a point from a line, distance between two parallel lines, equations of bisectors of angle between two lines, family of lines, equation of a straight line parallel to a given line, equation of a straight line perpendicular to a given line, equation of family of lines through the intersection of two lines.

7. **Circle and Conics :** Revision, standard equation, centre-radius form, diameter form, general equation, parametric equations of standard equation, Conics Napees – Intersection of Napees of a cone and Plane, introduction, focus-directrix property of parabola, ellipse, hyperbola, parabola, standard equation (different forms of parabola), parametric equations, ellipse, standard equation, hyperbola, standard equation, parametric equations. Application of conic section.

8. Vectors

Definition, magnitude of a vector, free



and localized vectors, types of vectors, zero vector, unit vector, equality of vectors, negative of a vector, collinear vectors, coplanar vectors, coinitial vectors, like and unlike vectors, scalar multiple of a vector, triangle law, parallelogram law, polygon law, properties of addition of vectors, three dimensional co-ordinate geometry, co-ordinate axes & coordinate planes in space, co-ordinates of a point in space, distance between two points in a space, unit vectors along axes, position vector of a point in a space, product of vectors, scalar product, definition, properties, vector product, definition, properties, simple applications, work done by force, resolved part of a force, moment of a force.

9. Linear Inequations

Linear inequations in one variable – solution of linear inequation in one variable & graphical solution, solutions of system of linear inequations in one variable, Linear inequations in two variables – solution of linear inequation in one variable & graphical solution, solution of linear inequations in two variables & graphical solution, solutions of system of linear inequations in two variables, Replacement of a set or domain of a set, Transposition.

10. Determinants

Revision, determinant of order three, definition, expansion, properties of determinants, minors & co-factors, applications of determinants, condition of consistency, area of a triangle, Cramer's rule for system of equations in three variables.

11. Matrices

Introduction, concepts, notations, order,

types of matrices – zero matrix, row matrix, column matrix, square matrix, determinant of a square matrix, diagonal matrix, scalar matrix, identity matrix, triangular matrices, singular & non-singular matrices, transpose of a matrix, symmetric & skew symmetric matrices, operations on matrices – equality, addition, subtraction, multiplication of a matrix by a scalar, simple properties, multiplication of matrices – definition, properties of matrix multiplication, properties of transpose of a matrix - $(A')' = A$, $(KA)' = KA'$, $(AB)' = B'A'$.

PART – 2

1. Sets, Relations and Functions

Set – Revision, subset, proper improper subset and their properties, union, intersection, disjoint sets, empty set, finite & infinite sets, equal sets, equivalent sets, universal set, Venn diagrams, complement of a set, difference of two sets, power set, Relations – ordered pairs, equality of ordered pairs, Cartesian product of two sets, No. of elements in the Cartesian product of two finite sets, Cartesian product of the reals with itself, definition of relation, pictorial diagrams, domain, codomain and range of a relation, types of relations, one-one, many-one, binary equivalence relation, functions – function as a special kind of relation, pictorial representation of a function, domain, codomain and range of a function, equal functions, types of functions - constant function, identity function, one-one function, onto function, into function, even & odd functions, polynomial function, rational function, modulus function,



signum & greatest integer, exponential function, logarithmic function, functions with their graphs, sum, difference, product, quotient of functions, scalar multiplication, composite function, inverse function, binary operations, real valued function of the real variable, domain and range of these functions.

2. Logarithms

Introduction, definition, properties, laws of logarithms, change of base, characteristics & mantissa – method of finding characteristics, method of finding mantissa, method of finding antilogarithm.

3. Complex Numbers

Introduction, need for complex numbers, definitions – (real parts, imaginary parts, complex conjugates, modulus, argument), algebra of complex numbers – equality, addition, subtraction, multiplication, division, powers and square root of a complex number, higher powers of i , DeMoivre's formula – (without proof), square root of a complex number, properties of complex numbers – properties of addition of complex numbers, 1) Closure Property 2) Commutative Law 3) Associative law 4) Existence of additive identity 5) Existence of additive inverse. Properties of product of complex numbers – Existence of multiplicative identity – Existence of multiplicative inverse, properties of conjugate & modulus of complex numbers, Argand Diagram – representation of a complex number as a point in plane, geometrical meaning of modulus and argument, polar representation of complex numbers, Fundamental theorem of algebra, cube

roots of unity – solution of quadratic equations in the complex number system, cube roots of unity.

4. Sequences & Series

Revision - sequence, A.P., Sum of first n terms of A.P., properties of A.P., geometric progression – introduction, general term, sum of the first ' n ' terms, (n terms from the end of G.P.) containing finitely many terms & sum to infinite terms, properties of G.P., H.P. as a special type of A.P., Means – arithmetic mean, geometric mean, harmonic mean, relation between A.M., G.M., H.M., Arithmetico-Geometric sequence, special series, sum of cube of first n natural numbers, sum of cube of first n odd natural nos., exponential & logarithmic series.

5. Permutations & combinations

Introduction, fundamental principle of counting, factorial notation, permutations, when all r objects are distinct, when all r objects are not distinct, circular permutations, simple applications, combinations – definition, properties, relations between permutations and combinations, simple applications.

6. Mathematical Induction and Binomial Theorem

Principle of mathematical induction, simple applications, binomial theorem – binomial theorem for positive integers, general term, particular term, properties of binomial coefficient with simple application, binomial theorem for any index (without proof), particular cases of binomial theorem, simple applications.

7. Limits

Introduction of concept, meaning of $x \rightarrow a$,



the limit of a function, fundamental theorem on limits, algebra of limits – standard limits, without proof, limits at infinity – concepts, simple problems.

8. Differentiation

Definition : derivative, derivative at a point, geometrical significance of derivative, physical significance (velocity as a rate of change of displacement), derivatives from first principle - of trigonometric functions, logarithmic functions, algebraic functions, exponential functions, rules of differentiation – derivative of sum, difference, product and quotient.

9. Integration

Definition of integration as antiderivative, geometrical interpretation of indefinite integrals, algebra of integrals – integrals of some standard functions, rules of integration.

10. Statistics

Measures of dispersion – range, quartile & quartile deviation (for grouped and ungrouped data), comparison of two frequency distributions with same mean, mean deviation about mean, mean deviation about median (for grouped & ungrouped data), variance, standard deviation, effect of change of origin and scale on variance and standard deviation, combined variance and standard deviation, co-efficient of variation.

11. Probability

Revision, types of events – events and algebra of events, axiomatic definition of probability, mutually exclusive and exhaustive events, mutually exclusive events, addition theorem – for any two events A and B, Result on complementary

events. Conditional probability – definition, multiplication theorem, independent events, Baye's theorem, odds in favour and against.

List of Practicals: XI

1. Problems on locus.
2. Family of lines.
3. Tracing of Conics I.
4. Tracing of Conics II.
5. Applications of vectors (Dot and cross product).
6. Linear inequation.
7. Applications of determinants.
8. Algebra of matrices.
9. Tracing of graphs of functions.
10. Numerical problems using laws of logarithms.
11. Power and square root of a complex number, cube root of unity.
12. Examples on special series.
13. Permutations and combinations.
14. Mathematical induction.
15. Binomial theorem.
16. Limits.
17. Differentiation.
18. Integration.
19. Measures of dispersion.
20. Probability.

Std. XII : PART – 1

1. Mathematical Logic

Statements - Introduction, sentences and statement, truth value of statement, open sentences, compound statement, quantifier and quantified statements, logical connectives : conjunction, disjunction, negation, implication/ conditional,



biconditional, truth tables of compound statements, examples related to real life and mathematics, statement patterns and logical equivalence - tautology, contradiction, contingency, duality, negation of compound statement, contrapositive, converse, inverse, algebra of statements-idempotent law, associative law, commutative law, distributive law, identity law, complement law, involution law, DeMorgan's laws, difference between converse, contrapositive, contradiction, application-introduction to switching circuits (simple examples).

2. Matrices

Elementary transformation of a matrix-revision of cofactor and minor, elementary row transformation, elementary column transformation, inverse of a matrix-existence and uniqueness of inverse of a matrix, inverse by elementary transformation, adjoint method, application-solution of system of linear equations by – reduction method, inversion method.

3. Trigonometric functions

Trigonometric equations-general solution of trigonometric equation of the type : $\sin\theta = 0$, $\cos\theta = 0$, $\tan\theta = 0$, $\sin\theta = \sin\alpha$, $\cos\theta = \cos\alpha$, $\tan\theta = \tan\alpha$, $\sin^2\theta = \sin^2\alpha$, $\cos^2\theta = \cos^2\alpha$, $\tan^2\theta = \tan^2\alpha$, $\operatorname{acos}\theta + b\sin\theta = C$ solution of a triangle : polar coordinates, sine rule, cosine rule, projection rule, area of a triangle, application, Hero's formula, Napier Analogues, inverse trigonometric functions-definitions, domain, range, principle values, graphs of inverse

trigonometric function, properties of inverse functions.

4. Pair of straight lines

Pair of lines passing through origin-combined equation, homogenous equation, theorem-the joint equation of a pair of lines passing through origin and its converse, acute angle between the lines represented by $ax^2+2hxy+by^2=0$, condition for parallel lines, condition for perpendicular lines, pair of lines not passing through origin-combined equation of any two lines, condition that the equation $ax^2+2hxy+by^2+2gx+2fy+c=0$ should represent a pair of lines (without proof), acute angle between the lines (without proof), condition of parallel and perpendicular lines, point of intersection of two lines.

5. Circle

Tangent of a circle-equation of a tangent at a point to 1) standard circle, 2) general circle, condition of tangency only for line $y = mx + c$ to the circle $x^2 + y^2 = a^2$, tangents to a circle from a point outside the circle, director circle, length of tangent segments, normal to a circle-equation of normal at a point.

6. Conics

Tangents and normals-equations of tangent and normal at a point for parabola, ellipse, hyperbola; condition of tangency for parabola; ellipse, hyperbola; tangents in terms of slope for parabola, ellipse, hyperbola, tangents from a point outside conics, locus of points from which two tangents are mutually perpendicular, properties of tangents and normals to conics (without proof).



7. Vectors

Revision, Collinearity and coplanarity of vectors : linear combination of vectors, condition of collinearity of two vectors, conditions of coplanarity of three vectors, section formula : section formula for internal and external division, midpoint formula, centroid formula, scalar triple product : definition, formula, properties, geometrical interpretation of scalar triple product, application of vectors to geometry- medians of a triangle are concurrent, altitudes of a triangle are concurrent, angle bisectors of a triangle are concurrent, diagonals of a parallelogram bisect each other and converse, median of trapezium is parallel to the parallel sides and its length is half the sum of parallel sides, angle subtended on a semicircle is right angle.

8. Three dimensional geometry

Direction cosines and direction ratios: direction angles, direction cosines, direction ratios, relation between direction ratio and direction cosines, angle between two lines, condition of perpendicular lines.

9. Line

Equation of line passing through given point and parallel to given vector, equation of line passing through two given points, distance of a point from a line, distance between two skew lines, distance between two parallel lines (vector approach).

10. Plane

Equation of plane in normal form, equation of plane passing through the given point and perpendicular to given vector, equation of plane passing through the given point

and parallel to two given vectors, equation of plane passing through three non-collinear points, equation of plane passing through the intersection of two given planes, angle between two planes, angle between line and plane, condition for the coplanarity of two lines, distance of a point from a plane (vector approach)

11. Linear programming problems

Introduction of L.P.P. definition of constraints, objective function, optimization, constraint equations, non-negativity restrictions, feasible and infeasible region, feasible solutions, Mathematical formulation-mathematical formulation of L.P.P. different types of L.P.P. problems, graphical solutions for problem in two variables, optimum feasible solution.

Std. XII - PART – 2

1. Continuity

Continuity of a function at a point : left hand limit, right hand limit, definition of continuity of a function at a point, discontinuity of a function, types of discontinuity, algebra of continuous functions, continuity in interval-definition, continuity of some standard functions-polynomial, rational, trigonometric, exponential and logarithmic function.

2. Differentiation

Revision- revision of derivative, relationship between continuity and differentiability-left hand derivative and right hand derivative (need and concept), every differentiable function is continuous but converse is not true, Derivative of



composite function-chain rule, derivative of inverse function, derivative of inverse trigonometric function : Derivative of implicit function definition and examples, derivative of parametric function – definition of parametric function , exponential and logarithmic function-derivative of functions which are expressed in one of the following form a) product of functions, b) quotient of functions, c) higher order derivative, second order derivative d) $[f_{(x)}]^{[g(x)]}$

3. Applications of derivative

Geometrical application-tangent and normal at a point, Rolle's theorem, and Mean value theorem and their geometrical interpretation (without proof), derivative as a rate measure-introduction, increasing and decreasing function, approximation (without proof), Maxima and minima-introduction of extrema and extreme values, maxima and minima in a closed interval, first derivative test, second derivative test.

4. Integration

Indefinite integrals-methods of integration, substitution method, integrals of the various types, integration by parts (reduction formulae are not expected), integration by partial fraction-factors involving repeated and non-repeated linear factors, non-repeated quadratic factors, definite integral-definite integral as a limit of sum, fundamental theorem of integral calculus (without proof), evaluation of definite integral 1) by substitution, 2) integration by parts, properties of definite integrals.

5. Applications of definite integral

Area under the curve : area bounded by curve and axis (simple problems), area bounded by two curves, volume of solid of revolution-volume of solid obtained by revolving the area under the curve about the axis (simple problems).

6. Differential equation

Definition-differential equation, order, degree, general solution, particular solution of differential equation, formation of differential equation-formation of differential equation by eliminating arbitrary constants (at most two constants), solution of first order and first degree differential equation-variable separable method, homogeneous differential equation (equation reducible to homogeneous form are not expected), Linear differential equation, applications : population growth, bacterial colony growth, surface area, Newton's laws of cooling, radioactive decay.

7. Statistics

Bivariate frequency distribution - bivariate data, tabulation of bivariate data, scatter diagram, covariance of ungrouped data, covariance for bivariate frequency distribution, Karl Pearson's coefficient of correlation.

8. Probability distribution

Probability distribution of a random variable-definition of a random variable, discrete and continuous random variable, probability mass function (p.m.f.), probability distribution of a discrete random variable, cumulative probability distribution of a discrete random variable,



expected value, variance and standard deviation of a discrete random variable, probability density function (p.d.f.), distribution function of a continuous random variable.

9. Bernoulli trials and Binomial distribution

Definition of Bernoulli trial, conditions for Binomial distribution, binomial distribution (p.m.f.), mean, variance and standard deviation, calculation of probabilities (without proof), Normal distribution : p.d.f., mean, variance and standard deviation, standard normal variable, simple problems (without proof).

List of Practicals : XII

1. Applications of logic.
2. Inverse of a matrix by adjoint method and hence solution of system of linear equations.
3. Inverse of a matrix by elementary transformation and hence solution of system of linear equations.
4. Solutions of a triangle.
5. Tracing of tangents and normals for circle and parabola.
6. Tracing of tangents and normals for ellipse and hyperbola.
7. Applications of scalar triple product of vectors.
8. Three dimensional geometry - line.
9. Three dimensional geometry - plane.
10. Formations and solutions of LPP.
11. Applications of derivatives (Geometric applications).
12. Applications of derivatives – Rate measure.
13. Applications of derivatives - Maxima and minima
14. Applications of definite integrals - Limit of a sum.
15. Applications of definite integrals - Area.
16. Applications of definite integrals - volume.
17. Applications of differential equations.
18. Bivariate frequency distribution.
19. Expected value, variance and S.D of a random variable.
20. Binomial distribution.

