PART - I

I. General Knowledge and Current Affairs (Marks: 10)

PART - I

II. Perspectives in Education (Marks: 05)

1. History of Education :
   - The Education in Ancient India - Pre-Vedic and Post-Vedic period, Medieval Education.
   - Education in Pre Independent era - Woods Despatch (1854), Hunter Commission (1882), Hartog Committee (1929), Sargent Committee (1944).

2. Teacher Empowerment:
   - Need, interventions for empowerment, Professional code of conduct for teachers, Teacher motivation, Professional development of Teachers and Teacher organizations, National / State Level Organizations for Teacher Education, Maintenance of Records and Registers in Schools.

3. Educational Concerns in Contemporary India:
   - Democracy and Education, Equality, Equity, Quality in Education, Equality of Educational opportunities.
   - Population Education, Gender - Equality, Equity and Empowerment of Women, Urbanization and migration, Life skills.
   - Adolescence Education
   - Value Education – Morel Value and Professional Eathics in Education.
   - Health and Physical Education
   - Inclusive Education - Classroom Management in Inclusive Education
   - Role of Education in view of Liberalization, Privatization and Globalization
   - Programmes and Projects – APPEP, DPEP, Sarva Siksha Abhiyan, National Programme for Education of Girls at Elementary Level (NPEGEL), Rashtriya Madhyamika Siksha Abhiyan(RMSA), Rashtriya Aveshekar Abhiyan (RAA), KGBVs, Model Schools.
4. **Acts / Rights:**
   - Right of Children to Free and Compulsory Education Act - 2009
   - Right to Information Act - 2005
   - Child Rights
   - Human Rights.


III. **Classroom implications Educational Psychology – 05Marks**

1. **Individual differences:** Inter and intra individual differences, meaning, nature and theories of intelligence with special emphasis to multiple intelligence, IQ, assessment of intelligence, EQ, Creativity. Attitude, Aptitude, Interest, Habit and its Influence on Intelligence – Class room implementation.

2. **Learning:** Theories and approaches of learning, learning curves, Factors, Phases, Dimensions of learning, Types of learning, Transfer of learning. Memory, Forgetting, Learning and assessment – Class room implementation.

3. **Personality:** Nature, characteristics and theories of personality, factors of Personality, Assessment of Personality, Mental health, Adjustment, Stress – nature, Symptoms and management. Emotional intelligence, Management of emotions – Class room implementation.

**PART - B**

IV. **Content Science (40Marks)**

**Physical Science (Marks: 20)**

1. **Units And Measurements:** Systems of Measurement, Units of Measurements, Measurement of Length, Measurement of time, Accuracy, precision of instruments errors in measurement, Significant figures, Measurement of Mass and Density, Units and Dimensions Fundamental and derived physical quantities, Systems of units, Multiples and submultiples of SI units. Dimensions Dimensional formulae and dimensional equations, dimensional constants and dimensionless quantities, principle of homogeneity of dimensions. Application of dimensional method of analysis. Conversion of one system of units into another.

2. **Motion In A Straight Line**
   Position, path length and displacement, Average velocity and average speed, Instantaneous velocity and speed, Acceleration, Kinematic equations for uniformly accelerated motion, Relative velocity, Velocity-time and position-time graphs, Kinematical Equations of motion by graphical Method, Scalars and Vectors, laws of addition of vectors, subtraction of vectors. Resolution of vectors, Motion in a plane, Motion in a plane with constant acceleration, Relative velocity in two dimensions, Projectile motion.

3. **Laws Of Motion**
   The law of inertia, Newton's second law of motion, Newton's third law of motion. Force – Types of Force, Free Body Diagrams. Newton’s Universal Gravitation, Centre of Mass, Centre of Gravity, Stability, Applications, Equations of Motion, Motion of a body under gravity - Acceleration due to Gravity "g", Equations of Motion for a freely falling body, Equations of Motion for a body thrown upwards. Equations, Applications and

4. Ray and Optical Instruments

5. Waves: Transverse and longitudinal waves, Displacement relation in a progressive wave, The speed of a travelling wave, The principle of superposition of waves, Reflection of waves, Beats, Doppler effect, Characteristics of Sound, Speed of sound in different media, Reflection of sound, Echoes, standing waves, nodes & antinodes, measurement of wavelength, Multiple reflection of sound, its uses, Hearing and audibility of a sound, Ultrasound, uses, Sound -Propagation of sound, Musical

6. Thermal Properties Of Matter

7. Electricity

8. Electromagnetism – Magnets and their properties, Magnetic field and field lines, Oersted's Experiment, Ampere's Law, Magnetic field near a long straight wire and magnetic field at the Center of a circular coil carrying current, Field on the axis of circular coil carrying current, Force on a moving charge in a magnetic field - Force on a current carrying conductor placed in a magnetic field. Force between two long straight parallel conductors carrying current, Definition of Ampere. Fleming's Left Hand Rule. Current loop as magnetic dipole, force and Torque on Current loop in an uniform


10. **Natural Phenomena** – Lightning: Charging by rubbing, Types of charges and nature of interaction of charged bodies, Transfer of charge: electroscope as a detector of charging, Lightning: discharge, earthling, lightning conductors, Safety measures during a thunder storm. Earthquake: Earthquake, Causes of an earthquake, Seismic fault zone, Protection to damage caused by earthquakes, Measurement of intensity of earthquake, Seismograph,


12. **States Of Mater – Physical Nature Of Matter** - Composition of matter: particles (Historical introduction), Characterization of matter in terms of physical properties, Characteristics of particles of matter: space between them, attraction between them, their continuous motion, States of matter: solids, liquids and gasses, Shape, mass, volume and density of matter, Change of state of matter with temperature and pressure, Evaporation and condensation: factors effecting the rate of condensation/evaporation-surface area, temperature, humidity, wind speed. Evaporation and cooling with examples. Mixtures, type of mixtures, homogeneous and hetero generous, Solution, components, properties, concentration, dilute and saturated Solutions, Mass / Mass percentage; Mass / volume percentage, Suspension, properties of suspensions, Colloidal solution, properties of colloids, Tyndall effect, Separating the components of a mixture, Separating components of blue / black ink, evaporation, Cream from milk by churning, centrifugation, Separating immiscible liquids, Separation by sublimation Separation by chromatography, Separation by distillation (miscible liquids), fractional distillation, Separating components of air, Obtaining pure copper sulphate from impure


**14. Classification of Elements:** Symbols and formulae, Radicals and their formulae, Chemical equation, Meaning, Calculations based on equations and relationship of reactants and products by weights, History of Classification of Elements, The Periodic Law, Modern Periodic Table, The significance of atomic number and electronic configuration, Classification of elements into s, p, d, f blocks and their characteristics, Period trends in physical and chemical properties of elements, Periodic trends of elements with respect to atomic radii, ionic radii, inert gas radii, ionization energy, electron gain energy, electro negativity, Valency.

**15. Chemical Bonding And Molecular Structure:** Types of Bonds, Inter Molecular Attractions, Energy changes during a chemical reaction, Exothermic and Endothermic Relations, ionic bond, Electronic theory


17. Solutions, Acids, And Bases:

18. Hydrogen And Its Compounds

19. S - Block Elements
Alkali metals; Electronic configurations; Atomic and Ionic radii; Ionization enthalpy; Hydration enthalpy; Physical properties; Chemical properties; Uses, General characteristics of the compounds of the alkali, metals: Oxides; Halides; Salts of Oxy Acids. Anomalous properties of Lithium: Differences and similarities with other alkali metals. Diagonal relationship; similarities between Lithium and Magnesium. Some important compounds of Sodium: Sodium Carbonate; Sodium Chloride; Sodium Hydroxide; Sodium hydrogen carbonate. Biological importance of Sodium and Potassium. Alkaline earth elements; Electronic configuration; Ionization enthalpy; Hydration enthalpy; Physical properties, Chemical properties; Uses. General characteristics of compounds of the Alkaline Earth Metals: Oxides, hydroxides, halides, salts of Oxycacids (Carbonates; Sulphates and Nitrates). Anomalous behavior of Beryllium; its diagonal relationship with Aluminum. Some important compounds of calcium: Preparation and uses of Calcium Oxide; Calcium Hydroxide; Calcium Carbonate; Plaster of Paris; Cement. Biological importance of Calcium and Magnesium.

20. P - Block Elements

21. Organic Chemistry
Allotropic forms of Carbon, Oxides of Carbon, Uniqueness of Carbon and Source of Carbon Compounds, Anomalous behavior of first element namely Carbon, Carbon catenation, allotropic forms, physical and chemical properties and uses, Bonding in carbon, Covalent bond, Catenation, Saturated and unsaturated carbon compounds, Chains, branches and rings, Bonding of carbon with other elements, Functional groups in carbon compounds, Homologous series. Nomenclature of carbon compounds, Chemical properties of carbon compounds, Combustion, Blue flame, Sooty flame, Oxidation, Addition reaction, Substitution reaction, Important carbon compounds, Ethanol, Ethanoic acid, properties of ethanol – General properties,
reaction of ethanol with sodium, reaction with hot concentrated sulphuric acid, 
Properties of ethanoic acid – General properties. Esterification reaction, Reaction with 
a base, sodium hydroxide, sodium carbonate and sodium hydrogen carbonate, Soaps 
and detergents, Micelles. Classification and nomenclature, Nature of C-X bond, 
Methods of preparation : Alkyl halides and aryl halides-from alcohols, from 
hydrocarbons (a)by free radical halogenation -(b) by electrophilic substitution (c) by 
replacement of diazonium group(Sand-Meyer reaction) (d) by the addition of 
hydrogen halides and halogens to alkenes-by halogen exchange(Finkelstein reaction), 
Physical properties-melting and boiling points,density and solubility, Chemical 
reactions, Reactions of haloalkanes (i)Nucleophilic substitution reactions (a) Sn^2 
mechanism (b) Sn^1 mechanism (c) stereochemical aspects of nucleophilic substitution 
reactions -optical activity (ii) Elimination reactions (iii) Reaction with 
metals-Reactions of haloaranes: (i) Nucleophilic substitution (ii)Electrophilic 
substitution and (iii) Reaction with metals, Polyhalogen compounds: Uses and 
environmental effects of dichloro methane, trichloromethane, triiodomethane, 
tetrachloro methane, freons and DDT. Alcohols,phenols and ethers –classification, 
Nomenclature: (a)Alcohols, (b)phenols and (c)ethers, Structures of hydroxy 
and ether functional groups, Methods of preparation: Alcohols from alkenes and 
carboxyl compounds- Phenols from haloaranes, benzene sulphonic acid, diazonium 
salts, cumene, Physical properties of alcohols and phenols, Chemical reactions of 
alcohols and phenols (i) Reactions involving cleavage of O-H bond-Acidity of 
alcohols and phenols, esterification (ii) Reactions involving cleavage of C-O bond-
reactions with HX, PX3, dehydration and oxidation (iii) Reactions of phenols-
electrophili aromatic substitution, Kolbe's reaction, Reimer - Tiemann reaction, 
reaction with zinc dust, oxidation, Commercially important alcohols 
(methanol,ethanol), Ethers-Methods of preparation: By dehydration of alcohols, 
Williamson synthesis- Physical properties-Chemical reactions: Cleavage of C-O 
bond and electrophilic substitution of aromatic ethers. Nomenclature and 
structure of carbonyl group, Preparation of aldehydes and ketones-(1) by 
oxidation of alcohols (2) by dehydrogenation of alcohols (3) from 
hydrocarbons -Preparation of aldehydes (1) from acyl chlorides (2) from nitriles and 
esters(3)from hydrocarbons-Preparation of ketones(1) from acyl chlorides (2)from 
nitriles (3)from benzene or substituted benzenes, Physical properties of aldehydes and 
ketones, Chemical reactions of aldehydes and ketones-nucleophilic addition, 
reduction, oxidation, reactions due to -Hydrogen and other reactions (Cannizzaro 
reaction,electrophilic substitution reaction), Uses of aldehydes and ketones, 
CARBOXYLIC ACIDS, Nomenclature and structure of carboxylgroup, Methods of 
preparation of carboxylic acids- (1)from primary alcohols and aldehydes (2) from 
alkylbenzenes(3)from nitriles and amides (4)from Grignard reagents (5) from acyl 
halides and anhydrides (6) from esters, Physical properties, Chemical reactions: (i) 
Reactions involving cleavage of OH bond-acidity, reactions with metals and alkalis 
(ii) Reactions involving cleavage of C-OH bond-formation of anhydride, reactions 
with PCl5, PCl3, SOCl2, esterification and reaction with ammonia (iii) Reactions 
involving -COOH group-reduction, decarboxylation (iv) Substitution reactions in the 
hydrocarbon part - halogenation and ring substitution, Uses of carboxylic acids. 
Structure of amines, Classification, Nomenclature, Preparation of amines:reduction of 
nitro compounds, ammonolysis of alkyl halides, reduction of nitriles, reduction of 
amides, Gabriel phthalimide synthesis and Hoffmann bromamide degradation 
reaction. Physical properties, Chemical reactions:basic character of amines, alkylation, 
acylation, carbly amine reaction, reaction with nitrous acid, reaction with aryl 
sulphonyl chloride, electrophilic substitution of aromatic amines-bromination,
nitration and sulphonation. DIAZONIUM SALTS - Methods of preparation of diazonium salts (by diazotization), Physical properties. Chemical reactions: Reactions involving CYANIDES AND ISOCYANIDES - Structure and nomenclature of cyanides and isocyanides, Preparation, physical properties and chemical reactions of cyanides and isocyanides

22. Polymers:
Classification of Polymers - Classification based on source, structure, mode of polymerization, molecular forces and growth polymerization. Types of polymerization reactions-addition polymerization or chain growth polymerization-ionic polymerization, free radical mechanism-preparation of addition polymers-polythene, teflon and polyacrylonitrile-condensation polymerization or step growth polymerization-polyamides-preparation of Nylon 6,6 and nylon 6-poly esters- eylene - bakelite, melamine, formaldehyde polymer- copolymerization-Rubber-natural rubber-vulcanisation of rubber-Synthetic rubbers-preparation of neoprene and buna-N.

Molecular mass of polymers-number average and weight average molecular mass-poly dispersity index (PDI). Biodegradable polymers-PHBV, Nylon 2-nylon 6.


23. Chemistry In Everyday Life

Drugs and their classification: (a) Classification of drugs on the basis of pharmacological effect(b) Classification of drugs on the basis of drug action (c) Classification of drugs on the basis of chemical structure (d) Classification of drugs on the basis of molecular targets. Drug-Target interaction-Enzymes as drug targets(a) Catalytic action of enzymes (b) Drug-enzyme interaction Receptors as drug targets. Therapeutic action of different classes of drugs: antacids, antihistamines, neurologically active drugs: tranquilizers, analgesics-non-narcotic,narcotic analgesics, antimicrobials-antibiotics,antiseptics and disinfectants- antifertility drugs. Chemicals in food-artificial sweetening agents, food preservatives, antioxidants in food. Cleansing agents-soaps and synthetic detergents.
24. Environmental Chemistry:
Sources of energy, Conventional sources of energy, Fossil fuels, Petroleum formation, refining of petroleum, constituents of petroleum, Natural gas, Petrochemicals, Thermal power plant, Hydro power plants, Improvements in the technology for using conventional sources of energy, Bio-Mass, Wind energy, Alternative or non-conventional sources of energy, Solar energy, Energy from sea, Tidal energy, Wave energy, Ocean thermal energy, Geothermal energy, Nuclear energy, Environmental consequences of production and consumption of energy, Sustainability of energy sources. Pollution: Air, Water and Soil Pollution, Oxides of Carbon, Carbon Monoxide, Oxides of nitrogen and Sulphur, Chlorofluro carbons, Chemical reactions in atmosphere, smogs, 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 with two examples.

Biology Content (Marks: 20)

Insect, Scorpion and Snakes, Fractures, Accidents, Life skills, Wild and Domesticated animals, Economic Importance of Animals, Animal Husbandry - Pisciculture, Sericulture, Poultry, Breeding of Cows and Buffaloes, animal behavior.

7. **Heredity and Evolution**: Terms, Mendel laws, Sex determination in humans, Inheritance of Blood Groups, Erythroblastosis foetalis, Theories of Evolution, Speciation, Evidences of Evolution, Human Evolution, sex linkage, genetic disorders, syndromes, human genome project, evolutionary forces, DNA and finger printing.

8. **Our Environment – Ecology**: Abiotic and Biotic factors of Ecosystems, Ecosystem - Types, components, adaptations, Food chains, Food web and Ecological pyramids, Natural Resources - Type of water managements, soil waste land management, forests, sustainable development, fossil fuels and bio fuels, 4Rs, bio-geo-chemical cycles, pollution, air, water, soil, global environmental issues – global warming – (Green House Effect), acid rains and depletion of Ozone layer; Population - interaction in Eco-system, plant ecology.


10. **Biodiversity – Conservation**: Biodiversity – levels of bio diversity, conservation, wild life, sanctuaries, national parks in India, importance of species, diversity to the Ecosystem.

V. **Methodology (Marks: 20)**

1. The Nature of Science: Nature and scope of science, Science, ideology and Society, Structure of Science (a) Substantive structure - Empirical knowledge, Theoretical Knowledge - (Facts, Concepts, hypothesis, theory, Principle Law), (b)Syntactic Structure of Science - Scientific inquiry, Processes of Science, Attitudes of inquiry
2. The History and Development of Science: A brief introduction to oriental and western science, Contribution of the following Scientists in the Development of Science: Aryabhatta, BhaskaraCharya, Aristotle, Copernicus, Newton, Einstein, C.V.Raman, Various organizations working for the development of science in India
3. Aims and Values of teaching Sciences: Aims of teaching Sciences, Values of teaching Science, Correlation of Science with other subjects
4. Objectives of teaching Sciences: Meaning and importance of objectives, Bloom's Taxonomy of Educational objectives, Specific / Behavioral objectives / (Instructional objectives), Critique on Bloom's Taxonomy
6. Planning for effective instruction in Science: Year Plan, Unit Plan, Lesson Plan, Learning experience, characteristics, classification, source and relevance.
7. Teaching Learning Material (TLM): Characteristics and Importance of TLM, Classification and Types of TLM, Hardware and Software in TLM, TLM-Principles to be followed, Edgar Dale's cone of learning experience.


10. Non-formal Science Education: Science Clubs, Science Fairs - purposes, levels, organization, advantages, Science Library, Role of NGOs and State in popularizing Science