Teachers' Service Commission

Lower Secondary Level Curriculum of Subjective Examination- 2076

Subject: Science Full Marks: 100 Time: 3 Hrs

Section A

Unit One: Teaching Mechanics and Heat

1.1 System of Measurement: Measurement, SI unit, relation between FPS, CGS and MKS system of measurement, scalar and vector quantities, fundamental and derived units, local and standard measurement, measurement of solid and liquid

1.2 Force, Rest and Motion: Force and motion, uniform and non- uniform motion, distance and displacement, speed, velocity, acceleration and retardation, equations, inertia, Newton's laws of motion, Newton's laws of gravitation, force and momentum and circular motion

1.3 Heat: Introduction, temperature and pressure, thermometer and units, specific heat capacity, transmission and absorption, relation between Celsius and Fahrenheit

1.4 Pressure: Pressure and its measurement, atmospheric pressure and pressure in a fluid, density of a body and relative density, solution of numerical problem and application of pressure in daily life

1.5 Energy, Power and Work: Kinetic and potential energy, power and work, transformation of energy, alternative energy sources, energy conservation, numerical problem, simple machine, mechanical advantage, efficiency and velocity ratio of simple machines

Unit Two: Teaching Wave, Electricity and Magnetism

2.1 Wave: Simple harmonic motion of simple pendulum, oscillation and waves characteristics of wave motion, light and sound as a wave.

2.2 Light: Nature, properties and propagation of light, luminous and non luminous body, laws of reflection, law of refraction, critical angle and total internal reflection, concave and convex lens, real and virtual image, magnification, defects of vision and correction

2.3 Sound: Nature, source, properties and medium propagation, amplitude, frequency, wavelength, velocity, relation $V=f\lambda$, reflection of sound with some practical applications, ultra sound, musical sound and noise

2.4: Current Electricity and Magnetism: Electric circuit, static electricity and current electricity, dry cell, series and parallel combination of cells, e. m. f., potential difference, heating effect of current, Faradays laws of electromagnetic induction, dynamo, generator and transformer, magnetic effect of current

2.5 Magnetism: Properties, magnetic material, natural and artificial magnet, methods of preparation of

magnets, magnetic induction, molecular theory of magnetism, electromagnet, magnetic field and magnetic lines of forces, dip and dip circle

Unit Three: Teaching Earth and Space

3.1 Earth : External and internal structure, time scale and evolution of life, earth quake

3.2 Universe: Origin of Solar system, constellation, eclipse, phases of moon, satellites, meteors, meteorites, comets, galaxies, astronomical instruments, big bang theory, tidal hypothesis, Nebular hypothesis

3.3 Soil, Rocks and Mountain: Soil profile, soil formation, soil erosion, rocks, formation of mountain

3.4 Weather and Climate: Factors affecting weather, water cycle, weather forecast, climate, factors affecting climate, climatic condition of Nepal and monsoon

Unit Four: Teaching Classification of Living Beings

4.1 Classification of Plants and Animals: Differences between plant and animal, monocotyledon and dicotyledonous plants, gymnosperm and angiosperm, characteristics of cryptogams and phanerogams, algae (*spirogyra*), fungi (m*ucor*), bryophyta (*marchantia*), pteridophyta (*pteridium*), characteristics of protozoa, porifera, coelenterata, platyhelminthes, aschelminthes, annelida, arthropoda, mollusca, echinodermata, chordata

4.2 Microscopic Organisms: Bacteria and virus, common diseases caused by them with preventive measures.

4.3 Modification and Adaptation: Modification of different parts of plant, plant adaptation (aquatic, grassland, tropical rain forest and desert)

4.4 Cell Biology: Structure of plant and animal cells, cell types, cell organelles, plant tissue (meristematic) and animal tissue (epithelial), and cell division

4.5 Life Process: Respiration in plants and animals, reproduction (asexual and sexual), pollination and fertilization in plants. introduction to human systems (digestion, respiration, circulation, excretion, reproduction and nervous) structure of flower and life cycle (mustard plant, mosquito and silk worm)

Unit Five: Overview of Lower Secondary Level Science Curriculum

5.1. Curriculum and Textbook: Comparative study of science curriculum, textbooks and teachers guide of grade 6 -8 .

5.2. Teaching Materials: Development and use of teaching and supplementary materials in science teaching

5.3. Evaluation and Testing: Testing and evaluation in science teaching and specification grid.

5.4. Assessment: Continuous assessment system, grading system in student assessment

5.5. Teaching Learning Science: Science process skills, scientific method, approaches of teaching science, science laboratory and safety measures

Section B

Unit Six: Teaching Basics of Physical Chemistry

6.1 Matter and Mixture: State, properties and classification of matter and mixture, process of separation of mixture, solution, concentration of solution in terms of normality and molarities

6.2 **Physical, Chemical Process and Bonding:** Physical and chemical change, process involved in chemical change, hardness of water, methods of removing hardness of water, properties of gas, Boyle's law, Charles's law, kinetic molecular theory of gas, Dalton's law of partial pressure. properties of solids, bond (ionic, covalent, co-ordinate covalent, metallic, hydrogen), Vander Wall's force, ionic and covalent compounds.

6.3 Acids, Bases and Salts: Properties of acid, base and salt, mineral acids (HCl, HNO_3 and H_2SO_4) acid base indicators, pH scale, pH and pOH of solution, selection of acid base indicators using titration curve

6.4 Atomic Structure: Discovery and properties of fundamental particles of atom Bohr's model of atom, electronic theory of valence, octet rule, Aufbau principle, periodic table**,** electronic configuration of atom and ions, periodic law, classification of elements on the basis of electronic configuration,

6.5 Energetic and Electrochemistry: First and second law of thermodynamics, entropy and enthalpy, internal energy, electrolysis and electroplating, electrolytes

Unit Seven: Thermodynamics

7.1 Heat and Temperature: Molecular concept of thermal energy, heat, temperature and thermal equilibrium

7.2 Thermal expansion: Linear, superficial, cubical expansion and define their corresponding coefficients with physical meaning,

7.3 Quantity of Heat: Heat capacity, specific heat capacity, Newton' law of cooling and latent heat

7.4 First law of thermodynamics: State and explain first law with limitation, thermodynamic

process, reversible and irreversible process

7.5 Second Law of Thermodynamics: State and explain second second law of thermodynamics , compare second and first law and heat engine

Unit Eight: Basics of Inorganic and Organic Chemistry

8.1 Metallurgy: Metal, non metal, metalloid, alloys, mineral and ores, extraction, properties and uses of Fe, Cu and Zn.

8.2 Some Inorganic Compounds: Laboratory preparation, properties and uses of gases (oxygen, hydrogen, nitrogen), allotropes of carbon, sulphur and phosphorus, chemistry of some important compounds (green vitriol, blue vitriol and white vitriol, horn silver, sodium carbonate, iodine)

8.3 Basics of Organic Chemistry: Hybridization (involving s and p orbitals), tetra covalency and catenation property of carbon, Preparation and properties of aliphatic hydrocarbons

8.4. Fundamental Principles: IUPAC name of the organic compounds, isomerism (concept and type)

8.5 Important Industrial Materials: Soaps and detergents (manufacture, cleansing action and effect), chemical fertilizers (simple and mixed), pesticides, polymerization, preparation and uses of polythene, PVC and Bakelite

Unit Nine: Microbiology and Genetics:

9.1 Bacteria (structure, mode of nutrition and growth), coronavirus (COVID-19)

9.2 Structure of DNA and RNA

9.3 DNA replication and genetic codes

9.4 Linkage: Concept, type and sex-linked inheritance

9.5 Mutation: Concept, type and importance

Unit Ten: Environmental Science

10.1 Ecology and Ecosystem: Introduction to ecology and ecosystem, components and types, food chain, food web, ecological pyramid

10.2 Natural Resources and Environmental Balance: Natural resources, common medicinal plants of Nepal and their uses, environmental degradation, role of human in environmental balance.

10.3 Biogeochemical Cycle: Biogeochemical cycles (carbon, water, nitrogen)

10.4 Pollution and Environment: Causes, effects and control of water, air and soil pollution, solid waste and its management, green house effect, acid rain and ozone layer depletion

10.5 Biodiversity and Sustainable Development: Biodiversity of Nepal, factors responsible for biodiversity degradation, sustainable development (goals, policy and programmes in Nepal)

Specification Grid

Subject: Science **Level: Lower Secondary**

Units	Content area	Question	Mark
Section :A			
1	Teaching Mechanics and Heat	1	10
2	Teaching Wave, Electricity and Magnetism	1	10
3	Teaching Earth and Space	1	10
4	Classification of Living Beings	1	10
5	Overview of Lower Secondary Level Science Curriculum	1	10
Section:B			
6	Basics of Physical Chemistry		10
7	Thermodynamics		10
8	Basics of Inorganic and Organic Chemistry		10
9	Microbiology and Genetics		10
10	Environmental Science		10
Total		10	100

Notes:

1. This curriculum is divided into sections A & Section B.
2. Generally from section A, questions will be asked related to pedagogy.
3. From section B questions will be asked covering cognitive level.
4. Separate answer sheets will be used for each section.
5. The medium of the language in written test will be either Nepali or English or both.
6. This curriculum will be effective from 207/03/ 03.