

प्रदेश लोक सेवा आयोग
गण्डकी प्रदेश
प्रदेश शिक्षा सेवा, शिक्षा प्रशासन समूह, विज्ञान उपसमूहको अधिकृत सातौं तहको पदको खुला तथा अन्तर
तह प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

तृतीय-पत्र (Paper III) : Service Group Specific Subject

Section A – 30 Marks

- 1. Basic Properties of matter** **10%**
- 1.1 Vector, Motion, Work and Energy, Torque
 - 1.2 Circular motion, Simple harmonic motion, Rotational motion
 - 1.3 Gravity and Gravitation, Artificial satellites
 - 1.4 Surface tension, Hydrostatic, Viscosity, Fluid dynamics and Elasticity
 - 1.5 Thermodynamics, Thermoelectric effect, Heat Transfer and Calorimetry
- 2. Waves and Oscillation: Light, Sound waves, Electricity and Magnetism** **10%**
- 2.1 Basic properties of light, Geometrical & Physical Optics
Principle of telescopes, Principle of reflection, refraction and dispersion, Solar spectrum, Huygen's construction, Interference, Diffraction and Polarization of light
 - 2.2 Stationary & Progressive waves, Waves in pipes and strings, Beats & Acoustic
 - 2.3 Static and Current Electricity - Charge, Current, Potential difference, Electric potential, Power, Wheatstone bridge, Potentiometer
 - 2.4 Electric, Magnetic, Chemical and Heating effect of current; Electromagnetic waves
 - 2.5 Alternative currents, Resonance
 - 2.6 Magnetic materials: Dia, para and ferro magnetism
 - 2.7 Semiconductor, Capacitors and Electronics
- 3. Earth, Universe and Space Science** **10%**
- 3.1 Astronomy, Astronomical Objects, Astronomical instruments
 - 3.1.1 Origin of Sun and members of solar system
 - 3.1.2 Contribution to planetary motion by Copernicus, Tycho, Kepler, Galilee and Newton
 - 3.1.3 Eclipse: Solar and lunar eclipse - Occurrence and types
 - 3.1.4 Astronomical instruments - Optical & Radio telescope, Photocell, Artificial satellites
 - 3.1.5 Astronomical objects – Distance, Size, Mass, Surface temperature
 - 3.1.6 The Universe - Stars, Satellite, Meteors, Comets, and Galaxies
Stars - Stellar distance, Brightness of stars, Stellar spectra, Birth and death of stars
 - 3.1.7 Cosmological theories of the universe - Hubble's law, Expanding universe, The bigbang theory, Pulsating theory, Steady state theory, Critical density, Dark matter
 - 3.2 Earthquake: cause, nature and preservation measure, Geo-structure of Nepal
 - 3.3 Geology: Earth's major division, size, functions of each part, Rock and minerals

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Section B – 20 Marks

- 4 Atomic structure, Periodic Table and Chemical Bonding 10%**
- 4.1 Rutherford, Bohr and Sommerfeld's atomic model and their drawbacks
 - 4.2 Aufbau Principle, Paulis Exclusion Principle and Hands Rule
 - 4.3 Quantum numbers and Orbitals, Hybridization and its type
 - 4.4 Spectrum: Absorption, Emission and Hydrogen spectra
 - 4.5 Interpretation and Properties of chemical behavior
 - 4.5.1 Chemical Reactions: Types of chemical reaction, role of catalysts and promoter
 - 4.5.2 Bonding: Ionic, covalent, coordinate covalent, dipole moment,
 - 4.5.3 Intermolecular bonding: Van Der Waals, Hydrogen, Hydrophobic
 - 4.5.4 Bond energy, Electron affinity, atomic size, Ionic radius
 - 4.6 Periodic classification of elements
 - Superiority and defects of long form of periodic table
- 5 Metals and metallurgy, Man made materials and Organic compounds 10%**
- 5.1 Metallurgy: General steps of metallurgy, Extraction, properties and uses of some metals in Group IB, IIB, VIII
 - 5.2 Preparation, properties and uses of some gases: H₂, O₂, NH₃ and CO₂, and Copper oxide, Cupric sulphate, Cupric carbonate, silver chloride, silver nitrate
 - 5.3 Nature, preparation, properties and uses of Plastics, Pesticides, Cement, Glass, Fibers, Soaps, Detergents
 - 5.4 Homologous series – Alkenes, Alkenes, Alkynes
 - 5.5 Organic compounds:
 - 5.5.1 Benzene – structure, preparation and properties
 - 5.5.2 Introduction, Preparation, Physical & chemical properties of Aerometric nitro-compounds: Amino compounds, hydroxy compounds, Aldehyde, Ketone, Carboxylic acids

Section C – 20 Marks

- 6 General Biology and Evolution 10%**
- 6.1 Algae, Fungi, Bryophyta, Pteridophytes, Gymnosperms: Habit, habitat, structure and life cycle. Features of taxonomy, vegetative and Medicinal & Aromatic plants (MAPs)
 - 6.2 Classification of plants/animals: Cell structure, Cell cycle, cell division, tissues and organs.
Characteristics of Kingdom, phylum or division, class, order, family, genus and species of plants/animals

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6.3 Microbiology: Symptoms, mode of transmission and control of microscopic organisms like viruses, bacteria, algae, fungi, slime molds, and protozoa.

6.4 Plant Physiology and Anatomy: Cell division, Mendel's law, Gene & gene action, Evolution

7 Economic Biology and Environmental Science 10%

7.1 Economic Botany:

Economic importance of medicinal and vegetable plants

Horticulture, Floriculture, Mushroom cultivation, Manuring, Biofertilizers, Aquaponics

7.2 Economic zoology: Structure and life cycle of Bees, Sericulture (silkworm) Pisciculture, Aquaculture, Dairy farming, Prawn culture, Vermiculture

7.3 Ecosystem, Biogeochemical cycle:

Definition, structure, types, functions and their importance

7.4 Environmental pollution: Concept of Buffer zone, NTNC, Eco tourism, Conservation of wild life Law in Nepal, Biopesticide, Biofertilizer, Environmental hazard due to chemical fertilizer, Air pollution

Section D – 30 Marks

8 Foundation of Teaching Science and Psychology of Learning 10%

8.1 Nature and Objectives of Science Education

8.1.1 Science as a process and as a product, Its historical development, Values and importance, Paradigm shift and Science for all

8.1.2 Meaning, functions, criteria and approaches of behavioral objectives, Revised Bloom's taxonomy of educational objectives, Critical analysis of objectives in secondary level science curriculum

8.2 Scientific Attitude and Critical Thinking

8.2.1 Characteristics of the scientific attitude, ways of developing scientific attitudes,

8.2.2 Creativity and implication of critical thinking in science classroom

8.3 Learning theories – Piaget, Brunner, Gagne, Devy, Ausubel and Constructivism

8.3.1 Use of ICT tools for learning theories

9 Curriculum and Method of Teaching 10%

9.1 Curriculum and Curriculum materials in Science Education

Curriculum as a process, Principles of curriculum organization, Approaches of curriculum development, Criteria of competency-based science curriculum, Analyze the issues of school science curriculum in Nepal, Edgar Dale's cone, Some innovative Science Curriculum and Projects

9.2 Pedagogical approaches of Science Teaching

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Discuss the use of teacher centered methods, heuristic method, problem-solving method, inductive and deductive methods, problem-based learning, project-based learning, inquiry-based learning in science teaching

9.3 Facilities and use of environmental resources

Conduct co-curricular and extra-curricular activities based on school-level science curriculum, manage course in LMS (Learning management system) tools such as Moodle, Design and develop lessons in moodle

9.4 Recent trends and issues in science education:

9.4.1 Issues in school science education in Nepal,

9.4.2 Teaching science in a wider context, Teaching science for the future

10 Educational Planning and Evaluation

10%

10.1 Instructional design and Planning in Science teaching

Concepts, significance and steps of instructional design, Models: ADDIE (Assess, Design, Develop, Implement and Evaluate) model, Process/steps: ASSURE (Assess learners, State learning objectives, select methods and materials, utilize methods and media/materials, require learners' participations, and Evaluate and revise) Instructional Planning, Approaches to design lesson plan: Herbartian, ABC, Constructivist (5E approach), Problem solving, Investigative, Laboratory, Criteria for the evaluation of lesson plan

10.2 Evaluating students learning

Type and Functions of evaluation, Specification grid, Attributes of good test items, General steps of test construction, Construction of test items based on the revised Bloom's taxonomy, Standardization/ analysis of test, Letter grading system

10.3 Classroom management and professional development of Science Teacher/Personal

10.3.1 Student-centered classroom strategies and classroom management strategies

10.3.2 Basic qualities and qualifications of a science teachers at school level

10.4 Science teacher's professional development, Importance of professional training in recent instructional pedagogies, Competency of science teachers, Professional standards of science teachers in terms of ICT competences

10.5 Action Research and its use in science education

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प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र लिइने
सामूहिक परीक्षण (Group Test) को लागि

सामूहिक परीक्षण (Group Discussion)

यस प्रयोजनको लागि गरिने परीक्षण १० पूर्णाङ्क र ३० मिनेट अवधिको हुनेछ जुन नेताविहिन सामूहिक
छलफल (Leaderless Group Discussion) को रूपमा अवलम्बन गरिने छ। दिइएको प्रश्न वा Topic
का विषयमा पालैपालोसँग निर्दिष्ट समयभित्र समूहबीच छलफल गर्दै प्रत्येक उम्मेदवारले व्यक्तिगत प्रस्तुति
(Individual Presentation) गर्नु पर्नेछ। यस परीक्षणमा मूल्याङ्कनको लागि देहाय अनुसारको कम्तीमा ३
जनाको समिति रहनेछ।

आयोगका अध्यक्ष वा निजले तोकेको सदस्य - अध्यक्ष

विज्ञ - सदस्य

दक्ष/विज्ञ (१ जना) - सदस्य

सामूहिक छलफलमा दिइने नमुना प्रश्न वा Topic

उदाहरणको लागि - उर्जा संकट, गरीबी निवारण, स्वास्थ्य बीमा, खाद्य सुरक्षा, प्रतिभा पलायन जस्ता Topics
मध्ये कुनै एक Topic मात्र दिइनेछ।