

प्रदेश लोक सेवा आयोग, मधेश प्रदेश
इञ्जिनियरिङ्ग सेवा, जियोलोजी समूह, हाड्रोजियोलोजी उपसमूह, सहायक पाचौं तह, अ.ग.हा.जी पदको खुला र अन्तर सेवा
प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम ।

द्वितीय पत्र (Paper II):-
सेवा सम्बन्धित कार्य-ज्ञान (Job Based - knowledge)

खण्ड (Section) (A): ५० अङ्क

1. Physical Geology and Geology of Nepal Himalaya

- 1.1 The science of geology and its branches
- 1.2 Geologic time scale; hydrologic cycle and rock cycle
- 1.3 Internal structure of the earth, the crust, mantle and core, lithosphere and asthenosphere, pressure and temperature inside the earth
- 1.4 Earthquakes and faults; mechanism of earthquake, seismic waves; seismograph, magnitude and intensity of earthquakes, liquefaction, forecast and prediction of earthquakes, earthquakes in Nepal
- 1.5 History of seismological monitoring in Nepal Himalaya
- 1.6 Geological works of surface water, groundwater, glacier and wind
- 1.7 Physiography and tectonic divisions of the Nepal Himalaya
- 1.8 Evolution of the Himalaya
- 1.9 Structures and stratigraphy of different tectonic zones of Nepal Himalaya

2. Structural Geology

- 2.1 Definition and scope of structural geology
- 2.2 Geological map and cross-section; orientation of a line (trend and plunge) and a plane (dip and strike); geological compass; stereographic projection; stress and strain, stress in two dimensions: Mohr circle and its use
- 2.3 Primary structures and their importance in structural geological interpretation, unconformity
- 2.4 Folds, classification of folds, criteria of recognition of folds in the field
- 2.5 Faults, classification of faults, criteria of recognition of faults in the field
- 2.6 Joints, classification of joints; study of joints in the field
- 2.7 Foliation, lineation, cleavage, schistosity and their classifications; relationship of foliation and lineation with other structures in the field

3. Sedimentary Petrology

- 3.1 Depositional environment: Fluvial, lacustrine and glacial environments
- 3.2 Distribution of sedimentary rocks, formation of sediments
- 3.3 Tectonic setting of sediment accumulations
- 3.4 Geosynclines and plate tectonics
- 3.5 Structure of sedimentary rocks: Erosional structures, depositional structures, synsedimentary deformational structures and their significance
- 3.6 Sedimentary rocks classification, definitions, texture and structures, and compositions of sandstones, conglomerates, mudrocks, limestones and dolomites; Introduction to other sedimentary rocks, evaporites, bedded cherts, and iron deposits; Diagenesis, compaction, cementation, dissolution, replacement, recrystallization. inversion and authigenesis, provenance

4. Crystallography and Mineralogy

- 4.1 Introduction to crystallography, morphology of crystals: Point group; symmetry; geometrical operation symmetry notations
- 4.2 Concept of point groups and 32 classes; definition of crystal face, edge, and solid angle; Forty-eight forms
- 4.3 Definition of mineral, rock and ore-forming minerals
- 4.4 Physical properties of minerals
- 4.5 Crystallinity and forms of minerals, habit of minerals, forms of crystalline and cryptocrystalline aggregates
- 4.6 Chemical properties of minerals: native elements, sulphides, halides, oxides, silicates, titanates, phosphates, arsenates and vanadates; nitrates, borates and uranates, sulphates and chromates, tungstates and molybdates, oxalates and hydrocarbons.
- 4.7 Optical mineralogy: Snell's law, total internal reflection, critical angle, isotropic and anisotropic minerals, polarization and interference of light, polarizing microscope. pleochroism and birefringence, uniaxial and biaxial crystals, optical properties of minerals form, cleavage, fracture, and parting, refractive index and relief, Becke line and its use, twining, colour and pleochroism, properties under crossed polarisers - interference colour, twining and extinction angle

5. Stratigraphy, Paleontology and Historical Geology

- 5.1 Stratigraphy
 - 5.1.1 Stratification and sedimentary cycles.
 - 5.1.2 Principles of stratigraphic classification and correlation
 - 5.1.3 International stratigraphic codes
 - 5.1.4 Unit and measurement of geological time and geochronology
 - 5.1.5 Lithostratigraphy, biostratigraphy and chronostratigraphy
- 5.2 Paleontology
 - 5.2.1 Fossils and their mode of preservation
 - 5.2.2 Evolution of life, definition, concept and method of nomenclature
 - 5.2.3 Classification, geographical distribution, morphology, evolution and geological history of different Phylums
 - 5.2.4 Fossils found in Nepal
- 5.3 Historical geology
 - 5.3.1 Evolution of the Earth
 - 5.3.2 Theory of origin of life, index fossils
 - 5.3.3 Geological history of Phanerozoic eon, organic life evolution through geological time scale

खण्ड (Section) (B):- ५० अङ्क

6. Igneous and Metamorphic Petrology

- 6.1 Igneous Petrology

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- 6.1.1 General characteristics of igneous rocks.
- 6.1.2 Magma: definition, composition, physico-chemical constitution, primary magma
- 6.1.3 Evolution and differentiation of magmas: fractional crystallization, Magmatic mixing and assimilation
- 6.1.4 Forms and structures of igneous rocks, method of emplacement of intrusive rocks; Extrusive igneous rock: type, their structures and forms
- 6.1.5 The IUGS classification system, chemical classification, characteristics and description of common igneous rocks
- 6.1.6 Distribution of Igneous rocks in Nepal
- 6.2 Metamorphic Petrology
 - 6.2.1 General characteristics: definition, types of metamorphism, distribution and nomenclature, structures and textures of metamorphic rocks
 - 6.2.2 Shape of minerals, growth and mutual relation of minerals, pressure, temperature and composition in metamorphism
 - 6.2.3 Slate, phyllite, schist, gneiss, amphibolite, marble, quartzite, hornfels. serpentinite, granulite and eclogite
 - 6.2.4 Types of metamorphism, contact metamorphism, regional metamorphism and others; metamorphic differentiation, metamorphic reactions
 - 6.2.5 Metamorphic zones, index minerals, isograds

7. Economic and Exploration Geology

- 7.1 Economic Geology
 - 7.1.1 Morphology of ore bodies, classification of mineral deposits, physical characteristics, properties of ore minerals. Genesis of mineral deposits:
 - 7.1.2 Magmatic concentration, Contact metasomatism, Hydrothermal. Sublimation, Volcanic and submarine exhalative, Sedimentation, Sublimation, Bacteriogenic, Residual and mechanical concentration, Oxidation and supergene enrichment and Metamorphism
 - 7.1.3 Important mineral deposits of Nepal
- 7.2 Exploration Geology
 - 7.2.1 Scope and principles of exploration geology, prospecting criteria: Structural- tectonic, Lithological, Stratigraphical, Magmatogenic, Geomorphologic, Geochemical
 - 7.2.2 Prospecting methods and techniques: Geological, Geophysical, Geochemical

8. Engineering Geology

- 8.1 Role of engineering geology in engineering works
- 8.2 Index properties of soil: unit weight, porosity, void ratio, degree of saturation, cohesive and non-cohesive soil, soil consistency, classification of engineering soil, unified soil classification
- 8.3 Rock strength and deformation, discontinuities in rock masses, index tests, engineering classification of rocks

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- 8.4 Mass movements and landslides: causes and classification, control and mitigation measures, landslides of Nepal
- 8.5 Slope stability analysis, construction material
- 8.6 Concept of geohazard, risk and vulnerability
- 8.7 Site investigation

9. Hydrogeology

9.1 Principle of Groundwater Flow

- 9.1.1 Groundwater and hydrological cycle, occurrence of groundwater, forms of sub-surface water, springs
- 9.1.2 Hydro-geological properties of soil and rocks, porosity, permeability, void ratio
- 9.1.3 Types of aquifers - confined, unconfined, perched and leaky aquifers
- 9.1.4 Groundwater movement, laminar and turbulent flow, Darcy's Law, hydraulic conductivity, estimation of well yields, depth to water level, cone of depression

9.2 Pumping Test and Water Pumps

- 9.2.1 Objective and types of pumping tests
- 9.2.2 Well interference and well efficiency
- 9.2.3 Water pumps and their selection

9.3 Tube Well Drilling

- 9.3.1 Basic principle of well drilling, dug well, driven wells, jet drilling, rotary drilling, reverse rotary drilling, cable-tool percussion method of drilling and their equipment's, drilling bits, drilling fluid
- 9.3.2 Well development, installation and commissioning

9.4 Ground water exploration

- 9.4.1 Geological and hydro geological, exploratory drillings, piezometers, Monitoring of depth to water level,
- 9.4.2 Geophysical survey (electrical resistivity survey), geophysical well logging (self potential logging, resistivity logging, gamma-ray logging, etc.)
- 9.4.3 Ground water quality and its data presentation
- 9.4.4 Ground water resources of Nepal

10. Relevant Laws

- 10.1 खानी तथा खनिज पदार्थ ऐन, २०४२ र खानी तथा खनिज पदार्थ नियमावली, २०५६
- 10.2 जलस्रोत ऐन, २०४९ र जलस्रोत नियमावली, २०५०
- 10.3 जलस्रोत, वातावरण र प्राकृतिक स्रोत सम्बन्धी नेपालको संविधानमा भएका प्रावधानहरु
- 10.4 चालु आवधिक योजनामा खनिज तथा जलस्रोत सम्बन्धी व्यवस्था

द्वितीय पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरु सोधिनेछ ।

द्वितीय पत्र (विषयगत)					
पत्र	विषय	खण्ड	अङ्क भार	छोटो उत्तर	लामो उत्तर
द्वितीय	सेवा सम्बन्धित कार्य-ज्ञान (Job Based-Knowledge)	(A)	५०	६ प्रश्न X ५ अङ्क = ३०	२ प्रश्न X १० अङ्क = २०
		(B)	५०	६ प्रश्न X ५ अङ्क = ३०	२ प्रश्न X १० अङ्क = २०