लोक सेवा आयोग

नेपाल इञ्जिनियरिङ्ग सेवा, जियोलोजी समूह अन्तर्गतका जनरल जियोलोजी, हाड्रोजियोलोजी र इन्जिनियरिङ्ग जियोलोजी उपसमूह, राजपत्र अनंकित प्रथम श्रेणीका पदहरुको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रुपरेखा:– यस पाठ्यक्रमको आधारमा निम्नानुसार चरणमा परीक्षा लिइने छ :

प्रथम चरण :–	लिखित परीक्षा	पूर्णाङ्क :– १००
द्वितीय चरण :–	अन्तर्वार्ता	पूर्णाङ्क :– २०

प्रथम चरण – लिखित परीक्षा योजना (Examination Scheme)

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या X अङ्कभार	समय
सेवा सम्बन्धी	१००	४०	वस्तुगत बहुवैकल्पिक (Multiple Choice)	५० प्रश्न X २ अङ्क = १००	४५ मिनेट

द्वितीय चरण

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	२०	मौखिक

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।

२. लिखित परीक्षामा यथासम्भव निम्नानुसार प्रश्नहरु सोधिनेछ ।

पाठ्यक्रमका एकाइ	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
प्रश्न संख्या	5	5	5	5	5	5	5	5	5	5

३. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।

४. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

५. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।

६. पाठ्यक्रम लागू मिति :- २०७४/१०/१७

लोक सेवा आयोग

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पाठ्यक्रम

पत्र/ विषय :– सेवा सम्वन्धी

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, conglormerates, 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

6. **Igneous and Metamorphic Petrology**

6.1 Igneous Petrology

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
   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 equipments, 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 निजामती सेवा ऐन, २०४९ तथा नियमावली, २०५० मा कर्मचारीको आचरण, विदा र सजाय सम्बन्धी व्यवस्था
- 10.5 चालु आवधिक योजनामा खनिज तथा जलस्रोत सम्बन्धी व्यवस्था