

## Section A- 20 Marks

- 1. MINERAL RESOURCES AND THEIR PROCESSING 10%**
- 1.1 Mineral resources of Nepal: Metallic, nonmetallic, industrial and fuel minerals; construction materials, block stone, dimension stones and decorative stones
  - 1.2 Use of physical, optical and other specific properties in mineral identifications.
  - 1.3 Determination of minerals by chemical compositions
  - 1.4 Physical properties of minerals, applied in mineral processing
  - 1.5 Basic principles and objectives of mineral processing/ beneficiation
  - 1.6 Introductory aspects of applicability of mineral concentration techniques such as hand picking, panning, jigging, heavy fluid separation, magnetic separation, decrepitation, agglomeration, floatation, amalgamation, cyanidation, leaching, roasting, smelting, refining and calcinations in mineral concentration/ separation
- 3. MINERAL EVALUATION, DEVELOPMENT AND PRODUCTION 10%**
- 3.1 Potential, exploration, development and production of mineral resources in Nepal Himalayas
  - 3.2 Global tectonics as guide to mineral deposits, spatial and temporal position of mineral deposits in Nepal
  - 3.3 Estimation, evaluation and assessment of mineral resources in Nepal Himalayas.
  - 3.4 Tonnage and grade of various mineral resources in Nepal and adjoining Himalayas; tonnage, cut off grade, prices and specification of commodities for mining
  - 3.5 Factors involved in the mineral economics and viability assessment of mineral deposits. Importance of tonnage versus grade in mineral development
  - 3.6 Potential, exploration and development of hydrocarbon or fuel mineral resources in Nepal in Particular and in the Himalayan region as a whole
  - 3.7 Prospectivity and exploration of trace elements and gem minerals in Nepal Himalaya and adjoining region
  - 3.8 Application of techniques and methods in open cast and underground mining in Nepal Himalaya and adjoining regions
  - 3.9 Surface exploration versus subsurface exploration and their comparative importance

## Section B- 20 Marks

- 2. GEOLOGY OF NEPAL HIMALAYAS AND ADJACENT REGION 10%**
- 2.1 Plate tectonic model versus evolution of Himalaya
  - 2.2 Plate Tectonic model versus evolution of the different sedimentary basins in Nepal Himalaya
  - 2.3 Geology and Tectonics of the adjoining regions of Nepal taking into account of the salt range, Kashmir, Uttaranchal, Himanchal, Punjab, Kumao, Sikkim, Bhutan, And Arunachal Himalaya
  - 2.4 Introductory geology of the Peninsular India with special reference to Delhi, Vindhyan and Gondwana systems
  - 2.5 Issues and basic problems in the study of the Himalayan geology and emerging aspects towards remedy

**10. STRUCTURAL GEOLOGY AND TECTONICS**

**10%**

- 10.1 Primary and secondary structures in structural geology; Importance of regional, local and microstructures in geological mapping and mineral exploration
- 10.2 Role of major and micro geological structures in localization of economic minerals
- 10.3 Pre and post mineralization structures versus control of economic minerals in the Himalayan regions
- 10.4 Characteristics of the important tectonic features in the Nepal Himalayas
- 10.5 Earthquake seismology, earthquake sources and seismicity in the Nepal Himalayas and in the adjoining regions
- 10.6 Tectonic and active faults in the Himalayan region as a whole and in the Nepal Himalayas in particular
- 10.8 Application of microstructures in the identifications of major structure. Structural mapping in Nepal and problems encountered
- 10.9 Plate tectonics and development of Structural features in the Himalaya

**Section C- 30 Marks**

**4. GEOPHYSICAL EXPLORATION**

**10%**

- 4.1 General principles of geophysical exploration and its applicability and limitations; geophysics as an indirect tool for determining hidden geological features and mineral deposits; physical properties involved in geophysical exploration and factors controlling geophysical anomalies; Application and significance of local and regional anomalies
- 4.2 Principles, application and limitation of gravity survey; identification and interpretation of anomalies, importance of correction factors in gravity survey
- 4.3 Basic principles, application, limitation of magnetic survey, identification and interpretation of anomalies, significance of correction factors in magnetic survey
- 4.4 Basic principles, application, limitation of Electrical Resistivity, Induced polarization, Self potential, Telluric and Electromagnetic methods, basic factors essential in such survey; Identification and interpretation of anomalies
- 4.5 Basic principles, application, limitation of Seismic Reflection and Refraction surveys, factors important in Seismic reflection and refraction survey

**5. GEOCHEMICAL EXPLORATION**

**10%**

- 5.1 Principles of Geochemistry, application and limitation of geochemical exploration
- 5.2 Primary and Secondary Dispersion; Clastic and Hydromorphic dispersion; Mobility of elements, Indicator and path finder elements
- 5.3 Trace element abundance in natural materials; common Geochemical Association of the trace elements in different types of mineral deposits and rocks
- 5.4 Soil survey; Drainage sediment survey, Heavy concentrate survey, Water and Vegetation survey, Background and Threshold values and Geochemical Anomalies
- 5.5 Stages of geochemical exploration
- 5.6 Analytical methods involved in geochemical exploration; Statistical analysis of geochemical data and interpretations

**6. HYDROGEOLOGY AND ENGINEERING AND ENVIRONMENTAL GEOLOGY 10%**

- 6.1 Hydrogeological properties of rocks and sediments; Factors involved in storage of ground water in rock and sediments; Indicator of ground water occurrences in the hard rock and sediment regime; Types of aquifer
- 6.2 Ground water movement, Permeability, Transmissibility; Storage and draw down from pumping tests; Well design, Development, Construction and Rehabilitation
- 6.3 Management of ground water with consideration of hydraulic budget, Water balance and artificial recharges
- 6.4 Water quality analysis and standard used in different purposes; Sources of ground water pollution and Remedial action in Nepal
- 6.5 Ground water in different geological formation; Present situation of utilization of such resources; Plan and programs for utilization and conservation of ground water in Nepal
- 6.6 Exploration techniques applied for identification of ground water in Nepal
- 6.7 Role in site selection and investigation, design, construction and maintenance of infrastructures; Utility of engineering geological maps versus its content/ useful parameters; Engineering properties of soil
- 6.8 Unified soil classification system, consolidation, compaction, settlements and plasticity index of soils; cohesive and compressive strengths and frictional angle of soil
- 6.9 Engineering properties of rocks; RMR and Q – system in rock mass classification, stereographic projection and analysis of rock slope stability
- 6.10 Specification of rocks and soils as construction materials; Exploration of construction materials borrow areas
- 6.11 Stages and types of investigations for the site selection for the purpose of constructing engineering structures (a) Dam (b) Cannel for hydropower and irrigation (c) Tunnel (d) Road and bridge and (e) Multistory buildings
- 6.12 Urban geology- importance of geology in urban development planning, Geological factors considered in urban planning
- 6.13 Geological hazards; Earthquake, Landslide, GLOF, Flood and sedimentation, Subsidence and Collapse: Environmental changes due to pollution

**Section D- 30 Marks**

**7. STRATIGRAPHY AND PALEONTOLOGY**

**10%**

- 7.1 Broader geological and stratigraphic framework of Himalayas and adjacent regions
- 7.2 Regional geology and stratigraphy of Nepal Himalayas and at the adjoining region
- 7.3 Stratigraphy and structure of the Indogangetic plain, Sub Himalaya, Lesser Himalaya, Higher Himalaya and Trans Himalaya or Tibetan Tethys zone
- 7.4 Correlation problem in geological study of Nepal Himalayas
- 7.5 Main characteristics of the major Folds and Thrust Structures of Nepal Himalayas and its stratigraphic implications
- 7.6 Techniques of collecting, preparing, describing, and identifying Plant fossils, Invertebrate and Vertebrate fossils and Micro fossils
- 7.7 Importance of Paleontological studies in Geology, Stratigraphy with reference to Nepal
- 7.8 Detail study of morphology, classification, ecology and geological history of Foraminifera and Radiolaria

लोक सेवा आयोग  
नेपाल इन्जिनियरिङ्ग सेवा, जियोलोजी समूह, जनरल जियोलोजी उपसमूहको राजपत्राङ्कित तृतीय श्रेणीको खुला र  
आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

**8. IGNEOUS AND METAMORPHIC PETROLOGY**

**10%**

- 8.1 Distribution, textural, mineralogical and geochemical characteristics of igneous rock with reference to Nepal Himalayas and in the adjoining regions
- 8.2 Distribution, textural, mineralogical and geochemical characteristics of metamorphic rocks with reference to Nepal Himalaya and adjoining regions
- 8.3 Criteria for classification and mapping of the igneous and metamorphic rocks
- 8.4 Association of economic minerals in relation to igneous rocks in the Nepal Himalaya and in the adjoining regions
- 8.5 Geological and Economic significance of metamorphic rocks and minerals with reference to Nepal Himalayas and adjoining regions
- 8.6 Overview of issues, discrepancies and problems in geological mapping of igneous and metamorphic provinces

**9. SEDIMENTOLOGY AND SEDIMENTARY PETROLOGY**

**10%**

- 9.1 Temporal and Spatial distribution of sedimentary basins; Petrographic and geochemical characteristics and origin of sedimentary basins in the Nepal Himalayas
- 9.2 Criteria for classification and mapping of the sedimentary rocks and the basins in Nepal.
- 9.3 Geological significance and economic importance of the sedimentary basins in Nepal
- 9.4 Economic minerals, rocks and mineral deposits associated with sedimentary basins
- 9.5 Over view of Geological mapping of the Sedimentary basins, issues and problems encountered
- 9.6 Oil and natural gas association with sedimentary basins

द्वितीय पत्रको एकाइहरूको प्रश्नसंख्या निम्नानुसार हुनेछ

द्वितीय पत्रका खण्ड	A		B		C			D		
द्वितीय पत्रका एकाई	1	3	2	10	4	5	6	7	8	9
प्रश्न संख्या	1	1	1	1	1	1	1	1	1	1

लोक सेवा आयोग  
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विषयगत नमूना प्रश्नहरू (Sample questions)

1. Mention the name of the five main group of rock forming minerals. Describe the chemical composition, physical characteristics and Economic importance of one of those groups. (2+2+2+4)
2. Describe the stratigraphy, geological setting and distribution of magnesite in the Nepal Himalayas. How is its significance in the country in respect of exploration, development and production? (5+5)
3. What is the objective of geochemical exploration? What are the principles adopted in such exploration method? What do you know about geochemical exploration activities conducted in Nepal for the base metal exploration? (3+3+4)
4. What are the basic information that should be addressed in the preparation of Geological Map for the purpose of mineral exploration? How do you plan to achieve that in the mountainous area of 300 sq. km in our country? (5+5)
5. Discuss the relationship between Tectonic Setting and Mineral Deposits. What kinds of mineral deposits can be expected in the different tectonic settings of Nepal Himalayas? (5+5)
6. In order to access and evaluate the resource potential of base metal deposits in Nepal, describe how would you plan and proceed the method of geochemical exploration in various stages? (10)
7. Discuss occurrences and development potential of high grade limestone deposits in Nepal. Describe briefly which is the most favorable geological setting for the occurrences of the limestone deposits in the Nepal Himalayas. (10)
8. Write short notes on the followings: (5+5)
  - a) Granites of Nepal
  - b) Main Boundary Thrust (MBT)