

**DETAILED SYLLABUS FOR THE POST OF
ASSISTANT GEOLOGIST IN MINING & GEOLOGY DEPARTMENT.
CAT.NO- 029/2024**

Module I

- Geomorphology-fundamental concepts.
- Different models of evolution of landscape.
- Geomorphic agents and processes
- Geomorphology of Kerala
- Role of Geologists in environment management.
- Wastes and its disposal.
- Different types of Pollution.
- Weathering – Type, Processes and products
- Soils and soil formation, Soil profile.

(5marks)

Module II

- Symmetry concept in crystals
- Important crystal systems in crystallography.
- Mineral, their classification and their identification in field and in hand specimen.
- Important optical properties of minerals and the identification of minerals in thin section.
- Geochemical classification of elements
- Geochemical cycle
- Applications of Thermodynamics in Geochemistry
- Principles and methods of isotope dating.
- Structures and textures of igneous, sedimentary & metamorphic rocks.
- Petrography and petrogenesis of important rocks of Kerala
- Factors of metamorphism
- Grade, Zone & Facies concept in metamorphism

(15marks)

Module III

- Classification of Mineral deposits.
- Controls of ore localization.
- Metallogenic Epochs and Provinces.
- Ore deposits associated with mafic and ultramafic complexes.
- Strata-bound and stratiform ore deposits.
- Mineral Resources of Kerala
- VMS -SEDEX deposits
- Skarn deposits
- Laterite deposits
- Clay deposits
- Placer deposits
- Banded Iron formations
- Phosphorites
- Evaporites
- Fossil fuels-Coal, Petroleum, Natural Gas
- Gas hydrates
- Polymetallic nodules
- Ferromanganese Crust
- Deep sea mining methods
- Ore dressing-fundamentals
- Ground Penetrating Radar
- Coal Bed Methane
- Various methods of geophysical exploration.
- Geochemical and geobotanical exploration.

(20 marks)

Module IV

- Principles of geological mapping and map reading.
- Rock deformation: concept of stress and strain.
- Classification of folds, joints and faults their recognition in the field. Foliation and Lination. Petro fabric analysis.
- Plate Tectonics

- Principles of stratigraphy.
- Modern stratigraphic classification.
- Stratigraphy of Kerala
- Major geological events during different periods of earth's history.
- Important Pre-Cambrian formations of South India (5marks)

Module V

- Occurrence of ground water
- Water bearing geologic formations
- Types of aquifers
- Storage Coefficient
- Groundwater movement-Darcy's Law
- Ground water flow rates
- Ground water flow directions
- Tracers
- Surface and subsurface investigation methods of ground water.
- Water laws and policies
- Saline water intrusion
- Ground water quality and the graphical representation of ground water quality data (5marks)

Content	Max. Marks
<p>Module VI .Mine Development Choice, location and size of mine entry: inclines, declines, adit, shaft; Raising and shaft sinking methods; Types of explosives and accessories, Drilling and blasting patterns; Mine Structures: Shaft insets, ore and waste bins, skip-pockets, engine chambers, ore passes, chutes, grizzlies and sumps</p>	(6)
<p>Module VII.Mine Surveying Levelling; theodolite survey; Tacheometric Surveying; Triangulation Surveying; surface and underground correlation; contorting; error adjustment; Application of laser in surveying; Electronic distance measuring (EDM) equipment; Total station; GPS, GIS and remote sensing</p>	(6)
<p>Module VIII .Rock Mechanics and ground control Physico-mechanical properties; Stresses and strain in two dimensions; Stress- Strain relations; Rock mass classifications: RQD, RMR, Q-system; Theories of rock failure: Mohr-Coulomb, Hoek-Brown; Stress around opening; In-situ stress: theories and measurement; Rock reinforcement; Design of pillars, slopes; Subsidence prediction</p>	(3)
<p>Module IX. Mining Method Surface mining: layout design, stripping ratio, drilling and blasting Pattern, loading and transportation system, continuous surface mining, highwall mining; Underground coal mining: Bord and pillar method, thin seams, thick seams, contiguous seams, Longwall and short-wall mining; Underground metalliferous mining: classification of stopping methods, open, supported and caving stopping methods, ore transportation system</p>	(6)
<p>Module X. Mining Machinery Power sources: electrical, pneumatic and hydraulic power; Drilling machine: Jack hammer, sinkers, stoppers, drill jumbos, DTH, drill bits; Loading and face machine: SDL, LHD, shovels, motor graders, scrappers, rippers; Material handling machines: haulage, conveyors system, mine locomotives, hoisting system, LPDT, dumpers; Rock cutting machine: surface miners, continuous miners, road headers, longwall shearer, bucket wheel excavator; Pumps</p>	(5)
<p>Module XI. Mine ventilation Ventilation network: Standards of ventilation; Equivalent orifice of the mine; Resistances in series and parallel; Leakages; Homotropical and Antitropical ventilation; Central and boundary ventilation; Mechanical Ventilation: Centrifugal and axial flow fans, characteristic curves, series and parallel operations; Natural Ventilation: mechanism; estimation of NVP; Ventilation Devices: Stopping, doors, air locks, air crossings and regulators, regulators and boosters; Ventilation Survey</p>	(6)
<p>Module XII .Mine environment and hazards Mine gases; Noise pollution and control, Land reclamation, EIA, Air, water and soil pollution; Heat and Humidity; Mine lighting;</p>	(3)

Underground hazards: Spontaneous Heating, fires, explosions, inundation; Rescue apparatus and practices	
Module XIII. Mineral Economics Mineral resources in India; Classification of mineral resources; Sampling methods; Reserve estimation techniques: interpolation method, geo-statistics; Cash flow analysis: break even, NPV, IRR, Mine valuation	(6)
Module XIV. Mine Planning Selection of mining method; Determination of mine size and mine life; Planning stages: micro and macro planning, Computer aided Mine planning and scheduling; feasibility report; Surface mine planning: optimum pit design, haul road design; section of mine machineries; Underground mine planning: division of underground mine into parts, levels and panels, determination of level interval, size of long wall faces, stope design	(6)
Module XV. Mine Legislation Principal provisions of Mines and Minerals (Development and Regulation) Act & Mineral Concession and Development Rules; Mines Act; Mines Rules; Coal Mines Regulation, Metalliferous Mines Regulations	(3)

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.