

# Geology

## Unit – I: Physical Geology, Remote Sensing and Structural Geology

Internal structure and composition of Earth; Origin of Earth, Weathering and Erosion; Geological action of River, Wind and Glacier and their landforms; Physiography of India; Application of geomorphology.

Theory of Isostasy, Continental drift, Plate tectonics, Mid Oceanic Ridges, Island arc.

Principles of Aerial Photography; Satellite Remote Sensing – Data products, their interpretation and application; Geographic Information System (GIS) – Principles and application.

Concept of stress, strain and rock deformation; Attitude of beds, Classification and mechanism of folds, joints, faults; Lineation and Foliation; Types of Unconformities.

## Unit – II: Mineralogy and Petrology

Crystallography: Six systems (Normal Class); Structural classification of silicates; Physical, chemical and optical characteristics of common rock forming silicate mineral groups (Garnet, Olivine, Pyroxene, Amphibole, Mica, Feldspar, Feldspathoid, and Quartz); Minerals of Carbonate, Phosphate and sulphide groups; Atomic substitution, isomorphism, polymorphism; X-Ray analysis of crystal structures.

Form, texture, structure and classification of igneous rocks; Binary (Eutectic, Solid Solution) and Ternary phase diagrams; Magmatic differentiation, assimilation;

Sedimentary structures and textures; Provenance and diagenesis. Sedimentary environment and facies. Classification of sedimentary rocks. Heavy minerals and their significance; Sedimentary basins of India.

Texture and structure of metamorphic rocks, regional and contact metamorphism of argillaceous, basic and calcareous rocks. Characteristics of different grades and facies of metamorphism. Metasomatism, granulitisation and paired metamorphic belts.

Petrography of Granites, Basalts, Dunite, Anorthosites, Gabbro, Peridotite, Quartzite, Marble, Khondalite, Charnockite, Sandstone, Conglomerate, Limestone.

## Unit – III: Economic Geology

Classification of mineral deposits, Process of formation of mineral deposits; magmatic, hydrothermal (cavity filling and replacement), oxidation and supergene enrichment, sedimentary exhalation (SEDEX) processes; mechanical and residual concentration; Metallogenic epochs and provinces.

Geophysical exploration: gravity, electrical, magnetic and seismic; Geological and Geochemical exploration; Controls of ore localization, Mineral beneficiation, Drilling and Mining. Conservation of minerals, Strategic, Critical and Essential minerals.

Mineralogy, mode of occurrence and distribution of Iron, Manganese, Aluminum, Chromite, Base metals and Gold.

Indian deposits of mica, asbestos, graphite, beach placer, gemstones, limestones, gypsum;

Coal and Petroleum deposits: Their occurrence, genesis and Indian distribution.

#### **Unit – IV:Stratigraphy and Palaeontology**

Geological Time Scale, Principles of Stratigraphy, Stratigraphic correlation, Code of Stratigraphic nomenclature;

Precambrian Stratigraphy: Dharwars, Eastern Ghats, Iron Ore Group, Sausar Group, Aravallis, Cuddapahs and Vindhyaans;

Detailed study of type area of Triassic of Spiti; Jurassic of Kutch; Cretaceous of Trichinopoly, Tertiary of Assam and Siwaliks; Gondwana Super Group; Deccan Traps; Geology of Odisha.

Study of morphology, classification and evolution of Brachiopods, Lamellibranchs, Gastropods, Cephalopods, Trilobites, Echinoids, Corals and Graptolites;

Elementary idea on Palaeobotany and Palynology, Gondwana flora and its significance;

Types of microfossils; Study of morphology and classification of foraminifers and Ostracods.

Evolution of horse and man;

#### **Unit – V:Geochemistry, Environmental Geology, Engineering Geology, Hydrogeology, and Marine Geology**

Cosmic abundance of the elements, Primary geochemical differentiation of the earth, Geochemical classification of elements, Geochemical cycle, Meteorites

Natural hazards and their mitigation measures—floods, landslides, earthquakes, tsunami, coastal erosion.

Impact assessment of anthropogenic activities: opencast mining, river valley projects; solid and radioactive waste disposal; excess withdrawal of groundwater, oil spill; concept of global warming, sea level rise.

Engineering properties of rocks and soil; geological investigation for dams, reservoirs and Tunnels.

Vertical distribution of groundwater, classification of aquifers, hydrologic cycle; Hydrological properties, Darcy's law and its application; Groundwater quality and contamination; groundwater recharge, rainwater harvesting; Groundwater provinces of India and Odisha.

Relief of Ocean floor, Marine Sediments, Marine mineral resources.

## MODEL QUESTIONS IN GEOLOGY

### Unit I

1. The discontinuity separating Mantle from the Core is known as
  - a. Mohorovicic discontinuity
  - b. Guttenberg-Wiechert discontinuity
  - c. Conard discontinuity
  - d. Repettii discontinuityAns: b
2. Which one of the following plates has travelled maximum distance
  - a. Pacific plate
  - b. African plate
  - c. Indian plate
  - d. North American plateAns: c
3. If the hanging wall has gone up relative to the foot wall, the fault is known as
  - a. Reverse fault
  - b. Normal fault
  - c. Strike slip fault
  - d. GrabenAns: a
4. The fluvial landform in which one side has steep slope relative to other is called
  - a. Hogback
  - b. Plateau
  - c. Mesa
  - d. CuestaAns: d
5. The amount of overlap in a aerial photo pair for stereoscopic view is
  - a. 20%
  - b. 40%
  - c. 60%
  - d. 80%Ans: c

### Unit II

6. The silicate structure exhibited by Olivine is
  - a. Neso silicate
  - b. Soro silicate
  - c. Cyclo silicate
  - d. Tekto silicateAns: a
7. The size range of granule is
  - a. 1/16-2mm
  - b. 2-4mm

- c. 4-16 mm
- d. 16-256mm

Ans: b

8. A rock containing pyroxene and olivine as essential minerals is named as

- a. Pyroxinite
- b. Dunite
- c. Peridotite
- d. Anorthosite

Ans: c

9. In addition to quartz, feldspar and garnet, Khondalite also contains essential mineral

- a. Silimanite
- b. Muscovite
- c. Hornblende
- d. Augite

Ans: a

10. Silica percentage of basic igneous rock is

- a. 25-35
- b. 35-45
- c. 45-55
- d. 55-65

Ans: c

### **Unit III**

11. The Gonditic Manganese deposits of Odisha is located in the district of

- a. Koraput
- b. Keonjhar
- c. Sundargarh
- d. Bolangir

Ans: c

12. In Odisha, graphite mostly occurs in association with

- a. Khondalite
- b. Basic granulite
- c. Granite Gneiss
- d. Quartzite

Ans: a

13. In Bombay High, the host rock for Petroleum occurrence is

- a. Sandstone
- b. Limestone
- c. Dolomite
- d. Siltstone

Ans: b

14. In Copper sulphide ore beneficiation, the most suitable process is

- a. Gravity separation
- b. Magnetic separation
- c. Electrostatic separation

d. Froth flotation

Ans: d

15. Seismic refraction method is applied for exploration of

- a. Petroleum
- b. Ground water
- c. Iron ores
- d. Limestone

Ans: b

#### **Unit IV**

16. Important rock types of Eastern Ghats are

- a. Limestone and Dolomite
- b. Sandstone and Shale
- c. Khondalite and Charnockite
- d. Gabbro and Norite

Ans: c

17. Which of the following is not a Time –Rock unit.

- a. Epoch
- b. Series
- c. Stage
- d. System

Ans: a

18. Age of the Baripada Bed is

- a. Mio-Pliocene
- b. Eocene
- c. Pleistocene
- d. Oligocene

Ans: a

19. Straight hinge line is exhibited by

- a. Ostrea
- b. Pecten
- c. Spirifer
- d. Atrypa

Ans: b

20. The plant fossil having no midrib is

- a. *Glossopteris indica*
- b. *Gangamopteris*
- c. *Palaeovittaria*
- d. *Glossopteris communis*

Ans: b

21. The gastropod fossil having large body whorl but short spire is

- a. Turritella
- b. Conus
- c. Voluta

d. Murex

Ans: b

**Unit V**

22. Out of the following which has the maximum porosity

- a. Sandstone
- b. Shale
- c. Clay
- d. Limestone

Ans: c

23. In the Wenner's arrangement the potential electrode separation is \_\_\_\_\_ of the current electrode separation.

- a.  $1/3$
- b.  $1/5$
- c.  $1/4$
- d.  $1/2$

Ans: a

24. The elements having affinity for sulphides are known as

- a. Siderophile elements
- b. Chalcophile elements
- c. Lithophile elements
- d. Atmosphile elements

Ans: b

25. Ocean floor having nearly horizontal surface beyond the shore is known as

- a. Continental shelf
- b. Continental slope
- c. Continental rise
- d. Abyssal plane

Ans: a

26. The forceful injection of cement and sand to strengthen the weak zone in an geological formation is known as

- a. Cementation
- b. Grouting
- c. Curing
- d. Filling

Ans: b