

Serial No.

0005593

A-IGQ-O-JHC

GEOLOGY

Paper—III

Time Allowed : Three Hours

Maximum Marks : 200

INSTRUCTIONS

Please read each of the following instructions carefully before attempting questions :

*Candidates should attempt **SIX** questions in **ALL** including Question No. 1, which is compulsory, from **Part I** and attempt **ONE** question each from **Sections A, B, C, D** and **E** of **Part II**.*

The number of marks carried by each question/part is indicated at the end of the question.

All parts and sub-parts of a question are to be attempted together in the answer book.

Attempts of a part/question shall be counted in chronological order. Unless struck off, attempt of part/question shall be counted even if attempted partly. Any page or portion of the page left blank in the answer book must be clearly struck off.

*Answers must be written only in **ENGLISH**.*

Symbols and abbreviations are as usual.

Neat sketches are to be drawn to illustrate answers, wherever required.

PART—I

1. Write short notes on the following with suitable examples and sketches wherever necessary :

5×10=50

- (a) Borehole logging methods. 5
- (b) Earthquake resistant structures. 5
- (c) Iron-Oxide-Copper-Gold (IOCG) type of deposits. 5
- (d) Airborne Magnetic Survey. 5
- (e) Prospects of Coal Bed Methane in India. 5
- (f) Mica belts of India. 5
- (g) Ore genesis of magmatic sulphide deposits. 5
- (h) Mines and Minerals Development and Regulation (MMDR) Act, 1957. 5
- (i) Application of Isopach and Isochore maps in petroleum exploration. 5
- (j) Rock Mass Rating (RMR) parameters and applications. 5

PART—II
SECTION—A

2. (a) Describe geology, mineralogy, occurrence and geographic distribution of iron ore deposits of India. 15
- (b) Give a brief account of the genesis, mode of occurrence and distribution of bauxite deposits of India. 15
3. Write short notes on each of the following : $6 \times 5 = 30$
- (a) Minerals used in glass and ceramic industries and their major deposits in India. 6
- (b) Various methods of mineral conservation. 6
- (c) Primary diamond deposits of India. 6
- (d) By-products and Co-products of mineral deposits with examples from India. 6
- (e) Types of Placer deposits with emphasis on beach placers of India. 6

SECTION—B

4. (a) What are volcanogenic massive sulphide deposits? Describe their types, tectonic setting and ore forming processes. 15

(b) Explain the process of formation of rare metal deposits in granitic pegmatites. Add a note on mineralogy of rare metal pegmatites. 15

5. Write short notes on each of the following : $6 \times 5 = 30$

(a) Ore deposits associated with Archean greenstone belt. 6

(b) Establishing Ore Mineral Paragenesis. 6

(c) Metallogenic Epochs and Metallogenic Provinces. 6

(d) Eh and pH diagrams and application in ore genesis. 6

(e) Stratiform and stratabound ore deposits with suitable examples. 6

SECTION—C

6. (a) Discuss briefly the various geophysical methods applied in exploration of mineral deposits. 15

(b) Give an account of sampling methods adopted for exploration of various types of mineral deposits. 15

7. Write short notes on the following : $6 \times 5 = 30$

(a) How do remote sensing data help in recognition of lithological and structural guides in mineral exploration ? 6

- (b) Stream sediment survey in mineral exploration. 6
- (c) A tabular copper ore body with a true dip of 40° and strike length of 200 m continued up to a depth of 150 m along the dip direction. It was intersected by an inclined bore hole with an angle of 50° drilled towards the direction of dip of the ore body. The thickness of the ore body along the bore hole is 4 m. Assuming the average grade of copper as 2.5 wt % and specific gravity of 2.8, calculate the tonnage and metal content of the ore body. 6
- (d) Application of Pathfinder and indicator elements in mineral exploration with examples of Au, Zn and Cu. 6
- (e) Significance of gossans, wall rock alterations and old workings in mineral exploration. 6

SECTION—D

8. (a) Discuss briefly the bio-geochemical coalification process. Add a note on characteristics of various types of coal. 15

- (b) Define the source and reservoir rocks of petroleum. Describe the characteristics of the source and reservoir rocks. Give examples. 15
9. Write short notes on each of the following : $6 \times 5 = 30$
- (a) Trapping mechanisms of hydrocarbon and differences between stratigraphic and structural traps. 6
- (b) Shale gas and gas hydrates. 6
- (c) Types of Kerogen. 6
- (d) Uranium mineralization in Cuddapah basin. 6
- (e) Macerals and micro-litho types. 6

SECTION—E

10. (a) Discuss the geological constraints for construction and stability of dams. Also discuss the problem associated with ground water conditions at the dam site. 15
- (b) Explain how is landslide hazard severity predicted and monitored suggesting both geological and technological remedial measures. 15

11. Write short notes on each of the following : $6 \times 5 = 30$

- (a) Discuss briefly the geological constraints in nuclear waste disposal. Suggest some suitable geological sites as repositories from India. 6
- (b) Reservoir induced seismicity with a case study from India. 6
- (c) Geological considerations for construction of a tunnel. 6
- (d) Alkali-aggregate reaction. 6
- (e) Shoreline engineering and the associated problems. 6