GEOLOGY

PAPER—III

| Time Allowed : Three Hours | Maximum Marks : 200 |

QUESTION PAPER SPECIFIC INSTRUCTIONS

**Please read each of the following instructions carefully
before attempting questions.**

There are ELEVEN questions divided under SIX Sections.

Candidate has to attempt SIX questions in all.

The ONLY question in Section A is compulsory.

Out of the remaining TEN questions, the candidate has to attempt FIVE, choosing ONE from each of the other Sections B, C, D, E and F.

The number of marks carried by a question/part is indicated against it.

Symbols, abbreviations and notations have their usual standard meanings.

Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly.

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

Wherever required, graphs/tables are to be drawn on the QCA Booklet itself.

Any page or portion of the page left blank in the QCA Booklet must be clearly struck off.

Answers must be written in ENGLISH only.

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SECTION—A

1. Write on/Answer each of the following in short with sketches, wherever necessary :

5×10=50

(a) Distribution of bauxite deposits in India

(b) Mineral resources of sea

(c) What are the applications of magnetic method of geophysical exploration?

(d) Various types of iron ore deposits, their host rocks and ore mineral assemblages

(e) What are old workings? What is the significance of old workings in mineral prospecting?

(f) Explain syngenetic and epigenetic geochemical anomalies with examples of ore deposits hosted by igneous rocks.

(g) Calculation method of calorific value from Goutal's formula

(h) Primary stratigraphic traps

(i) Importance of *in situ* stress measurements

(j) Favourable geological conditions for toppling failure

SECTION—B

Attempt *any* **one** question

2. (a) Describe in detail about the modes of occurrence, origin, distribution and reserves of minerals used in glass industries in India. 15

(b) Discuss in detail the salient features of National Mineral Policy of India. 15

3. (a) Describe the geological characteristics and distribution of iron ore deposits in India. 10

(b) Write about the distribution of some important gemstones in India. 10

(c) Describe the evolution of mineral legislation system in India. 10

Attempt *any one* question

4. *(a)* How are the seismic waves classified and what is their importance? Enumerate the general scheme of seismic prospecting operation.   15

   (b) How do you explore a diamondiferous pipe using geophysical methods?   15

5. *(a)* Explain the genesis of stratiform chromite deposit in ultramafic rock.   10

   (b) What are the different types of water that participate in ore-forming processes? How are metals from source rock dissolved in water and subsequently precipitated to form ore deposits?   10

   (c) What are the criteria for identifying primary fluid inclusions in minerals? What is the relation between degree of fill and density of fluid inclusion?   10

SECTION—D

Attempt *any one* question

6. *(a)* What are the scope and objectives of detailed exploration stage of a mineral exploration programme? Why is exploratory mining carried out?   15

   (b) Explain various methods of identifying geochemical anomalies based on the concentration of one indicator element in samples analyzed during geochemical exploration.   15

7. *(a)* Rock-ore association is an important criterion in selection of area for mineral prospecting. Explain with examples.   10

   (b) What are the criteria by which an indicator or pathfinder element is chosen for geochemical exploration programme?   10

   (c) A copper mineralized quartz vein is exposed over a strike length of 120 m. Five trenches are made across the width of the vein at uniform interval of 30 m. The width of the quartz vein in these trenches and assay value of copper in the sample of quartz vein collected from each trench are given below :

Trench No.	Width (m)	Assay Value of Copper (wt %)
1	0·6	0·5
2	0·4	0·7
3	0·3	1·3
4	0·3	1·2
5	0·2	0·8

   Calculate the average grade of copper in the quartz vein.   10

Attempt *any* **one** question

8. (a) What are the general avenues for petroleum occurrence? Write an account on the origin and classification of reservoir rocks.   15

   (b) Describe various geological and geophysical techniques of exploration of natural hydrocarbons.   15

9. (a) Write an account on geology and evolution of Krishna-Godavari basin.   10

   (b) Describe the ultimate analysis of coal and its applications.   10

   (c) What are the chief primary ore minerals of uranium? Write an account on the distribution of uranium deposits in India.   10

SECTION—F

Attempt *any* **one** question

10. (a) How will you differentiate fall, flow and slide in the field? Explain various techniques used for stabilization of jointed rock mass slope.   15

    (b) Explain the various risks associated with spent fuel disposal site selection. Describe rock engineering parameters which need to be addressed for long-term safety and stability.

    15

11. (a) Define drillability of rock. How is rock drillability index used for estimation of drill bit life?   10

    (b) Explain the importance of engineering geological risk management in tunneling. How to minimize the risk in seismically active zones?

    10

    (c) What are the different scientific approaches to select a suitable aggregate for construction work?

    10

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