

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.

Unless otherwise mentioned, symbols, abbreviations and notations have their usual standard meanings.

Neat sketches are to be drawn to illustrate answers, wherever required. They shall be drawn in the space provided for answering the question itself.

Wherever required, graphs/tables are to be drawn on the Question-cum-Answer Booklet itself.

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

Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

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

SECTION—A

(Compulsory Section)

1. Describe the following in brief with neat labelled diagrams, wherever necessary :

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| (a) Ilmenite-magnetite exsolution lamellae formation mechanism | 5 |
| (b) Physical and optical characters that differentiate pyrolusite from cryptomelane-psilomelane | 5 |
| (c) Conservation of minerals | 5 |
| (d) Status of India w.r.t. mica deposits and production | 5 |
| (e) Causes of non-significant and lateral anomalies | 5 |
| (f) Significance of black shales in metallogenesis | 5 |
| (g) Secondary migration of oil | 5 |
| (h) Main attributes of the coal of Wardha Basin | 5 |
| (i) Earth's radiation budget | 5 |
| (j) Suitable geological formations for carbon capture and storage | 5 |

SECTION—B

Attempt *any one* question

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| 2. (a) What are the main chemical reactions involved in oxidation and supergene sulphide enrichment processes? How do pH and Eh affect the stability of sulphide minerals? | 15 |
| (b) What is the role of iron in gossan? How are the various types of limonite boxworks useful? | 15 |
| 3. (a) Discuss the various forms of syngenetic and epigenetic ore bodies. | 10 |
| (b) Discuss the various types of replacement textures and their paragenetic significance. | 10 |
| (c) Describe the origin and evolution of Zawar Pb-Zn mineralization in Rajasthan. | 10 |

SECTION—C

Attempt *any one* question

4. (a) Describe the mode of occurrence and distribution of gold deposits in India. Write a note on gold mineralization in Bundelkhand Craton. 15
- (b) Which are three major limestone-producing States of India? Briefly describe the geology and mode of occurrence of these deposits. 15
5. (a) Which is the major diamond-producing geological formation in India? Describe the geological setting and depositional history of these deposits. 10
- (b) Briefly describe the mineral deposits associated with 'Singhbhum Shear Zone (SSZ)'. 10
- (c) What is 'National Mineral Policy (NMP)' ? Give its objectives and features. Discuss the impact, benefits and significance of NMP. 10

SECTION—D

Attempt *any one* question

6. (a) Give an idea about syngenetic and epigenetic types of secondary dispersion patterns. Add a note on their origin. 15
- (b) Explain, with the help of neat suitable diagram, about various forms and interpretation of secondary dispersion patterns. 15
7. (a) How are mineralogical and stratigraphic guides useful in mineral exploration? 10
- (b) What are the main differences between self-potential and induced polarization methods? Add a note on their applications in search of base metal mineralization. 10
- (c) Compare and contrast the advantages and disadvantages of diamond and churn drills. 10

SECTION—E

Attempt *any one* question

8. (a) Evaluate the geological factors which govern the type of dam to be constructed across a river. What are the unique features of Tehri Dam situated in seismic hazardous zone? 15
- (b) List the sedimentary basins of India where prospects of finding hydrocarbons are higher. Discuss such prospects for Ganga Basin. 15
9. (a) Elaborate the origin and mode of occurrence of common minerals found in coal. How do these minerals affect the grade and use of coal? 10
- (b) Discuss the geotechnical investigations required for locating the stable foundations for abutments and piers of bridges. 10
- (c) What are the different types of sediment-hosted uranium deposits? Describe the origin of 'roll front' uranium ores. 10

SECTION—F

Attempt *any one* question

10. (a) What are the types and causes of floods? How does a river morphology affect the flooding of its channel? 15
- (b) Discuss the causes and effects of global climate change. How do you place it in the Earth's geological history? 15
11. (a) Discuss the environmental impacts of mining and hydropower projects. 10
- (b) Describe the major sources of groundwater pollution. 10
- (c) What are the geochemical and geohydrological precursors of earthquake? How do you measure the intensity of an earthquake? 10

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