

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 :
 - 1.(a) Role of Sulfur isotope in ore genesis. 5
 - 1.(b) Discuss about the different regimes of volcanic-hosted massive sulfide (VMS) deposits in the light of plate tectonic settings. 5
 - 1.(c) REE in ores, its different sub-groups and status of India in world production. 5
 - 1.(d) Jhamarkotra phosphorite deposit. 5
 - 1.(e) Indicator plant – a tool for geobotanical survey. 5
 - 1.(f) What are the special considerations for shear waves in mineral exploration ? 5
 - 1.(g) Write short notes on coal maturity. 5
 - 1.(h) Write a brief note on Engineering properties of Rocks. 5
 - 1.(i) What is Ring of fire and its significance ? 5
 - 1.(j) Causes and effects of sea level rise. 5

SECTION 'B'

(Attempt any **one** question)

- 2.(a) Give a brief account on metamorphic and metamorphosed ore deposits. 15
- 2.(b) Differentiate between 'strata-bound' and 'stratified' ore deposits. Describe the features related to these two different types of deposits. 15
- 3.(a) Discuss the various ore deposits associated with different type of Granitoids. 10
- 3.(b) Discuss about the salient conditions of manganese nodule deposition in the present day oceans with their mineralogy. 10
- 3.(c) Enumerate the present day Red-sea mineralization process in the light of OMZ and redoxcline with neat sketches. 10

SECTION 'C'

(Attempt any **one** question)

- 4.(a) What are the major minerals of uranium ores ? Briefly discuss the mode of occurrence and origin of uranium ores. What is the major productive area of uranium deposit in India ? 15
- 4.(b) What are the major uses of manganese ores in the industry ? Discuss about the mode of occurrence of Mn-ores in India. Name the major oxide ores of manganese. 15

- 5.(a) Briefly describe the bauxitic ore deposits of India with respect to their mineralogy, origin and total reserves. 10
- 5.(b) Discuss about the objectives of mining laws as considered in the National Mineral Policy, 1990. What were the minerals reserved for exploration exclusively by Government of India. 10
- 5.(c) Describe the basic types of Indian iron-ore based on their origin and mineralization. 10

SECTION 'D'

(Attempt any **one** question)

- 6.(a) What are the structural guides considered for mineral exploration ? Explain various types of structural guides and how are they useful in mineral exploration. 15
- 6.(b) Enumerate the various electrical properties of rocks and their application in electrical prospecting. 15
- 7.(a) Explain the role of Earth's gravitational field and its relation to gravity method in mineral exploration. 10
- 7.(b) Discuss various types of Percussion drills. Add a note on their application and advantages. 10
- 7.(c) Define trenching. Describe different types of trenching methods of sampling in mineral exploration. 10

SECTION 'E'

(Attempt any **one** question)

- 8.(a) Discuss the Petroleferous basins of India, highlighting their tectonic framework and hydrocarbon potential. 15
- 8.(b) Evaluate the importance of Engineering geological studies for the construction of Dams, Reservoirs and Highways in diverge lithological terrains. 15
- 9.(a) Explain the significance of maceral composition in determining the coking properties of coal for industrial use. 10
- 9.(b) Discuss about the geological considerations of construction materials. 10
- 9.(c) Explain how lithotypes and microlithotypes reflects depositional environments in coal formation. 10

SECTION 'F'

(Attempt any **one** question)

- 10.(a) Discuss Stefan-Boltzmann equation and greenhouse gases in the context of planetary temperature regulation and present day climate change. 15
- 10.(b) Critically analyse the geological considerations involved in nuclear waste disposal, emphasizing site selection and long term safety. 15
- 11.(a) What are the causes and effects of coastal erosion ? Indicate the measures to mitigate the erosion. 10
- 11.(b) Discuss the causes and consequences of ocean acidification on marine ecosystems. 10
- 11.(c) Examine the role of Remote sensing and GIS in monitoring and managing the environmental degradation. 10