

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.

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

Wherever required, graphs/tables are to be drawn on the QCA 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 QCA Booklet must be clearly struck off.

Answers must be written in ENGLISH only.

## SECTION—A

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

5×10=50

- (a) Reserves and occurrence of gold deposits in India
- (b) Mineralogy and classification of chromite deposits in India
- (c) Common rock types found in skarn deposits and factors which control skarn mineralization
- (d) Induced potential methods of geophysical exploration
- (e) Reserves, probable resource and hypothetical resources for mineral commodities
- (f) Geobotanical indicators of ore deposits
- (g) Describe briefly about structural oil traps.
- (h) Stratigraphic status of Neyveli lignite deposits
- (i) Remedial measures of landslides
- (j) Compressive strength of rocks

## SECTION—B

Attempt *any one* question

- 2. (a) Describe in detail about the mineralogy, modes of occurrence, origin and distribution of nickel deposits in India. 15
- (b) Discuss in detail about UNFC's classification of mineral resources and reserves. 15
- 3. (a) Give an account of the marine mineral resources of India. 10
- (b) Describe the uses, occurrence and distribution of gypsum deposits of India. 10
- (c) Discuss in brief about strategic and critical minerals. 10

### SECTION—C

Attempt *any one* question

4. (a) Describe the association of different magma types with ore deposits and explain the role of geochemical behaviour of elements in ore deposit formation. 15
- (b) Name two mineral commodities for which gravity method of geophysical exploration may be employed. Also discuss the principle and corrections of gravity survey. 15
5. (a) Discuss the role of fluids in mineralization in magmatic systems. What controls the solubility of water in silicate melts? 10
- (b) What are kimberlites and from where these rocks are reported in India? Mention the relationship between kimberlites and formation of diamonds. 10
- (c) Describe metallogenesis through geological time. Illustrate your answer with one major ore deposit of India. 10

### SECTION—D

Attempt *any one* question

6. (a) Describe the main types of core drilling techniques. Also write how planning for a core drilling of a sub-horizontal and a steeply dipping deposit will be undertaken. 15
- (b) What do you understand by coefficient of aqueous migration? Write the factors which control the strength of a geochemical anomaly. Describe Hawkes model relating the size of mineralization with the strength of geochemical anomaly. 15
7. (a) Describe included and excluded area methods of ore reserve estimation for an irregular grid sampled deposit. 10
- (b) What are the different types of sampling errors? Describe Gy's theory for minimization of these errors. 10
- (c) Estimate ore reserves of a Zn deposit by cross-section method with the following data. Assume a dilution factor of 10%. Use the rule of influence for defining the strike length. Calculate the average grade of ore also : 10

| Section | Section area (sq. m) | Grade (percentage) | Bulk density (gm/cm <sup>3</sup> ) |
|---------|----------------------|--------------------|------------------------------------|
| A       | 1500                 | 6.7                | 2.8                                |
| B       | 1800                 | 4.3                | 2.9                                |
| C       | 2200                 | 5.1                | 2.9                                |

### SECTION—E

Attempt *any one* question

8. (a) Describe in detail the transformation of organic matter into oil and gas. What is the role of temperature in this transformation? 15
- (b) Discuss coal characterization in terms of lithotypes and macerals. Also describe the coal classification based on chemistry. 15
9. (a) What is oil shale? Briefly explain the problem of recovery of oil from oil shale. 10
- (b) Enumerate the types of environment for the formation of radioactive mineral deposits. 10
- (c) Describe the radioactive methods in petroleum exploration. 10

### SECTION—F

Attempt *any one* question

10. (a) Give an account of the geological investigations at bridge sites for the stability of a bridge. 15
- (b) Explain the various groundwater problems in connection with the construction of dams and tunnels. 15
11. (a) Give an account of the types of forces to be accounted for in the construction of dams in seismically active areas. 10
- (b) Explain the excavating cycle of a tunnel during construction in a hard rock terrain. 10
- (c) Describe the different types of coastal protection structures. 10

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