

S.No.

0000683

A-GSE-P-HMC

## GEOLOGY

### Paper III

Time Allowed : Three Hours

Maximum Marks : 200

### 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.*

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

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

*Answers must be written in ENGLISH only.*

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

*Wherever required, graphs/tables are to be drawn on the answer-book itself.*

*Any page or portion of the page left blank in the answer-book must be clearly struck off.*

## Section - A

1. Write short answer for each of the following with sketches wherever necessary.  $5 \times 10 = 50$

- (a) Favourable conditions for the formation of blanket type bauxite deposits.
- (b) Grade of iron ore from Singhbhum area.
- (c) Association of REEs and Rare metals in carbonatite.
- (d) Time-distance relation for horizontal layers in seismic refraction survey.
- (e) Methods of sampling of porphyry copper deposit.
- (f) Biogeochemical and geobotanical surveys.
- (g) Broad stratigraphic succession of Jharia coal field.
- (h) Geology and hydrocarbon reservoirs of Bombay High oil field.
- (i) Investigation of foundation rocks in a dam site using electrical resistivity method.
- (j) Overbreak in tunnelling in relation to different rock types.

## Section – B

Attempt any *one* question.

2. (a) Compare the geological set up of Khetri and Malanjkhand copper deposits. 15
- (b) With appropriate examples, write the genesis of gold deposit associated with the greenstone belts in Dharwar craton of South India. 15
3. (a) What are the major economically useful rocks belonging to 'Vindhyan Supergroup' ? 10
- (b) What are prospecting licence and mining leases for mineral investigation and exploitation ? 10
- (c) Explain the legal aspects of seabed mining with special reference to India. 10

## Section – C

Attempt any *one* question.

4. (a) How stratiform and podiform chromite deposits differ in geological age, lithological association, structure and tectonics ? 15
- (b) Describe with diagram the details of profiling and sounding methods of resistivity survey. Add a note on their applications. 12+3=15

5. (a) What do you mean by reduction of gravity data? Describe the correction to be applied to the gravity data. 2+8=10
- (b) How 'VMSD' and 'SEDEX' type deposits differ from each other? 10
- (c) How is fluid inclusion study helpful in geothermometry? 10

### Section - D

Attempt any *one* question.

6. (a) Describe the different stages in mineral exploration. 15
- (b) Describe the estimation of ore reserves in blanket type bauxite deposit using surface trenching and pitting. 15
7. (a) Write on the procedure of core logging in a drilling site. 10
- (b) Calculate ore reserve of a 5 m thick ore blocked out between two levels, separated by 30 m, and ready for immediate extraction. The length of the ore block is 40 m and the bulk density of the ore is 2.73 gm/cc. Assuming 0.63% average grade of copper, how much copper metal can be obtained from the block with 90% recovery? 5+5
- (c) How geochemical soil survey is carried out? 10

### Section – E

Attempt any *one* question.

8. (a) Describe the processes of migration and accumulation of hydrocarbon. 15
- (b) Describe the major Tertiary coal deposits of India. 15
9. (a) Write on the occurrence and distribution of major radioactive mineral deposits (U – Th) of India. 10
- (b) Describe the proximate analysis of coal and its industrial application. 10
- (c) Give an account of the geology and hydrocarbon occurrence in any one of the major producing oil fields of upper Assam shelf. 10

### Section – F

Attempt any *one* question.

10. (a) Give an account of the field procedures for the estimation of compressive and shear strengths of rocks used for stable foundation. 15
- (b) What is grouting? Describe the typical grouting applications in tunnelling. 15

11. (a) Discuss the seismic vulnerability of the India sub-continent and propose the features of an earthquake resistant dam in a high risk seismic zone. 10
- (b) Explain the various factors that influence the life of a reservoir. 10
- (c) Describe the different types of tunnel supports and their usefulness in different rock types while tunnelling. 10
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