

Serial No.

6410

A-GSE-P-HMB

GEOLOGY

Paper—II

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 & 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

(Compulsory Section)

5×10=50

1. Write short notes on each of the following:
 - (a) Application of Powder X-ray diffraction method in the study of silicates.
 - (b) Lanthanite contraction in REEs.
 - (c) Eutectic crystallization and related textural features.
 - (d) Tectono-magmatic setting for carbonatites.
 - (e) Distinguish between ACF and AKF diagrams.
 - (f) Explain paired metamorphic belts.
 - (g) Significance of cross bedding and current beddings.
 - (h) Distinguish between Arkose and Greywacke.
 - (i) Significance of 'PM₁₀' and its impact on respiratory system.
 - (j) Seismic zonation map of India.

SECTION—B

(Mineralogy, Geochemistry and Isotope Geology)

(Attempt any ONE question)

2. (a) Discuss the structure, composition, physical and optical properties of garnet. 15
- (b) Derive an equation used in the radiometric Rb-Sr age determination of rocks. Comment upon Concordia and Discordia. 15
3. (a) Discuss symmetry elements of the normal class of Monoclinic System. Add a note on the crystallographic notation. 10
- (b) What do you understand by coordination number? Discuss various types of silicate structures based on coordination number. 10
- (c) Discuss the geochemical classification of trace elements. Give an account of the role of L.I.L. (Large Ion Lithophiles) in magmatic crystallization. 10

SECTION—C

(Igneous Petrology)

(Attempt any ONE question)

4. (a) Discuss crystallization of a ternary magma, citing an example of Feldspar. 15
- (b) What do you understand by modal and norm? Discuss IUGS classification of basic and ultrabasic rocks. Add a note on TAS diagram. 15
5. (a) Discuss incongruent melting citing an example of Forsterite-Silica system. Give an account on reaction rim / corona structure. 10
- (b) Discuss about open and closed systems of magmatic crystallization. Add a note on the layered igneous complexes. 10
- (c) Discuss the age, duration and nature of Deccan Volcanism in India. Add a detailed note on the 'aa' and 'pahoehoe' type lava flows. 10

SECTION—D

(Metamorphic Petrology and Processes)

(Attempt any ONE question)

6. (a) What do you understand by porphyroblasts? Explain their significance in metamorphic terrains, citing an example of garnet in the mica schist. 15
- (b) Describe the characteristics and mineral assemblages of Green Schist Facies of metamorphism. Add a note on the mutual relationship between sub-facies and conditions of metamorphism. 15
7. (a) Give a brief account of Blue Schist and Eclogite Facies of metamorphism and their relationships to plate tectonics. 10
- (b) What is the principle of Garnet-Biotite Thermometry? Discuss its limitations and applications to metamorphic rocks. 10
- (c) Write a critique on "Facies concept of Metamorphism". 10

SECTION—E

(Sedimentology)

(Attempt any ONE question)

8. (a) What are the heavy minerals ? Discuss the application of heavy minerals in the determination of provenance. 15
- (b) How would you distinguish between Arkose and Greywacke? Discuss their depositional environments. 15
9. (a) Discuss the physicochemical factors, which play an important role in the sedimentation. What are the products of sedimentation? 10
- (b) Discuss in detail about the formation of clay minerals. Give your remarks on their environment of formation. 10
- (c) Describe the concept of sedimentary environment and add a note on the parameters. 10

SECTION—F

(Environmental Geology and Natural Hazards)

(Attempt any ONE question)

10. (a) What is coastal erosion? Discuss the causes and mitigation of coastal erosion and add a note on such incidences with reference to Indian context. 15
- (b) Discuss the causes and impacts of an earthquake. Give an account of the precautionary measures to be taken against earthquake hazards. 15
11. (a) How are the satellite imageries useful in environmental planning? Give an account of the factors controlling landslides. 10
- (b) What do you understand by global warming and climate change? Discuss the effects of CO₂ on green-house effect. 10
- (c) What is Cryosphere? Discuss the effects of Ozone depletion on ice sheets and sea level fluctuations. 10

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