

1006527

A-GSE-P-HMA

## GEOLOGY

### Paper I

*Time Allowed : Three Hours*

*Maximum Marks : 200*

#### INSTRUCTIONS

***Please read each of the following instructions carefully before attempting the 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.*

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

*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.*

## SECTION A

(Compulsory Section)

1. Describe the following in about 100 words each, with brief sketches, wherever necessary : 10×5=50
- (a) Levees and their role in flood control 5
  - (b) Differences between unsupervised and supervised classification 5
  - (c) Mechanism of parasitic folds 5
  - (d) Conditions leading to progressive deformation 5
  - (e) Concept of geodesy and crustal movement 5
  - (f) Gravity anomaly of mid-oceanic ridges 5
  - (g) Sargur Schist Belt 5
  - (h) Concurrent Range Zone 5
  - (i) Rajahmundry Formation 5
  - (j) Derived fossils 5

## SECTION B

*(Attempt any ONE question)*

2. (a) Compare the morphology of the landforms produced by glaciers and rivers. 15
- (b) Explain the term "Spectral reflectance" and describe its significance. Also, give a detailed account of the spectra of various rocks, vegetation, soil and water. 15
3. (a) Explain Davis cycle of erosion and landscape development. 10
- (b) Explain the causes and effects of variation of scale in aerial photographs. 10
- (c) Give an account of the types of lineaments and the role of remote sensing in mapping them. 10

## SECTION C

*(Attempt any ONE question)*

4. (a) Discuss the mechanism of stress and strain in elastic and plastic deformation. 15
- (b) Discuss in detail the time relationship between crystallization and deformation of mineral grains. 15
5. (a) What are joints ? Explain the mechanism of joint formation and explain the type of joints with neat sketches and their significance. 10
- (b) Discuss the mechanism and significance of mylonite and cataclastic deformation. 10
- (c) What are the stereographic projections ? Explain the use of cyclographic stereographic projection to analyse stress and strain in rocks. 10

## SECTION D

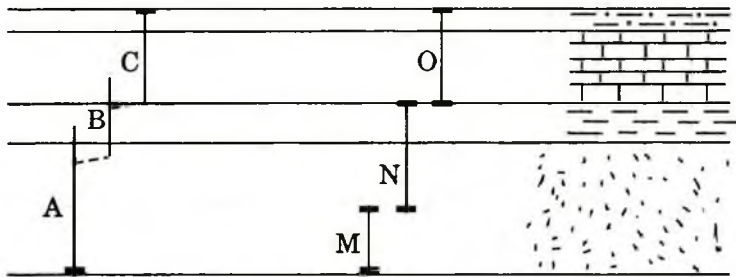
*(Attempt any ONE question)*

6. (a) Describe in detail the thickness of various layers of the Earth's interior, their composition and physical properties with neat sketches. 15
- (b) Explain the geological features and accretionary wedges of the lithosphere and asthenosphere with a neat sketch. 15
7. (a) Describe the seismic belts and seismic zones of the Indian Subcontinent. 10
- (b) Describe paleomagnetism and its application for determining paleoposition of India. 10
- (c) Discuss the theory and concept of plate tectonics with neat sketches. 10

## SECTION E

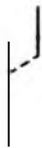
(Attempt any ONE question)

8. (a) "Late Cretaceous was a period of varied facies in the Indian Subcontinent." Discuss the statement giving examples. 15
- (b) In a stratigraphic sequence, evolutionary lineage of species A, B and C (a) and ranges of M, N and O (b) are shown. Divide the sequence into biostratigraphic zones based on both (a) and (b). Which of the zones should be preferred for correlation and why? 15



(a)

(b)



Evolutionary  
appearance



First occurrence



Last occurrence

9. (a) Give a broad classification of Siwalik Group in tabular form and mention the characteristic fossils in each division. 10
- (b) Briefly describing the lithologic succession of Bagh Beds, link the stratigraphic sequence with the episodes of marine transgression-regression. 10
- (c) Name the areas in Peninsular India affected by Permian marine transgression, briefly describing the lithology and fossil content. 10

## SECTION F

*(Attempt any ONE question)*

10. (a) Discuss, with examples, how microfossils are used as tracers of deep-sea currents. 15
- (b) Discuss the evolutionary changes that took place in facial sutures and glabella of trilobites. 15
11. (a) Describe the method of separation of foraminifera from soft shale or mudstone. 10
- (b) What is pallial sinus in a bivalve ? Discuss the habitat of bivalves having pallial sinus. 10
- (c) What is dimorphism in foraminifera ? Write the morphological difference in the foraminiferal forms which originate due to dimorphism. 10