

GEOLOGY
Paper – I

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)

- Q1. Describe the following in brief with diagrams, wherever necessary :** **5×10=50**
- (a) 'S' and 'P' wave shadow zone 5
 - (b) Rayleigh and Mie scattering 5
 - (c) Crenulation cleavage 5
 - (d) Pure shear and Simple shear 5
 - (e) Factors controlling base-level changes 5
 - (f) Gravity flows 5
 - (g) Permineralization and Petrification 5
 - (h) Causes and effects of Cretaceous/Paleogene K/Pg Mass Extinction 5
 - (i) Assemblage zone and its Indian examples 5
 - (j) Bagh formation 5

SECTION B

*Attempt any **one** question.*

- Q2.** (a) Describe spectral, radiometric, spatial and temporal resolutions in remote sensing. 15
- (b) Describe microwave remote sensing and enumerate its advantages. Add a note on distortions involved in this type of remote sensing. 15
- Q3.** (a) Describe in brief various fluvial landforms. 10
- (b) Describe the major features of the deep ocean floor and discuss the mechanism of their formation. 10
- (c) Give a brief account of major geomorphic features of Peninsular India. 10

SECTION C

Attempt any **one** question.

- Q4.** (a) Define dip isogon and describe the fold classification based on dip isogons, with suitable figures. In a multilayered rock system, which isogonal fold class will competent and incompetent layers display, respectively? 15
- (b) Describe transpression, transtension and flower structures in the context of strike-slip movements during faulting. 15
- Q5.** (a) Discuss the brittle and plastic deformation mechanisms operating at the micro-scale in rocks. 10
- (b) Draw a left lateral shear zone and mark the S-plane, the C-plane and the location of the largest strain in the shear zone. If S-planes are oriented at high angles ($> 45^\circ$) to the C-planes, what can be the chronological relation? 10
- (c) What are balanced sections? Explain how they are balanced and add a note on the conditions for balancing cross-sections. 10

SECTION D

Attempt any one question.

- Q6.** (a) Explain the various types of shallow-water carbonate platforms and discuss development of facies in response to sea-level change. 15
- (b) Define delta and explain delta sub-environments. Discuss diagnostic properties of various types of deltas. 15
- Q7.** (a) Explain types of systems tracts that develop in depositional sequence with suitable sketch. 10
- (b) Compare the facies model of meander and braided fluvial system. 10
- (c) Differentiate between wave-dominated and tide-dominated shallow marine clastic environment. 10

SECTION E

Attempt any one question.

- Q8.** (a) Illustrate with neat sketches the morphology of Graptolites and comment on its time significance in stratigraphy. 15
- (b) Discuss briefly the morphology of Dinoflagellates and add a note on their paleoecological significance. 15
- Q9.** (a) Explain briefly methods of preparation of organic-walled microfossils. 10
- (b) Give a brief account of applications of paleontological data in stratigraphy and paleoclimatology. 10
- (c) Describe briefly various evolutionary trends in Equidae. 10

SECTION F

Attempt any one question.

- Q10.** (a) What is stratigraphic correlation ? Discuss important physical and paleobiological criteria of stratigraphic correlation. 15
- (b) Give the stratigraphic succession of Gondwana sequence and discuss its classification, lithology and floral significance. 15
- Q11.** (a) Explain briefly as to how the principles of stratigraphy help in building stratigraphic record. 10
- (b) Discuss stratigraphy and tectonic evolution of Singhbhum Craton. Explain why only certain parts of Singhbhum Craton are highly mineralized. 10
- (c) Discuss the nature and stratigraphic position of Panjal Traps and associated volcano-sedimentary rocks. 10