

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)

1. Describe the following in brief with illustrations wherever necessary :
- 1.(a) Seismic waves 5
- 1.(b) Glacial moraines 5
- 1.(c) Atmospheric scattering of Electromagnetic Radiation 5
- 1.(d) Paracrystalline deformation 5
- 1.(e) Wave-Ravinement Surface 5
- 1.(f) Upper flow-regime bedforms 5
- 1.(g) Bhuj Formation 5
- 1.(h) Singhbhum Shear Zone 5
- 1.(i) Allopatric speciation 5
- 1.(j) Sexual dimorphism 5

SECTION 'B'

(Attempt any **one** question)

- 2.(a) Describe with neat sketches the importance of Visible and Near-Infrared, Shortwave-Infrared and Thermal-Infrared spectral signatures of Electromagnetic Radiation in recognising different rock-forming minerals. 15
- 2.(b) Describe the major processes of glacial erosion and the characteristic landforms created by glacial erosion. 15
- 3.(a) What is 'central eruption' ? What are the major types and characteristics of 'central eruption' ? 10
- 3.(b) Describe the digital image classification. 10
- 3.(c) Describe briefly the 'SPOT' programme. 10

SECTION 'C'

(Attempt any **one** question)

- 4.(a) Illustrate with neat sketches the types of fold interference patterns during superposed deformation of a folded strata adding a note on the development of such interference patterns. 15
- 4.(b) How can shape of strain ellipsoids be visualised by plotting the axial ratios as coordinate axes. 15

- 5.(a) Illustrate with the help of neat sketches differences between strike fault, strike slip fault and transform fault. 10
- 5.(b) Illustrate with neat sketches the important structures to determine shear sense in a ductile shear zone. 10
- 5.(c) Describe the Geometry of boudinage structures and define different types of boudinage structures. Briefly comment on the Geometrical relations of the boudinage structures with folds. 10

SECTION 'D'

(Attempt any **one** question)

- 6.(a) What are the different types of sediment-gravity flows ? How are deposits of such types of flows recognized in the rock record ? 15
- 6.(b) Why dolomite precipitation from normal seawater is very rare ? What are the special conditions commonly invoked for dolomitization ? 15
- 7.(a) Describe the application of grain-size statistical analyses in understanding depositional process and depositional environment of siliciclastic sediments. 10
- 7.(b) What are the major types of matrix-free sandstones ? How composition of such sandstones can be used to decipher the provenance, weathering condition at source and depositional setting ? 10
- 7.(c) Describe with neat sketches different subenvironments of a siliciclastic submarine fan. Comment on the generalized facies sequence that is likely to develop during relative sea-level fall in a siliciclastic submarine fan. 10

SECTION 'E'

(Attempt any **one** question)

- 8.(a) Explain the shell morphology of Graptolites with suitable sketches. Add a note on their significance in geological studies. 15
- 8.(b) Write the standard rock sample preparation methods for palynological analysis. How does study of spores and pollens play important role in paleoclimatic and paleobiogeographic reconstruction ? 15
- 9.(a) Enlist the suitable conditions required for the growth of corals. Discuss the types of coral reefs in brief. 10
- 9.(b) Describe important stages in the evolutionary trends in Equidae with suitable illustrations. Why Equidae evolution is considered as remarkably complete ? 10
- 9.(c) Discuss the composition of Gondwana flora and their implications in understanding paleoclimatic conditions. 10

SECTION 'F'

(Attempt any **one** question)

- 10.(a) Describe the Archean geological history of the Dharwar Craton with reference to stratigraphic development and geochronology. 15
- 10.(b) Describe the stratigraphic development recorded in the paleoproterozoics of The Aravalli Craton. 15
- 11.(a) Discuss the principles and methods of lithostratigraphic correlation. 10
- 11.(b) Explain different biostratigraphic zones with suitable illustrations. 10
- 11.(c) Give the lithostratigraphic classification of the Siwalik Group and comment on its fossil contents and depositional setting. 10