

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.

(Compulsory Section)

1. Describe the following in brief with illustrations, wherever necessary :
- (a) Differences between Specular and Lambertian reflection 5
 - (b) Various causes that were responsible for the glaciation on the Earth's surface 5
 - (c) Geometry of boudinage structure 5
 - (d) Conjugate and polyclinal folds 5
 - (e) Lowstand systems tract in sequence stratigraphy 5
 - (f) Solution structures 5
 - (g) Principles of magnetostratigraphy 5
 - (h) Stratigraphic classification of Upper Assam 5
 - (i) Conditions suitable for preservation and fossilization of soft parts of organisms 5
 - (j) Evolution of suture patterns in ammonites 5

SECTION—B

Attempt *any one* question

2. (a) Describe any five different processes of chemical weathering. 15
- (b) Explain the various interactions of electromagnetic radiation coming from the Sun with the atmosphere of the Earth. Discuss its impact on remote sensing images. 15
3. (a) With the help of neat diagrams, describe any five erosional landforms created by wind. 10
- (b) Describe any five different isotopic/radiometric dating techniques used to determine the age of the Earth. 10
- (c) Explain the differences between kinetic and radiant temperature and their interrelationship. What temperature do remote sensing sensors measure, and what are the factors influencing that temperature? 10

SECTION—C

Attempt *any one* question

4. (a) Explain the Mohr's stress diagram and its relevance in interpreting stress conditions in rocks. 15
- (b) Discuss in detail the time relationship between crystallization and deformation of mineral grains. 15
5. (a) Differentiate a dome from a doubly plunging fold and a fault surface from an unconformable surface. 10
- (b) Elucidate the mechanics and causes of folding. 10
- (c) Discuss the geometrical relation of joints with folds and faults. Add a note on joint surface markings. 10

SECTION—D

Attempt *any one* question

6. (a) Describe the mechanical structures of sedimentary rocks with neat sketches. 15
- (b) Describe the classification of conglomerates and breccias. 15
7. (a) What are the deformation and apposition fabric in sediments? Elucidate the gravel, sand and till fabric. 10
- (b) Describe the rift, foreland, interior and pull-apart basins with examples and suitable sketches. 10
- (c) Explain the relationship between kurtosis and sedimentary particle size. 10

SECTION—E

Attempt *any one* question

8. (a) Describe the shell morphology of brachiopods with neat and labelled sketches. Add a note on their biostratigraphic applications during Paleozoic. 15
- (b) Describe the morphology of spores and pollens with suitable sketches and its applications in geology. 15

9. (a) Describe the evolutionary history of Proboscidea with suitable illustrations. 10
(b) Write the methodology of separation of foraminifera from the sediments. Comment on the applications of foraminifera in geological studies. 10
(c) Discuss the various hypotheses proposed to explain the causes of mass extinctions on the Earth. Enlist the major mass extinctions in geological time. 10

SECTION—F

Attempt *any one* question

10. (a) Discuss the tectonic evolution and stratigraphic classification of Singhbhum Craton. Give reasons for the localized occurrences of economic mineral deposits within Singhbhum Craton. 15
(b) Describe the Mesozoic stratigraphic classification of Narmada Valley and comment on the lithology, fossils content and depositional environment. 15
11. (a) Describe the tectonic evolution of Eastern Ghat Mobile Belt (EGMB). 10
(b) Enlist the characteristic features of Proterozoic sedimentary basins of India. Comment on the depositional environment of the Vindhyan Supergroup. 10
(c) Draw the outline and tectonic trend of the cratons on the map of India (provided in the QCA Booklet). Enlist the major economic mineral deposits from each craton. 10
