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 EIGHT questions in all, out of which FIVE are to be attempted.

Questions no. 1 and 5 are compulsory. Out of the remaining SIX questions, THREE are to be attempted selecting at least ONE question from each of the two Sections A and B.

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.

All questions carry equal marks. The number of marks carried by a question/part is indicated against it.

Neat sketches may be drawn, wherever required.

Answers must be written in ENGLISH only.
SECTION A

Q1. Answer the following within 150 words each: \[8 \times 5 = 40\]

(a) Discuss the characteristics and properties of the lithosphere and the asthenosphere.

(b) Describe the origin of Karst topography.

(c) Write briefly on the Global Positioning System (GPS).

(d) What is the significance of equal area projection in solving structural geology problems?

(e) Enumerate the strain markers in deformed rocks, with the help of neat sketches.

Q2. (a) With the help of neat diagrams, discuss different types of plate boundaries and enumerate their characteristic features.

(b) Highlight the advantages and limitations of remote sensing studies with respect to conventional geological field work.

(c) Describe the different types of breaks in stratigraphic records and their identification in the field.

Q3. (a) Briefly enumerate the principles of radiometric dating using U–Pb isotopes.

(b) Discuss how lithology controls topography.

(c) What is thrust fault? Explain the mechanism of development of thrust fault with neat sketches.

Q4. (a) Elucidate the present status of Continental Drift in light of the geological and geophysical evidences.

(b) Compare the geomorphic features along the Eastern and Western Coasts of India.

(c) What is recrystallisation of minerals? How is it related to deformation? Explain with neat sketches.
SECTION B

Q5. Answer the following within 150 words each: 8×5=40

(a) Explain in brief the manner of preservation of traces of animals. 8
(b) In the context of Dollo's Law, discuss the different patterns of evolution observed in fossils. 8
(c) Describe the depositional environments prevailing during the deposition of the Paleogene belt of Sirmur Group of Himachal Pradesh. 8
(d) Describe the different techniques used to date groundwater. 8
(e) Enumerate the methods of groundwater exploration and development. 8

Q6. (a) Describe the lithostratigraphic succession of the Siwalik Group and comment on the paleoclimatic regime that prevailed during its deposition. 15
(b) Draw neat labelled sketches to depict the evolution of toes in Equidae. 10
(c) Describe various groundwater recharge structures with the help of neat diagrams. 15

Q7. (a) With the help of neat diagrams, depict the evolutionary trends in Proboscideans. 15
(b) Discuss the tectonic evolution of the Aravalli Craton. 15
(c) Describe the various groundwater quality criteria prescribed for drinking, agriculture and industrial use. 10

Q8. (a) The Permian – Triassic boundary represents a phase of mass extinction in the Earth's history. Discuss the Permian – Triassic boundary problem in stratigraphy. 15
(b) Describe the evolutionary trends in the eyes of trilobites. Illustrate your answer with suitable sketches. 15
(c) Discuss in detail the geotechnical parameters used for selection of tunnel sites. 10