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.

*Answers must be written in **ENGLISH** only.*

Neat sketches may be drawn, wherever required.

SECTION A

Q1. Write explanatory notes within 150 words each, on the following : *8×5=40*

(a) Protoplanetary hypothesis and its relationship to the Solar Nebula *8*

(b) Geomorphic features along the eastern coast of India *8*

(c) Salient characters of Geostationary and Polar orbiting satellites *8*

(d) Classification of folds on the basis of orientation of axial plane *8*

(e) Petrofabric analysis *8*

Q2. (a) Explain the geological and palaeontological evidences of continental drift and comment on the mechanism of plate separation and collision. *15*

(b) Using case studies, explain the application of geomorphology in mineral prospecting. *15*

(c) Describe unconformities and their types, and give the various criteria to distinguish them from faults. *10*

Q3. (a) Discuss the evidences of seafloor spreading and explain with illustrative diagrams, how earthquakes and subduction processes are related to each other. *15*

(b) Describe the components and working principles of (i) Cross-track scanners, and (ii) RISAT. *15*

(c) Enumerate the tools and equipment required to undertake geological mapping. Explain the importance of geological mapping. *10*

Q4. (a) With the help of a case study, describe the methodology for using satellite imagery and GIS to identify potential zones of groundwater. *15*

(b) How are stress and strain related to each other ? Explain the stress – strain curves in terms of brittle, ductile and viscous materials. *15*

(c) Discuss the internal structure of the Earth and comment on S and P-waves shadow zones with suitable diagrams. *10*

SECTION B

Q5. Write explanatory notes within 150 words each, on the following : *8×5=40*

(a) Mineral-walled microfossils and their applications in stratigraphic correlation *8*

(b) Chronological order of volcanic events of the Indian Plate, and explanation of causes and manner of Deccan volcanism *8*

(c) Ghyben-Herzberg relationship *8*

(d) Palaeogeographic reconstruction of India during Gondwana times, using suitable diagrams *8*

(e) Causes, effects and mitigation measures of concrete cancer *8*

Q6. (a) Define Lithostratigraphy and comment on the criteria for lithostratigraphic classification and description of various rank terms. *15*

(b) Briefly describe organic-walled microfossils. Discuss their applications in petroleum exploration. *15*

(c) Describe the geological considerations for designing and constructing earthquake resistant structures. *10*

Q7. (a) Elaborate the procedure for 'Aquifer Performance Test' and estimation of hydraulic properties of aquifers. *15*

(b) Describe using diagrams, the morphology of Graptolites and comment on the significance of Graptolites in the evolution of vertebrates. *15*

(c) Discuss the stratigraphy and distribution of marine depositional episodes in the Gondwana sequence of India. *10*

Q8. (a) Discuss the geological history of Trilobites with specific description of the abundance, decline and extinction of the group through the Palaeozoic Era. *15*

(b) Give a detailed account of the field and laboratory tests carried out to determine the engineering properties of rocks. *15*

(c) Tabulate the Palaeozoic stratigraphic successions and their equivalents in Spiti, Kashmir and Kumaon basins of the Himalayas. *10*