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. (a) Explain Orogeny and Epeirogeny. *8*

(b) Illustrate Plunging and Reclined folds. *8*

(c) Explain the Karst cycle. *8*

(d) An aerial mapping camera with a focal length of 120 mm is mounted on an aircraft flying at an altitude of 4800 meters above mean terrain level. The sensor of the camera has pixel size 12 μm and dimensions 36 mm × 24 mm. Calculate the ground resolution and ground coverage area at the nadir. *8*

(e) A rounded mineral grain of radius 4 cm got deformed. The lengthening of the grain perpendicular to stress became 10 cm. Find the extension and magnitude of change in length. *8*

Q2. (a) Explain the remote sensing techniques which are useful in groundwater and mineral explorations. *15*

(b) Illustrate oceanic topographies with their characteristics. Add a critical note on which part of oceanic topography is most suitable for the development of coral reefs. *10*

(c) Describe fault structures with the help of stress ellipsoids. How can one recognize the fault in the field ? *15*

Q3. (a) What is the magnitude of an earthquake ? What are the different magnitude scales used to measure earthquakes ? How is the magnitude of the earthquake related to earthquake intensity ? *15*

(b) What is Strain ? How does the shape and size of a mineral grain within a rock change during deformation ? *10*

(c) Describe the primary and secondary landforms and discuss their interrelationship. *15*

Q4. (a) What are the different hypotheses of Isostasy ? Explain each hypothesis with the help of suitable diagrams. *15*

(b) What are joints in a rock ? With neat sketches, show how the joints are related to folds and faults within an outcrop ? *10*

(c) Describe the geomorphic set-up of the Indian peninsular plateau and add a brief note on the forces responsible for their formation. *15*

SECTION B

Q5. (a) Define lithostratigraphic units and give suitable example from India. *8*

(b) How are biological species different from paleontological species ? *8*

(c) Write the conditions suitable for the preservation of soft parts of fossils. *8*

(d) An unconfined aquifer has areal extent of 200 km^2 and specific yield of 20%. What is the average drawdown in the aquifer, if the pumped volume of water from the area through uniformly distributed wells is 30 billion litres ? *8*

(e) What is porosity ? Briefly describe the generic classification of porosity. Support your explanation with appropriate neat sketches. *8*

Q6. (a) Describe lithostratigraphic classification and depositional environments of the Gondwana Supergroup. Comment on the economic importance of the Gondwana Supergroup. *15*

(b) Critically discuss the factors which influence groundwater chemistry. Explain the major chemical constituents of groundwater. *10*

(c) Describe the morphology of Ammonoidea with the help of neat and labelled diagrams. Comment on their geological history and stratigraphic importance. *15*

Q7. (a) Discuss in brief the evolutionary trends in Proboscidea. *15*

(b) Briefly discuss the stratigraphic classification of the Bastar Craton and add a note on its economic importance. *10*

(c) What are the laboratory methods used for the determination of hydraulic conductivity ? Explain each method in detail with the help of neat and well-labelled sketches. *15*

Q8. (a) Discuss the importance of geological investigations in planning and construction of tunnels. Add a note on potential consequences if adequate geological assessment is not carried out. *15*

(b) Draw a neat and labelled diagram of dorsal view of trilobite and explain the morphology. *10*

(c) Discuss the origin of the Deccan Trap Volcanism and comment on its aftermath on climatic conditions and mass extinction. *15*