

GEOLOGY

Paper I

Time Allowed : Three Hours

Maximum Marks : 200

INSTRUCTIONS

Please read each of the following instructions carefully before attempting questions :

There are SIX questions divided under TWO sections.

Candidate has to attempt ALL the SIX questions.

ALL the parts in the ONLY question in Section A are compulsory.

In Section B, THREE parts out of FOUR are to be attempted in each of the FIVE questions.

The number of marks carried by a question/part is indicated against it.

All parts and sub-parts of a question are to be attempted together in the answer book.

Attempts of questions shall be counted in chronological 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 answer book must be clearly struck off.

Answers must be written in ENGLISH only.

Neat sketches are to be drawn to illustrate answers, wherever required.

SECTION A

1. Describe the following in not more than 100 words each, with suitable sketches, wherever necessary : $5 \times 10 = 50$
- (a) Peneplanation as a component of erosional cycle. 5
 - (b) Characteristics and applications of CARTOSAT. 5
 - (c) Stress ellipsoid for thrust development. 5
 - (d) Conditions leading to the formation of sheath-folds. 5
 - (e) Differences between Main Boundary Thrust and Great Boundary Fault. 5
 - (f) Formation and location of 'Forearc Basin'. 5
 - (g) Eparchaeon Unconformity, its significance and locations in India. 5
 - (h) Conceptualisation of Anthropocene time. 5
 - (i) Sketch the Perignathic-girdle in Cidaroids, highlighting its functions. 5
 - (j) Phenotype. 5

SECTION B

2. Answer any *three* of the following : 10×3=30
- (a) Differentiate between the agents and processes that result in “U”- and “V”-shaped valleys. 10
 - (b) Explain the role of GIS in the preparation of ‘Landslide Hazard Zonation’ maps. 10
 - (c) Using a diagram, demonstrate how mechanical weathering enhances the process of chemical weathering. 10
 - (d) Compare the LANDSAT and IRS series of satellites. 10
3. Answer any *three* of the following : 10×3=30
- (a) Using suitable sketches, discuss the mechanism of folding. 10
 - (b) What is Mohr’s stress diagram ? Discuss its relevance in interpreting stress conditions in rocks. 10
 - (c) What are shear zones ? Explain diagrammatically the transition from brittle fault to ductile shear at depth. 10
 - (d) A limestone bed is found to be horizontal along an east-west trending railway cutting. The same bed is found to dip 20° in SW direction in an adjacent quarry. Find the True dip of the limestone bed, in amount and direction, using the geometric method. 10

4. Answer any *three* of the following : 10×3=30

- (a) Briefly discuss the evolution and significance of the Narmada Rift Valley. 10
- (b) What are Ophiolites ? Discuss their origin, tectonic significance and distribution in the Indian sub-continent. 10
- (c) Differentiate between Transform- and Transcurrent-faults. Explain the formation of Pull-apart basins using a diagram. 10
- (d) What is Neotectonism ? Describe three geomorphic indicators of neotectonic activity. 10

5. Answer any *three* of the following : 10×3=30

- (a) Explain 'Carbon Dating', and its utility. 10
- (b) Discuss the significance of 'Type-locality' and 'Type-section' in stratigraphy. 10
- (c) Comment on the lithology, characteristic fauna, and age of the 'Spiti Shales'. 10
- (d) Discuss the age and duration of the 'Deccan Volcanics'. 10

3. Answer any *three* of the following :

10×3=30

- (a) Define 'Index Fossil', giving one Indian example from different eras. 10
- (b) Distinguish between '*Dicellograptus*' and '*Dicranograptus*'. 10
- (c) Discuss '*Dicroidium*', and its age significance. 10
- (d) Explain the identity of 'Megalospheric' and 'Microspheric' forms, and their genetic significance. 10
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