

2022

GEOLOGY

PAPER-I

Time Allowed — 3 Hours

Full Marks — 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and same language.

Group-A

Answer any three questions.

1. a. Describe the layered structure of Earth with descriptions of chemical properties and physical properties in terms of density, temperature and pressure. 20
b. What are the heat sources in the interior of the earth? Write short notes on each. Write a very brief account on earth's heat flow. What is geothermal gradient? Why does the geothermal gradient vary? What is negative geothermal gradient? 5+5+2+6+2=20
2. a. Define strain. Define longitudinal, volume and shear strain. Why and how the strain ellipsoid is conceived? Define 'lines of no finite strain' and 'plain strain'. What do the prolate and oblate strain ellipsoids indicate? Explain with necessary sketches and graphical representations. 2+6+4+4+4=20
b. What is a shear zone? Define, with suitable sketches, left lateral and right lateral shear. Classify mylonites with a brief description of texture of each class. Describe with sketches two different indicators of sense of shear. 1+4+9+6=20
3. a. Define and describe with neat sketches: structure of passive continental margins and continental rifts. 10x2=20
b. (i) Write the principle of radiometric age estimation of rocks. Write and explain the age equation. Why is Rb-Sr method used for determination of ages of old igneous and metamorphic rocks and also of Lunar rock samples? 8+6
(ii) What are the reasons behind the separation of (A) Archaen and Proterozoic Eons, (B) Palaeozoic and Mesozoic Eras. 6
4. a. Write a note on evolution of Equidae. Describe with neat sketch(es) the hard part morphology of cephalopoda. 10+10=20
b. Draw a vertical section of distribution of groundwater and give a geological description of it. Describe in brief two methods of groundwater recharge. 10+10=20
5. a. Describe, with labelled sketches, four different types of unconformities. 20
b. Write notes on (i) Seismic zones of India, (ii) Cretaceous-Tertiary Boundary. 20

Group B

Answer any two questions

6. a. What are systematic joints and joint systems; define with explanatory sketches. Describe the features present on a joint surface. Draw joint superpositions / intersection patterns to show younger and older joints in an area with more than one joint set. 4+10+6=20
- b. Classify schistosity/rock cleavage. Draw sketches of each class. 20
7. a. Write in detail the engineering classification of intact rocks. Describe the geological investigations carried out before construction of a tunnel. 10+10=20
- b. Write in brief the history of formation of the Himalayan Mountain Belt since break-up of India from Gondwanaland to the present. 20
8. a. Write a detailed description of natural processes of preservation of plants and animals as fossils. 20
- b. Describe the lithostratigraphic succession and tectonic setting of the Bengal basin. 20

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