GEOLOGY

220128

Time : 3 hours | *Full Marks* : 200

Instructions :

(1) Answer ***all*** *questions following the directions.*

(2) The figures in the right-hand margin indicate full marks for the questions.

1. Give short answers of the following : 2×10=20

(a) Name different layers of the interior of the earth.

(b) Give two examples of depositional landform produced by rivers.

(c) Name different earthquake waves.

(d) Differentiate between confined and unconfined aquifers.

(e) Mention the name of different types of volcanoes.

(f) Write on the stratigraphy of coal-bearing sequences in the North-East India.

(g) Name two ore minerals of iron with chemical formula.

(h) Differentiate between angular unconformity and nonconformity.

(i) Name two ore minerals of manganese.

(j) Write the first and second law of thermodynamics.

2. *(a)* Write the name of different hypotheses regarding origin of the earth. Briefly describe any one of them. 4+6=10

(b) What is plate tectonic? Who proposed the concept of plate tectonics? Describe briefly different plate boundaries. 2+2+6=10

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3. *(a)* What is fold? What are different elements of folds? Define different types of fold with neat sketches. 2+2+6=10

(b) Explain the concept of stress and strain ellipsoid. How does this concept help in understanding the nature of rock deformation? 5+5=10

4. Answer any *four* of the following questions : 5×4=20

(a) Define a crystal. Explain briefly 'interfacial angle' and 'axial ratio'.

(b) What is 'twin crystal'? Describe different types of twinning.

(c) What are the two major divisions of pyroxene group of minerals? Give the name and chemical composition of pyroxene group of minerals.

(d) Explain the terms 'isomorphism', 'polymorphism' and 'pseudomorphism' with reference to minerals.

(e) What is an optical indicatrix? Explain in brief the chief characteristics of the uniaxial and biaxial indicatrix.

5. *(a)* What is magmatic differentiation? Describe the process of magmatic differentiation. 4+6=10

(b) Write short notes on any *two* of the following : 5×2=10

(i) Role of major and trace elements in petrogenesis of igneous rocks

(ii) Oxidation-reduction potential

(iii) Geochemical cycle

6. *(a)* Describe in detail the textures and structures of metamorphic rocks. 10

(b) What is a sedimentary rock? What are the classifications of sedimentary rocks? Give a brief description of each class. 2+3+5=10

7. *(a)* What are the major principles that are used to determine the relative ages of a strata? Describe briefly the principles of correlation. 5+5=10

(b) What is 'Siwalik group'? What are the major divisions of Siwalik group? Describe the uplifting phases during the rising of Himalayas. 2+3+5=10

8. Write short notes on any *four* of the following : 5×4=20

(a) Metallogenic epoch

(b) Copper deposits of Khetri in Rajasthan

(c) Chromite deposits in Indo-Myanmar ophiolite belt

(d) Sub-sea floor hydrothermal process of ore genesis

(e) Mechanism of formation of placer deposits

(f) Lindgreen (1911) classification of ore deposits

9. *(a)* Write about the morphological features of Foraminifera. Explain the application of Foraminiferas in palaeoecological studies. 6+4=10

(b) Give a detailed account of Gondwana flora. Briefly describe their importance in the study of palaeoclimate. 6+4=10

10. Answer any *two* of the following : 10×2=20

(a) Explain the importance of geological investigation in construction of dams. Describe various geological features that may pose problems in construction of dam. 5+5=10

(b) What is a tunnel? Describe various geological problems met during the construction of tunnels both in soft rocks and hard rocks. 2+8=10

(c) Mention various methods of geophysical prospecting. Describe the specific methods of geophysical exploration used in groundwater survey. 6+4=10

(d) What are 'specific yield' and 'specific retention'? Write an explanatory note on the pumping of wells. 5+5=10

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