2021

GEOLOGY

PAPER-II

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. Answer the following: 8×5=40

   (a) With suitable examples, discuss the causes behind and effects of (i) pleochroism and (ii) birefringence in minerals.

   (b) Enumerate any two types of twinning in minerals with neat sketches and examples.

   (c) Discuss in short the different physical characteristics used for recognition of minerals.

   (d) Comment briefly on the acute bisectrix interference figure of biaxial minerals.

   (e) Explain why in any igneous rock primary forsterite and quartz can not stably coexist.

2. (a) Discuss briefly the classification of silicate structures of minerals.

   (b) Describe with a diagram the approximate limits of solid solution in the feldspar group of minerals.

   (c) Discuss briefly on the general diagnostic physical and optical properties of the Pyroxene group of minerals. 15+15+10=40

3. (a) Give a brief account on the utility of ACF and AKF diagrams.

   (b) In a P – T diagram, show the domains of various metamorphic facies and briefly explain these facies.

   (c) Explain the two important types of metamorphism and their effects. How would you relate metamorphism and tectonics? 10+15+15=40

4. (a) Give a brief account on the classification of carbonate rocks giving emphasis on their depositional condition.

   (b) Describe the different primary depositional sedimentary structures that can be used for determining palaeocurrent directions. Draw sketches to explain your answer.

   (c) Discuss the significance of grain size in the studies of sedimentary rocks. 15+15+10=40

5. (a) Draw the diagram of Mg_2SiO_4—Fe_2SiO_4—SiO_2 and write its implication in the crystallization of basic magma.

   (b) Distinguish between concordant and discordant bodies of igneous rocks. What are dykes and sills and how they are formed? Illustrate the following with block diagrams: batholith, laccolith and lopolith.

   (c) With the help of neat sketches show the indicatrix diagram for the positive and negative biaxial minerals. 15+15+10=40

Group-B

Answer *any two* questions.

6. Answer the following questions: 8×5=40

   (a) Give an account of distribution of hydrocarbon resources of India.

   (b) Give an account of coal deposits of West Bengal.

   (c) Comment briefly on the environmental impact of Open Cast Mining.

   (d) What do you understand by the terms 'Cut-off grade', 'Tonnage', 'Clarke value' and 'Enrichment Factor'?

   (e) Discuss the climatic change-record during Pleistocene from Indian geologic formations.

7. (a) What is 'Tenor' of an ore? What are 'Assay width' and 'Average width' of an ore body? State different methods of mine sampling. How does sampling help in determination of ore reserve?

   (b) With suitable examples, define indicator and pathfinder elements in geochemical prospecting.

   (c) Explain how ore concentrations are produced from run-off mine by mineral beneficiation. 15+10+15=40

8. (a) Explain the geological setting and origin of petroleum bearing Reservoir rocks in Bombay High.

   (b) Describe effects of long term application of nitrate fertilizers on ground water regime.

   (c) What are the raw materials used in cement industry? Describe briefly the geology of cement grade limestones deposits in India. 15+10+15=40