

2022

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 any four questions

a) Define mineral and crystal? Are all mineral crystals? Justify your answer. What are the relations between lengths of crystallographic axes and angles between them in different crystal systems? 5+5=10

b) Describe morphology of any four types of intrusive igneous bodies. 2.5x4=10

c) What do you mean by CIPW norm? What are the bases of CIPW norm calculation? Describe in brief the use of norm. What are the disadvantages of CIPW norm? 1+3+4+2=10

d) What is a Tsunami? Describe, with a self-explanatory sketch, how does submarine faulting create a Tsunami? How does the character of Tsunami wave changes from ocean interior to the coast. 1+5+4=10

e) Describe, in brief, the processes of petroleum accumulation at structural traps. 10

2. a) Define (i) crystal form, (ii) crystal zone and (iii) crystal class with neat labelled sketches. Define 'Normal class' of crystal system. Describe, with a sketch, the general form of the normal class of Tetragonal system. Show, in a stereographic projection (hand-drawn, unmeasured projection), plots of the faces of this form and also the symmetry elements involved. 9+1+6+4=20

b) State and explain the Pauling's rules. Use sketches wherever necessary. 20

3. a) (i) Describe a typical facies association of barrier bar sediments. Explain how the facies members of this association indicates the geomorphological set up of the basin, nature of transporting agency(ies) and changes in energy conditions during deposition. 20

b) Define roundness and sphericity of clasts and sorting of clastic sediments. How do these help in interpretation of the maturity of the sediment? Write how the mineralogy of the clasts helps to interpret the nature of provenance. 3+7+10=20

4. a) Give a detailed account of Barrovian metamorphism of pelitic rocks in the Chlorite and Biotite zones. 20
- b) What are the physical and geological conditions of rock melting and formation of magma? Describe how magma from a single source is diversified to give different types of rock. 10+10=20
5. a) Write very brief accounts of mineral/ore present in the deposit, morphology and occurrence and origin of two important types of hydrothermal deposit. 20
- b) What are the bases of grading of coking and non-coking coals? How are coals classified in Indian Standard Classification? Write a short note on mode of occurrences of diamond deposits in India. 2+10+8=20

Group-B

Answer any two questions

6. a) What are different types of landslides? Give a geological description of each in brief. Write a note on measures practised for protection of hill-slopes and mitigation of landslide related hazards. 2+8+10=20
- b) How does mining activities pollute the soil and atmosphere? Describe the processes of industrial and nuclear waste disposal? 8+12=20
7. a) Draw a neat labelled representation of the Diopside (Di)-Anorthite (An) system. Describe the crystallisation behaviour of an initial melt of Composition $\text{Di}_{20}\text{An}_{80}$. Describe the petrogenetic significance of the system. 6+6+8=20
- b) What is metasomatism? Write a note on the roles of agents of metasomatism. What are the two main types of mantle metasomatism? Give one examples of each types? 2+10+6+2=20
8. a) Write notes on description of morphology and origin of four important types of fluvial landforms. 20
- b) Compare between alluvial fan and estuarine delta in terms of sediment type, sediment sequence, sedimentary structures and energy conditions of sedimentation. 20