

GEOLOGY**Paper – II****Time Allowed : Three Hours****Maximum Marks : 200****Question Paper Specific Instructions**

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

*There are **EIGHT** questions in all, out of which **FIVE** are to be attempted.*

*Questions no. 1 and 5 are **compulsory**. Out of the remaining **SIX** questions, **THREE** are to be attempted selecting at least **ONE** question from each of the two Sections A and B.*

Attempts of questions shall be counted in sequential 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 Question-cum-Answer Booklet must be clearly struck off.

All questions carry equal marks. The number of marks carried by a question/part is indicated against it.

Neat sketches may be drawn, wherever required.

*Answers must be written in **ENGLISH** only.*

SECTION A

- Q1.** (a) What do you understand by crystal defects ? Briefly explain the types of structural defects found in crystals. 8
- (b) What are the types of compositional zoning ? Discuss the petrogenetic significance of compositional zoning in feldspar minerals. 8
- (c) Explain the phenomenon of varying relief observed in calcite mineral under the plane polarised light with the help of neat well-labelled diagram. 8
- (d) Elaborately explain the significance of Bowen's reaction principle in petrogenetic studies. 8
- (e) How are diagenesis and lithification different in the process of formation of sedimentary rocks ? 8

- Q2.** (a) Describe the crystal structure, types, mineralogy, composition, physical and optical properties of amphibole group of minerals. Add a note on the uses of amphibole minerals. 15
- (b) What is magma diversification ? Explain in detail the mechanisms involved in the diversification of magma with the help of neat well-labelled diagrams, wherever required. 15
- (c) Discuss the sedimentary basins of India with a special reference to oil and gas. 10
- Q3.** (a) Describe in detail the classification of crystal systems based on the crystallographic axes and symmetry elements. Give examples and neat well-labelled diagrams, wherever required. 15
- (b) What are pyroclastic rocks ? Describe the textures exhibited by pyroclastic rocks with the help of neat well-labelled diagrams. 15
- (c) What are sedimentary structures ? Explain the significance of these structures. 10
- Q4.** (a) Explain in detail the physical properties of minerals depending upon :
 (i) Interaction with light.
 (ii) State of aggregation. 15
- (b) Discuss the processes involved in the principal types of metamorphism. Add a note on the resulting rocks in each type. 15
- (c) Discuss the sedimentary facies and their significance. 10

SECTION B

- Q5.** (a) What is metasomatic replacement ? How does it help in the formation of mineral deposits ? 8
- (b) Explain metallogenic provinces and epochs citing examples from India. 8
- (c) What is the significance of mineral beneficiation ? Explain the beneficiation technique used for sulphide ores. 8
- (d) Explain Isomorphism and Polymorphism with suitable examples. 8
- (e) What are the environmental impacts of urbanisation ? 8
- Q6.** (a) Discuss the mineralogy, mode of occurrence and distribution of uranium deposits of India. 15
- (b) Name the various geophysical methods of prospecting. Explain the methods used in prospecting of oil and gas. 15
- (c) Discuss the causes and effects of Earthquakes. Add a note on its mitigation measures. 10
- Q7.** (a) Discuss various controls of ore localization by giving suitable examples. 15
- (b) Discuss various conventional methods of estimation of reserves of ore bodies. 15
- (c) Give an account of compositional diversity across Earth's different layers with a neat sketch. 10
- Q8.** (a) Discuss various methods used for mining deep-seated ore bodies. 15
- (b) (i) Give a brief account of India's mineral policy.
- (ii) What are critical minerals ? Name fifteen critical minerals of India. 15
- (c) Discuss the point and non-point sources of groundwater pollution. 10

