

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 **ELEVEN** questions divided under **SIX** Sections.

Candidate has to attempt **SIX** questions in all.

The **ONLY** question in Section **A** is compulsory.

Out of the remaining **TEN** questions, the candidate has to attempt **FIVE** choosing **ONE** from each of the other Sections **B, C, D, E & F**.

The number of marks carried by a question / part is indicated against it.

Symbols, abbreviations and notations have their usual standard meanings.

Attempts of questions shall be counted in sequential order.

Unless struck off, attempt of a question shall be counted even if attempted partly.

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

Neat sketches are to be drawn to illustrate answers, wherever required.

Wherever required, graphs / tables are to be drawn on the answer-book itself.

Any page or portion of the page left blank in the answer-book must be clearly struck off.

SECTION 'A'
(Compulsory Section)

1. Write notes on each of the following : 5×10=50
- 1.(a) Partition coefficient
 - 1.(b) Binary eutectic in magmatic crystallization
 - 1.(c) CIPW Norm
 - 1.(d) Metasomatism
 - 1.(e) Shock metamorphism
 - 1.(f) Stylolite
 - 1.(g) Incized Valley Fill
 - 1.(h) Soil profile
 - 1.(i) Cultural eutrophication
 - 1.(j) Acid mine drainage

SECTION 'B'
(Mineralogy, Geochemistry and Isotope Geology)
(Attempt any ONE question)

- 2.(a) Briefly describe the structure and classification of pyroxene group of minerals. 20
- 2.(b) How would you determine optic sign of a biaxial mineral ? 10
- 3.(a) How do we come to know about the origin and evolution of atmosphere from geological record ? 20
- 3.(b) Illustrate the basic principle of radiometric dating of rocks. How would you use such principle in U-Pb decay series for constructing 'concordia' curve for dating of minerals such as zircon ? 10

SECTION 'C'
(Igneous Petrology)
(Attempt any ONE question)

- 4.(a) Explain the processes involved in the evolution and differentiation of a magma. 20
- 4.(b) Illustrate with examples the significance of textures in understanding crystallisation history of igneous rocks. 10
- 5.(a) What are alkaline igneous rocks ? How do you explain their compositional variation in relation to plate tectonics ? 20
- 5.(b) How are ultramafic rocks classified as per IUGS ? 10

SECTION 'D'
(Metamorphic Petrology and Processes)
(Attempt any ONE question)

- 6.(a) Discuss the role of temperature, pressure and fluids in causing different types of metamorphism. 20
- 6.(b) What is isograd ? How is it useful in distinguishing different metamorphic terranes ? 10
- 7.(a) Describe the granulite facies metamorphism in relation to mineral assemblages, composition and P-T conditions. 20
- 7.(b) What are paired metamorphic belts ? How do you explain the development of such belts ? 10

SECTION 'E'
(Sedimentology)
(Attempt any ONE question)

- 8.(a) What are the different types of sediment-gravity flows ? How would you infer rheological conditions of such flows from their deposits in rock record ? 20
- 8.(b) Describe with neat sketches two primary sedimentary structures that are commonly useful for paleocurrent analysis. How would you use paleocurrent analysis to facilitate interpretation of depositional environment from rock record ? 10

- 9.(a) How would you explain 'shallowing upward' facies sequence of shallow-marine siliciclastic and carbonate deposits in rock record? 20
- 9.(b) How would you distinguish between sedimentary basins of continental rift and foreland tectonic settings from sandstone detrital framework composition? 10

SECTION 'F'
(Environmental Geology and Natural Hazards)
(Attempt any ONE question)

- 10.(a) Describe common biological and toxic chemical pollutants of water. Add a note on their mobility in hydrological regime. 20
- 10.(b) How do geology and topography affect the flood conditions of a river? 10
- 11.(a) Explain the role of various factors affecting slope stability. 20
- 11.(b) What measures can be taken to control 'Global Warming'? 10
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