

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) Double refraction
 - 1.(b) Tektites
 - 1.(c) Liquid immiscibility
 - 1.(d) Mantle Xenoliths
 - 1.(e) Pyroxene-Hornfels
 - 1.(f) Mylonites
 - 1.(g) Normal regression in a sedimentary environment
 - 1.(h) Climatic arkose
 - 1.(i) Urban Heat Island
 - 1.(j) Reservoir Triggered Seismicity

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

- 2.(a) Briefly describe the composition, internal structure and the characteristic optical properties of Amphibole group. 20
- 2.(b) How would you explain the phenomenon of pleochroism in some anisotropic minerals ? How would you determine the scheme of pleochroism of such minerals under the petrological microscope ? 10

- 3.(a) "Present day Earth is a differentiated planet. Yet, the geochemists use bulk Earth composition." How is the bulk Earth composition estimated? For a differentiated Earth, how is its age of formation estimated? 20
- 3.(b) How would you explain the changes in rheological behaviour of Earth's mantle with increasing depth? 10

SECTION 'C'

(Igneous Petrology)

(Attempt any ONE question)

- 4.(a) Discuss the important petrological tools that are used to understand the origin and evolution of igneous rocks. 20
- 4.(b) Briefly discuss the origin and significance of Komatiites. Give examples of their occurrence in India. 10
- 5.(a) What are continental flood basalts? Discuss briefly their salient mineralogical and chemical characteristics. 20
- 5.(b) Discuss briefly, with the help of neat diagrams, the origin and significance of exsolution textures in feldspars. 10

SECTION 'D'

(Metamorphic Petrology and Processes)

(Attempt any ONE question)

- 6.(a) Describe the concept of equilibrium in the context of textural, mineralogical and chemical changes in metamorphic rocks. 20
- 6.(b) Comment on Ultra High Pressure metamorphism. 10
- 7.(a) Describe metamorphic facies series with the help of suitable diagrams. 20
- 7.(b) Discuss the role of fluids in metamorphism with suitable examples. 10

SECTION 'E'

(Sedimentology)

(Attempt any ONE question)

- 8.(a) Illustrate with neat, labelled sketches, the primary sedimentary structures that are likely to develop from varying conditions of deposition from simultaneous transport of sandy bedload and muddy suspension load in water medium. Comment on the possible depositional environment of such structures. 20
- 8.(b) With neat, labelled sketches, show the development of characteristic facies sequence in a meandering fluvial depositional system. 10
- 9.(a) Illustrate with a neat sketch, sedimentary basins in a convergent margin oceanic setting. How would you recognize such settings from sedimentary rock records. 20
- 9.(b) Comment on the variations in parasequence stacking patterns with base level changes. 10

SECTION 'F'

(Environmental Geology and Natural Hazards)

(Attempt any ONE question)

- 10.(a) Elaborate on the geological, geophysical, geotechnical and other parameters that are considered while carrying out seismic zonation and seismic micro-zonation of a region. 20
- 10.(b) Discuss the specific requirements for pre-disposal management of waste from mines and beneficiation plants of radioactive ores. 10
- 11.(a) Describe the process of land degradation and elaborate on the causes and types of land degradation. Cite appropriate examples for each type. 20
- 11.(b) Citing examples, give an account of point and non-point sources of pollution. 10