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# UPSC CGS Exam

Geology (Paper II)

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## 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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