Civil Services (Main) Examination, 2010

# GEOLOGY
## (Paper II)

**Time Allowed : Three Hours** **Maximum Marks : 300**

**QUESTION PAPER SPECIFIC INSTRUCTIONS**

*(Please read each of the following instructions carefully before attempting questions)*

There are EIGHT questions divided in two Sections.
Candidate has to attempt FIVE questions in all.
Question Nos. 1 and 5 are compulsory and out of the remaining, any THREE are to be attempted choosing at least ONE question from each Section.
The number of marks carried by a question/part is indicated against it.
Wherever any assumptions are made for answering a question, they must be clearly indicated.
Word limit in questions, wherever specified, should be adhered to.

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## SECTION 'A'

**1.** Attempt the following in about 150 words each: **4×15=60**

**(a)** What is chemical equilibrium? With suitable example, explain the consequence of disturbance of the equilibrium state in rocks.

**(b)** Explain how on the bases of chemistry and optical properties, the various feldspars differ from one another.

**(c)(i)** How does oxygen in atmosphere differ from oxygen in rocks and minerals?

**(c)(ii)** Can ice be called a mineral?

**(c)(iii)** Can a glacier be called a rock?

**(d)** Discuss the factors that control melting temperature in igneous rocks. How magmas of different composition evolve?

**2.** Discuss with sketches: **3×20=60**

**(a)** Double refraction

**(b)** Determination of optic sign of biaxial minerals

**(c)** Symmetry elements in crystals

**3.** **(a)(i)** What is the difference between biogenous and terrigenous sediments? **5**

**(a)(ii)** Why is burial necessary to form a sedimentary rock? **5**

**(a)(iii)** Why are most beds of sedimentary rocks formed horizontally? **5**

**(a)(iv)** How are the provenances of heavy minerals in sedimentary rocks identified? **5**

**(b)** What are the effects of temperature, confining pressure and different stresses on metamorphic minerals and textures of metamorphism in rocks? What are the different sources of heat for metamorphism? **20**

**(c)** What are the differences between (i) cleavage and external crystal form and (ii) colour and streak of a mineral? **20**

**4.** **(a)** What do mud cracks tell about the environment of deposition of a sedimentary rock? How does a graded bed form? How does a sedimentary braccia differ in appearance and origin from a conglomerate? What is an “Evaporite deposit” and how does it form? **30**

*English version compiled from published transcriptions and cross-checked across sources; not a facsimile of the official UPSC question paper.*



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**(b)** What role do gases play in volcanism? What does "Pillow Structures" indicate about the environment of volcanism? What determines the viscosity of a lava? Why are extrusive rocks fine grained? **30**

## SECTION 'B'

**5.** Answer the following in about 150 words each:

**4×15=60**

**(a)** What is "Tenor" of an ore? What are "Assay Width" and "Average Width" of an ore body? State different methods of mine sampling. How does sampling help in determination of ore reserve?

**(b)** What are the different types of mineral deposits, where (i) Magnetic (ii) Self-potential (iii) Resistivity and (iv) Gravity methods of Geophysical prospecting are applied.

**(c)** Briefly explain the laws of isomorphous substitution of elements and give examples wherever necessary.

**(d)** How do earthquakes cause tsunami?

**6. (a)** Compare the lithological associations of sedimentary and magmatic iron ore deposits. Name the locations of these two types of deposits found in India. Describe the geology, mineralogy and mode of formation of any important sedimentary iron ore deposit of India. **30**

**(b)** How oil and natural gas form in nature? What geologic factors make them an economically exploitable reserve. Briefly describe the hydrocarbon occurrences in the Bombay High. **30**

**7. (a)** Distinguish between contact metamorphic and contact metasomatic ore deposits. Give Indian examples of such deposits. How does porphyry copper deposits form in nature. Add a note on Malanjkhand copper ore deposit. **30**

**(b)** Enumerate in detail hydrogeochemical and biogeochemical prospecting methods. How Pedogeochemical prospecting helps in prospecting mineral deposits? Add a note on geochemical sampling. **30**

**8. (a)** Describe in details the cosmic abundance of elements. **30**

**(b)** Why is solifluction more common in cold climates than in temperate climates? Name and explain the key factors that control Mass Wasting. What role does water play in various types of Mass Wasting? **30**



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