Indian Forest Services (Main)
Examination-2025

DJSM–B–GELY

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.

Question Nos. **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

1. *(a)* Write down the symmetry elements required for different crystallographic systems. Corresponding to each system, give suitable examples of minerals. 8

(b) For mafic igneous rocks, draw labelled sketches for corona structure and porphyritic texture. Comment briefly on their petrogenetic significance. 8

(c) What do you mean by birefringence and twinning in minerals? Give some common examples of twinning found in quartz. 8

(d) Write briefly on retrograde metamorphism. 8

(e) What are turbidites? Give the sequence of bed-forms produced by turbidity currents. 8

2. *(a)* Give a systematic account of the pyroxene group of minerals highlighting their types, crystal structure, mineralogy, composition, physical and optical characters. 15

(b) Draw a neat labelled sketch of the Diopside-Anorthite phase diagram (1 atm; dry). Trace the course of crystallization in this system for an initial liquid (P) having a composition $Di_{80}An_{20}$. For this system, deduce the degree of freedom (F) at the eutectic point. Comment on the petrogenetic significance of this system. 15

(c) Define a sedimentary facies model. Illustrate with neat sketches the sedimentary facies likely to develop in a meandering fluvial depositional environment. 10

3. *(a)* Give a detailed petrogenetic account of anorthosites. Give any two well-known examples of anorthosite occurrences of India. 15

(b) Write short notes on the following :

(i) Poikilitic texture

(ii) Intergranular texture

(iii) Pleochroism 15

(c) Which factors control the composition and texture of sandstones? Give the classification of sandstone. 10

4. *(a)* *(i)* Write down the diagnostic physical properties of the following minerals :

Sphalerite, Dolomite, Stibnite 9

(ii) Give the characteristic optical properties for the following minerals :

Garnet, Hornblende 6

(b) Give a concise account of the effects of regional metamorphism of mafic igneous rocks. 15

(c) What is provenance? Discuss the various methods/tools used in provenance interpretation. 10

SECTION—B

5. (a) What are placer mineral deposits? Discuss the mode of formation of different types of placer deposits giving suitable Indian examples. 8

(b) Briefly describe the metallogenic epochs and provinces of India. 8

(c) How is the gravity method used for prospecting iron deposits? 8

(d) Briefly explain the role of trace elements in understanding the evolution of the Earth. 8

(e) How is the excessive use of fertilizers linked with groundwater pollution? 8

6. (a) Give the mineralogy, genesis and mode of occurrence of copper ore deposits of India. 15

(b) (i) Elaborately explain any five pathfinder elements in geochemical prospecting for metallic mineral deposits giving suitable examples. 10

(ii) Give an account of the sampling procedure, applications, advantages and disadvantages of channel sampling in mining geology. 5

(c) Discuss the causes and effects of landslides. Add a note on their mitigation measures. 10

7. (a) Briefly write on the different types of chemical bondings in minerals. What are coordination numbers and polymorphism in minerals? Substantiate your answer with appropriate sketches and examples. 15

(b) Name the various crushers used in ore dressing process. Explain the Blake and Dodge crushers with neat well-labelled sketches. 10

(c) (i) Describe the different layers of the Earth's interior including their composition, physical state and relative thickness with sketches. 10

(ii) Differentiate between continental crust and oceanic crust. 5

8. *(a)* *(i)* Comment on the strategic, critical and essential minerals giving Indian examples. 5

(ii) Give an account of tertiary coal deposits of India. 5

(iii) Describe any five industrial minerals, their source, composition and uses in the industry. 5

(b) Explain the following :

(i) Environmental impacts of mining

(ii) Dragline excavator in mining

(iii) Geobotanical prospecting in mineral exploration 15

(c) What are the environmental consequences of urbanization? Discuss greenhouse gas emissions due to urbanization and its impact on climate change. 10

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