

Sl. 1

A-HFP-M-FDNB

GEOLOGY

Paper II

Time Allowed : Three Hours

Maximum Marks : 200

INSTRUCTIONS

Candidates should attempt SIX questions in all including Question No. 1, which is compulsory, from Part I and attempt ONE question each from Sections A, B, C, D and E from Part II.

The number of marks carried by each question is indicated at the end of the question.

All parts and sub-parts of a question are to be attempted together in the answer book.

Attempts of a part/question shall be counted in chronological order. Unless struck off, attempt of a part/question shall be counted even if attempted partly. Any page or portion of the page left blank in the answer book must be clearly struck off.

Answers must be written only in ENGLISH.

Symbols and abbreviations are as usual.

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

(Contd.)

PART – I

1. Write short notes on each of the following :

5×10=50

- (a) Spinifex texture
- (b) Melatopes
- (c) Rapakivi texture
- (d) Twinning in staurolite
- (e) Melanosome
- (f) Bouma sequence
- (g) Welded tuff
- (h) Exsolution
- (i) Hotspot
- (j) Diadochy principle

PART – II

Section 'A'

2. (a) Describe the physical and optical properties of Ortho-Amphibole group of minerals.
- (b) Describe the structure of Phyllosilicates with examples.
- (c) Discuss the causes of normal and oscillatory zoning in Plagioclase Feldspar. 10×3=30

3. Give precise answers to each of the following questions : $6 \times 5 = 30$

- (a) Discuss the compositional variation of Enstatite, Bronzite and Hypersthene.
- (b) Describe the crystal structure of zeolite and highlight their role as adsorbents.
- (c) Differentiate between the following pairs of minerals :
 - (i) Orthoclase and Nepheline
 - (ii) Tourmaline and Hornblende
 - (iii) Lepidolite and Muscovite
 - (iv) Kyanite and Sillimanite
- (d) Describe the physical properties of Pyrrhotite and Marcasite.
- (e) Describe the Birefringence of a Mineral.

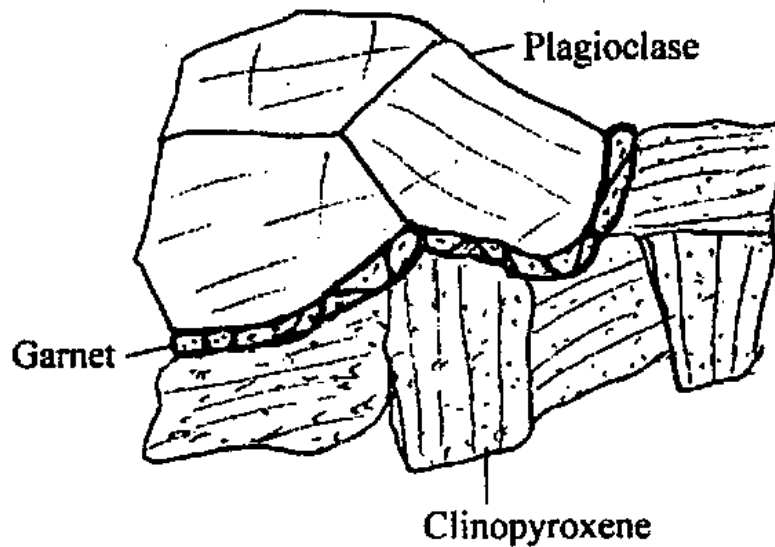
Section 'B'

4. Attempt each of the following with precise answers : $6 \times 5 = 30$

- (a) Describe syn-tectonic and post-tectonic metamorphic textures.
- (b) Write a note on nature and composition of metamorphic fluids.
- (c) Describe mineralogical changes during progressive metamorphism of impure carbonates.

(d) Describe various structural features observed in migmatites.

(e)



Identify the texture and infer the possible metamorphic reaction.

5. (a) Describe chromite bearing Archaean layered ultramafic-mafic igneous rocks in India.

(b) Explain various types of textures in plutonic igneous rocks.

(c) Describe Qtz-Ab-Or system and its use in granite petrogenesis. 10×3=30

Section 'C'

6. Write short notes on each of the following :

10×3=30

- (a) Write briefly about grain size parameters.
- (b) Write about primary structures of sedimentary rock.
- (c) Write about porosity and permeability of sedimentary rocks.

7. Write short notes on each of the following :

6×5=30

- (a) Glacial Till deposit.
- (b) Sedimentary rock formation.
- (c) Conglomerate.
- (d) Significance of Isopach Map.
- (e) Placer Minerals.

Section 'D'

8. (a) Define phase rule and its applications.

(b) Discuss the use of Harker's variation diagram in igneous rocks.

(c) Describe U-pb zircon dating techniques and its applications.

10×3=30

9. (a) Describe the role of REE in igneous petrogenesis.
- (b) Give an account on classification of meteorites.
- (c) What is thermodynamic equilibrium in mineralogy?
- (d) Discuss the importance of carbon isotopes in geological studies.
- (e) Explain biogeochemical cycle. $6 \times 5 = 30$

Section 'E'

10. (a) Describe the causes of Landslides in Himalayan region with recent examples.
- (b) What are the major objectives of National Environmental Policy?
- (c) What are the natural causes of Arsenic contamination in groundwater? $10 \times 3 = 30$
11. Give precise answers to each of the following questions : $6 \times 5 = 30$
- (a) How overburden dumps in open-cast mine can be stabilized?

- (b) Why River Kosi changes its course frequently ?
 - (c) What is the concept of 'Seismic Gap' in prediction of Earthquakes ?
 - (d) Describe the environmental implications with River Valley Projects with Examples from India.
 - (e) Discuss the causes of Gully erosion in plateau areas of Peninsular India.
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