

2021

GEOLOGY

PAPER-II

Time Allowed — 3 Hours

Full Marks — 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and same language.

Group-A

Answer any three questions.

1. Answer any four questions. All questions carry equal marks. 10×4=40
 - (a) A mineral section remains dark in all positions under crossed polars. — Explain how will you proceed to determine whether the mineral is isotropic, uniaxial or biaxial.
 - (b) Explain why all quartz grains in a rock section do not show first order yellow interference colour when viewed under crossed polars.
 - (c) What is 'pleochroism'? Explain why a section of Biotite cut parallel to cleavage does not show any pleochroism but when it is cut oblique to cleavage shows pleochroism.
 - (d) Distinguish between 'concordant' and 'discordant' bodies of igneous rocks. Illustrate the following with diagrams: (i) laccoliths and (ii) lopoliths.
 - (e) Differentiate between Transform and Transcurrent faults.
 - (f) Discuss briefly on 'Supergene sulphide enrichment'. Cite two examples to illustrate your views.
 - (g) Discuss on the basic differences in the crystal structures, physical and optical properties of pyroxene and amphibole?
2.
 - (a) What are the differences between Banded Iron Formation and Ironstone? Why are Banded Iron Formation practically devoid of detrital component? 20
 - (b) Discuss Bowen's Reaction Series. What is its significance in the process of crystallization of magma? 20
3.
 - (a) With the help of neat sketches, bring out the difference between porphyritic and poikilitic type of textures in igneous rocks. 10
 - (b) Describe with neat sketches how would you determine the pleochroic scheme of a biaxial mineral. 20

Please Turn Over

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(c) A uniaxial mineral has the following refractive indices (r.i):

$$\omega = 1.540$$

$$\xi = 1.638$$

Determine its birefringence and its optic sign. Give reasons to your answers. 10

4. (a) Explain the classification of Sedimentary rocks giving examples. What do we understand by 'structures' of sedimentary rocks? How these are related to environment of formation of sedimentary rocks? Give examples. 20
- (b) Briefly describe how ore concentrates are produced from run-off mine by mineral beneficiation. 20
5. (a) Explain basic differences between the terms "Metamorphic Facies", "Metamorphic Grade" and "Metamorphic Zones". 20
- (b) Comment briefly on the following: 10×2=20
- (i) Ray velocity surface and Indication of Uniaxial positive mineral
- (ii) Mohs' scale of hardness

Group-B

Answer *any two* questions.

6. (a) How oil reserves are formed and accumulated in nature? What are the different types of oil traps? Illustrate with neat diagrams. 20
- (b) What is an 'ore'? Define the terms 'cut-off grade', 'tonnage', 'clarke value' and 'enrichment factor'. Are gangue minerals always useless? 20
7. (a) What is rank of coal? Discuss the general changes that coal may undergo during its increase in rank. 20
- (b) Answer the following: 10×2=20
- (i) Write short notes on: Supergene enrichment and Placer deposits
- (ii) Briefly discuss the different ore-forming processes in sedimentary environment.
8. (a) Comment briefly on possible sources of fluoride pollution in groundwater in India. Also mention the states that are affected in India. 20
- (b) What is polymorphism? What are the different types of polymorphism? How the reconstructive polymorphism differs with displacive polymorphism? Illustrate with examples. 20