2017

GEOLOGY

[**Honours**]

PAPER – I

Full Marks : 90

Time : 4 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

GROUP – A

(*Introduction to Earth System Science*)

Part–I

Answer any **four** questions : 5×4

1. Briefly describe the different types of meteorites. 5

2. (*a*) Define earthquake focus and epicentre.

   (*b*) Write the differences between P-wave and S-wave.

   (*c*) What kind of instrument is used to measure the magnitude of an earthquake ? 2 + 2 + 1

3. The geometry of volcanic cone largely depends on the magma composition— Explain. 5

4. (*a*) What is subduction zone ?

   (*b*) Define passive and active continental margin.

   (*c*) What is hot spot ? 2 + 2 + 1

5. Write a short note on discontinuity surfaces present within the Earth's interior with proper sketch. 5

6. (*a*) What is point bar and how does it form ?

   (*b*) What is varve deposit ? 3 + 2

7. (*a*) What is Isostasy ?

(*b*) Write a short note on Isostatic anomaly. 1 + 4

8. Write a short note on law of superposition. 5

Part–II

Answer the following questions (any **one**) : 10 × 1

9. (*a*) Describe different types of erosional landforms formed by air with neat sketches.

(*b*) What is eskar ? 8 + 2

10. (*a*) What is mass wasting ?

(*b*) Classify mass wasting in a tabular form.

(*c*) What are the factors that control the rate of physical weathering ?

(*d*) Write a short note of exfoliation. 2 + 3 + 2 + 3

GROUP – B

(*Mineralogy*)

Part–I

Answer the following questions (any **four**) : 5 × 4

11. Write two diagnostic physical properties for identifying each of the following minerals : 5

Kyanite, Pyrite, Hematite, Alkalifeldspar, Garnet.

12. State the Pauling's rules for ionic co-ordination. 5

13. (*a*) Define polymorphism with example.

(*b*) Write the differences between displasive and reconstructive polymorphism. 2 + 3

14. (*a*) Define a Dome and a Sphenoid.

(*b*) What do you mean by the term 'zone' in crystallography and how can you denote a zone in crystal ? 2 + 3

15. (*a*) What is order-disorder solid solution ? Give example.

(*b*) What are the factors that govern the solid solution in minerals ? 2 + 3

16. (*a*) What is optical indicatrix ?

(*b*) Define 2V angle.

(*c*) Write the differentiate between isotropic and anisotropic minerals. 2+1+2

17. (*a*) Differentiate between the minerals in each of the pairs by their optical properties :

(*i*) Biotite and Muscovite

(*ii*) Hornblende and Hypersthene

(*iii*) Microcline and plagioclase feldspar.

(*b*) What is refractive index of a mineral ? 3 + 2

18. (*a*) What are unit cell and space lattice ?

(*b*) What do you understand by 2, 2/m, $\bar{2}$?

(*c*) How do you name the following :

(111), [100], 222 and {111} ? 2+1+2

Part–II

Answer the following questions (any **two**) : 10 × 2

19. (*a*) Draw the pyroxene quadrilateral to show its compositional variation.

(*b*) Describe the amphibole structure with proper diagram and its structural formula. 5 + 5

20. (*a*) Classify crystal system on the basis of the relation among their crystallographic axes and angles between them.

(*b*) Discuss briefly the stability relations of various Al_2SiO_5 polymorphic forms. 5 + 5

21. (*a*) Classify silicates on the basis of their atomic structure with at least two examples from each class.

(*b*) Write a short note on pseudomorphism. 5 + 5

22. (*a*) Write short notes on birefringence and interference colour of a mineral.

(*b*) Give a brief account of optical indicatrix of a uniaxial mineral.

(*c*) Define plane polarised light. 4 + 4 + 2

GROUP – C

(Elements of Structural Geology)

Part–I

Answer the following questions (any **two**) : 5×2

23. (*a*) Define the following structural terms :

Strike, True dip, Apparent dip, Rake.

(*b*) What is the difference between equal angle and equal area stereonet ? 4 + 1

24. (*a*) Write two difference between primary and secondary foliation.

(*b*) Write a short note on cleavage refraction. 2 + 3

25. (*a*) What is box fold and how does it differ from Chevron fold ? Give suitable diagram.

(*b*) According to Fluty's classification classify the fold on the basis of dip of axial plane. 2 + 3

26. Write short notes on the following (any *two*) : 5

(*i*) Boudinage

(*ii*) Nonconformity

(*iii*) Schistosity

(*iv*) Intersection lineation.

Part–II

Answer the following questions (any **one**) : 10×1

27. (*a*) Classify folds on the basis of dip isogon and orthogonal thickness with proper diagram.

(*b*) Name the types of lineations formed at extensional and compressional regime of a fold.

(*c*) Write the importance of axial planer cleavage in a folded region. $6 + 2 + 2$

28. (*a*) Provide the evidences to demarked the presence of unconformity surface.

(*b*) What is the difference between mullian and rodding ?

(*c*) Describe briefly how does the asymmetric minor folds are helpful to determine the identification of a major fold.

(*d*) Define interlimb angle of a fold with neat sketch. 3+2+3+2