

2017

**GEOLOGY**

[ **Honours** ]

**PAPER – II**

*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**

*( Principles of Petrology )*

**Part – I**

**Answer any four of the following questions : 5 × 4**

1. (a) Explain how do you identify texture of igneous rock ? 2

*( Turn Over )*

- (b) Describe how does the different factors control the grain size of igneous rock. 3
2. Difference between the following (any two):  $2\frac{1}{2} + 2\frac{1}{2}$
- (i) Diorite and Gabbro
  - (ii) Norm and Mode
  - (iii) Solid-solid net transfer reaction and ion-exchange reaction.
3. Write the forms structure that is most characteristic for the following rocks : 5
- (i) Granodiorite
  - (ii) Spillite
  - (iii) Granite
  - (iv) Lamprophyre
  - (v) Kimberlite.
4. Write brief notes on (any two) :  $2\frac{1}{2} + 2\frac{1}{2}$
- (i) Phonolite
  - (ii) Hornfels
  - (iii) Decussate texture.

5. (a) What is the difference between porphyroblast, poikiloblast and porphyroclast? 3
- (b) What is an isograd and how are isograds used? 2
6. Write the name of essential minerals of the following rocks : 5
- (i) Syenite
- (ii) Gabbro
- (iii) Lamprophyre
- (iv) Peridotite
- (v) Tonalite.
7. (a) What is Protolith? 2
- (b) State the protolith type of the following rocks : 3
- (i) Marble
- (ii) Amphibolite
- (iii) Slate.

9. (a) What is metamorphic grade? 2
- (b) Write three differences between prograde and retrograde metamorphism. 3

Part – II

Answer any two of the following questions : 10 × 2

9. (a) Describe briefly the types of changes that occur in a rock during metamorphism. 3
- (b) What is 'contact aureole'? What are the important factors that control the development of 'contact aureole'? 4
- (c) Describe the two important textures/structures developed during regional metamorphism? 3
10. (a) What volatiles are commonly present in a magma? 2
- (b) Describe the factors which control viscosity of silicate magma. 3

- (c) Explain why average composition of oceanic crust is basic ?  $2\frac{1}{2}$
- (d) Explain how do you identify a lava flow in a lava stratigraphy ?  $2\frac{1}{2}$
11. (a) What is recrystallisation ? What drives recrystallisation in metamorphic rock ? 3
- (b) Explain how do you identify chemical equilibrium in metamorphic rock ? 4
- (c) What is Geothermometry and Geobarometry ? Give suitable example to illustrate your answer. 3
12. (a) What is the difference between the continuous and discontinuous reaction series ? 2
- (b) What are the differences between rhyolitic lava and basaltic lava ? 2
- (c) Write the Hatch and Well's classification of igneous rock. 6

( 6 )

GROUP – B

( *Sedimentology* )

Part – I

Answer any four of the following questions :  $5 \times 4$

13. Discuss the common types of grain contacts found in clastic sedimentary rocks. 5

14. Difference between the following (any two) :  $2\frac{1}{2} + 2\frac{1}{2}$

(i) Grainstone and wackestone

(ii) Tillite and tilloid

(iii) Dolomite and high Mg calcite.

15. Write brief notes on (any two) :  $2\frac{1}{2} + 2\frac{1}{2}$

(i) Froude number

(ii) Textural inversion

(iii) Superior type banded iron formation.

16. Describe different modes of sediment transport. 5

17. Define roundness and sphericity of a grain. 5
18. What is maturity of sediments ? Does mineralogical maturity mean textural maturity of sediment always ? 5
19. Why are quartz, feldspar and rock fragments considered for sandstone classification ? 5
20. How do you define arkose ? What are its geological significance ? 5

Part – II

Answer any two of the following questions : 10 × 2

21. (a) Describe the classification of conglomerate as proposed by Pettijohn. 5
- (b) What is the difference between Quartz arenite and Quartz wacke ? 3
- (c) Discuss briefly the geological significance of occurrence of rounded quartz grains in sandstone ? 2

22. (a) Write a short account on Folk's classification of Limestone. 5
- (b) Describe the major changes undergone by limestone during diagenesis. 5
23. (a) Define primary sedimentary structures. What are the differences between depositional and erosional primary structures ? Discuss with examples. 2 + 6
- (b) What do you mean by penecontemporaneous deformation structure ? 2
24. What are the different methods of grain size measurement in sedimentary rocks ? Mention the merits and demerits of Udden-Wentworth and phi scale. Distinguish between skewness and kurtosis. 2 + 6 + 2

GROUP – C

( *Geological Field Study* )

25. Field Report. 10
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