

**HS/XI/Sc/G1/22**

**2022**

**GEOLOGY**

**( THEORY )**

*Full Marks : 70*

*Time : 3 hours*

*The figures in the margin indicate full marks for the questions*

*General Instructions:*

- (i) Write all the answers in the Answer Script.
- (ii) Attempt Part–A Objective Questions serially.
- (iii) Attempt all parts of a question together at one place.

( PART : A–OBJECTIVE )

( Marks : 35 )

**1.** Choose and write the correct answer (*any* 6) :  $1 \times 6 = 6$

(a) The study of the action of natural agents on the earth's surface giving rise to characteristic landforms is

- (i) Physical geology
- (ii) Seismology
- (iii) Isostasy

(b) Inorganic natural substances with well developed geometric forms are called

- (i) minerals
- (ii) crystals
- (iii) rocks

(c) The first mineral to crystallize from a basaltic magma is

- (i) Quartz
- (ii) Feldspar
- (iii) Olivine

(d) Temperature and directed pressure dominating metamorphism is called

- (i) contact metamorphism
- (ii) cataclastic metamorphism
- (iii) regional metamorphism

(e) The line of greatest curvature of a fold is called the

- (i) limb
- (ii) hinge
- (iii) fold axis

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- (f) The sum total effect of disintegration and decomposition of rocks is called
- (i) degradation
  - (ii) aggradation
  - (iii) weathering
- (g) Mafic igneous rocks contain
- (i) Olivine, pyroxene
  - (ii) biotite, quartz
  - (iii) quartz, K-feldspar
- (h) An acidic oversaturated igneous rock with more than 66% silica is
- (i) gabbro
  - (ii) dunite
  - (iii) granite
- (i) Folds with oldest rock in its core/centre are called
- (i) antiforms
  - (ii) synforms
  - (iii) anticlines

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2. State 'True' or 'False' (*any six*): 1 × 6 = 6
- (a) A seismic record is called a seismograph.
  - (b) There are 7 crystal systems.
  - (c) In normal slip faults, the hanging wall goes down relative to the footwall.
  - (d) Mineral grains too small to be discovered even under the microscope are said to be microcrystalline.
  - (e) Sillimanite is observed in very high grade metamorphic rocks.
  - (f) P-and S-waves create the destruction on the earth's surface during an earthquake.
  - (g) The hanging wall goes up relative to the footwall in reverse slip faults.
  - (h) An octahedron is made up of eight square faces.
  - (i) Earthquakes originate due to faulting in the earth's interior.
3. Fill in the blanks (*any six*) : 1 × 6 = 6
- (a) Paleocene is an example of a/an \_\_\_\_\_ of geological time scale.
  - (b) Minute solid particles in space which ultimately gave rise to the solar system are called \_\_\_\_\_.

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- (c) A qualitative expression of the scale of an earthquake is called earthquake \_\_\_\_\_.
- (d) The phenomenon of an incident light breaking up into two refracted rays is called \_\_\_\_\_.
- (e) The \_\_\_\_\_ passes through successive hinges in a stack of folded surfaces.
- (f) Country rocks taken in by invading magma is called \_\_\_\_\_.
- (g) The term 'blastic' or 'blast' is used to denote \_\_\_\_\_ rock texture.
- (h) When an oceanic plate collides with a continental plate, it is the \_\_\_\_\_ plate that sinks into the mantle.
- (i) Light vibrating along one plane is called \_\_\_\_\_ of light.

4. Express the following in one word (*any five*) :  $1 \times 5 = 5$

- (a) One single parental magma giving rise to many kinds of igneous rocks.
- (b) Color of the powder of minerals.
- (c) Fracture accompanied by displacement.
- (d) Zig-zag path of a river.
- (e) A hot mobile melt.

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- (f) Inclination of a rock layer.
- (g) Folds that are convex downwards.

5. Match Column A with Column B and write the corresponding numbers :  $1 \times 6 = 6$

Column A	Column B
(a) Pleochroism	(i) continuous reactions
(b) Attrition	(ii) simultaneous crystallization
(c) River	(iii) prism
(d) Solid solution	(iv) mineral color change
(e) Eutectic	(v) discontinuous reaction
(f) Tetragonal	(vi) cube
	(vii) point bar
	(viii) breakdown by mutual collision

6. Answer in 1 (one) or 2 (two) lines (*any six*) :  $1 \times 6 = 6$

- (a) Strike of rocks
- (b) Plane of symmetry
- (c) Sill
- (d) Lustre of mineral

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- (e) Subhedral grains
- (f) Hydraulic action
- (g) Metasomatism
- (h) Plastic deformation
- (i) Batholith

( PART : B-DESCRIPTIVE )

( Marks : 35 )

GROUP – A

( General Geology )

7. Explain the types of earthquake waves. Explain the tectonic cause of earthquake.  $3\frac{1}{2} + 3\frac{1}{2} = 7$

Or

8. Answer any two of the following :  $3\frac{1}{2} \times 2 = 7$

- (a) Origin of the earth.
- (b) Geological time scale in tabular form.
- (c) Weathering and erosion

Or

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9. Write brief notes on the common depositional features associated with a river. 7

GROUP – B

( Crystallography and Mineralogy )

10. List the symmetry elements of the normal class of the tetragonal system. Draw a clinographic sketch of the tetragonal system. List the forms developed. Name a mineral crystallizing in the tetragonal system.

$$1\frac{1}{2} + 1 + 4 + \frac{1}{2} = 7$$

Or

11. Write notes on any two of the followings:  $3\frac{1}{2} \times 2 = 7$

- (a) Extinction
- (b) Isotropism and anisotropism
- (c) Double refraction

Or

12. Write brief notes on the various physical properties of minerals. 7

GROUP – C

( Structural Geology and Geotectonics )

13. List and explain four elements of folds. Distinguish an antiform from an anticline. Write a note on asymmetrical folds.  $4 + 1 + 2 = 7$

Or

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14. Write notes on any two of the following:  $3\frac{1}{2} \times 2 = 7$

- (a) Dip and strike.
- (b) Types of dip-slip faults.
- (c) Plate boundaries.

Or

15. Define 'plate' in plate tectonics. Explain the concept of plate tectonics.  $2 + 5 = 7$

GROUP – D

( Igneous Petrology )

16. What is magmatic differentiation? List the processes of differentiation. Write in detail on any one of them.

$$1 + 2 + 4 = 7$$

Or

17. Answer **any two** of the following :  $3\frac{1}{2} \times 2 = 7$

- (a) Continuous reaction series.
- (b) Inequigranular igneous texture.
- (c) Magma and its composition.

Or

18. Write brief notes on six extrusive igneous rock structures. Draw sketches.  $6 + 1 = 7$

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GROUP – E

( Metamorphic Petrology )

19. List the agents of metamorphism and explain how they bring about changes in pre-existing rocks. 7

Or

20. Answer **any two** of the following :  $3\frac{1}{2} \times 2 = 7$

- (a) Grade of metamorphism
- (b) Gneiss
- (c) Regional metamorphism

Or

21. Write brief notes on any six metamorphic rock structures/textures. Draw neat sketches.  $6 + 1 = 7$

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