3 (Sem–3/CBCS) GLG HC 1

2023

GEOLOGY

(Honours Core)

Paper : GLG–HC–3016

(Igneous Petrology)

Full Marks : 60

Time : Three hours

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

1. Answer the following question : 1×7=7

(a) Write true ***or*** false

Tholeiitic magma is generated in the mantle.

(b) Choose the correct option :

Where might the geothermal gradient be lower than average ?

(i) Near zones of crustal thickening or crustal extension

(ii) In a subducting plate

(iii) Near an igneous intrusion

(iv) Above a hot spot

(c) Choose the correct option :

Viscosity of magma depends upon

(i) concentration of *Si*

(ii) amount of dissolved gas

(iii) amount of temperature

(iv) All of the above

(d) Fill in the blank :

IUGS stands for _____.

(e) Name the texture where exsolved lamellae of albite within K-feldspar are present.

(f) Name the rock where characteristic ophitic texture is present.

(g) What does solidus curve represent in a phase diagram ?

2. Give short answers to the following : 2×4=8

(a) Why heat flow is not uniform through the earth ?

(b) State the petrographic differences between kimberlites and lamproites.

(c) Write the names of *two* intensive variables which play important role in phase equilibria.

(d) State the petrogenetic differences between komatite and tholeiitic basalt.

3. Answer ***any three*** of the following questions : 5×3=15

(a) State the role of magma mixing in magmatic differentiation.

(b) Define the term 'phase', 'component' and 'degree of freedom'. Write the mineralogical phase rule.

(c) Describe the mechanism of magma generation in active continental margin.

(d) Describe the various secondary textures of igneous rock.

(e) Write briefly the petrography and genetic significance of granitoids.

4. Answer the following questions : ***(any three)***

(a) Define magma. Write about the composition of magma. Discuss the role of volatile constituents in magmatic differentiation. 2+3+5=10

(b) Define congruent and incongruent melting. Explain with neat sketches, the cryatallisation behaviour in the forsterite-silica system. 4+6=10

(c) Write short notes on the following : 5×2=10

(i) Petrographic and chemical classification of igneous rocks

(ii) Primary igneous texture and their importance in petrogenesis

(d) How MORB and OIB are compositionally different ? Explain magma generation process of OIB. 2+8=10

(e) Explain the mantle melting and generation of basaltic magma in mantle. 10

(f) Explain with neat sketches, the different mode of occurrences of igneous rocks. 10