3 (Sem–4/CBCS) GLG HC 1

2023

GEOLOGY

(Honours Core)

Paper : GLG–HC–4016

(Metamorphic Petrology)

Full Marks : 60

Time : Three hours

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

1. Choose the correct answer : 1×7=7

   (a) Metamorphism is a

   (i) solid–state reconstitution

   (ii) solid–liquid–state reconstitution

   (iii) solid–liquid–gas–state reconstitution

   (iv) liquid–state reconstitution

(b) Granulite fades rocks are generally formed under

(i) high P-T conditions with low H_2O activities

(ii) low P-T conditions

(iii) high P-T conditions with high H_2O activities

(iv) low P and high T condition

(c) A metamorphic rock, containing very high SiO_2 content (more than 80%), would indicate that the rock was originally a

(i) granite

(ii) syenite

(iii) sandstone

(iv) shale

(d) The mineral coesite is expected to be stable in which type of the following metamorphic facies ?

(i) Greenschist

(ii) Blueschist

(iii) Eclogite

(iv) Granulite

(e) A dolerite dyke metamorphosed under amphibolites facies condition is expected to have the mineral assemblage

(i) chlorite + actinolite + albite

(ii) lawsonite + glaucophane + epidote

(iii) orthopyroxene + clinopyroxene + plagioclase

(iv) hornblande + plagioclase

(f) The predominant agents in contact metamorphism is

(i) pressure

(ii) temperature

(iii) chemical fluid

(iv) All of the above

(g) Regional dynamothermal metamorphism is evidenced by the

(i) foliated fabric of rocks

(ii) granular fabric of rocks

(iii) presence of fluid inclusion

(iv) None of the above

2. Answer the following questions : 2×4=8

(a) What is mylonite ?

(b) Write the name of a geothermometer and a geobarometer those are suitable for regionally metamorphosed mineral assemblages.

(c) What do index minerals mean in metamorphic petrology ?

(d) State the name of most common fluids that participate in low-to-medium-grade metamorphism.

3. Answer ***any three*** question from the following: 5×3=15

(a) Write on the key factors that control metamorphism.

(b) What is chemographic diagram ? What are the common chemographic diagrams used in metamorphic rocks ? 3+2=5

(c) Briefly explain the Barrovian zones of metapelitic sequences.

(d) What is migmatite ? How migmatites are formed ? 2+3=5

(e) What is eclogite ? Where is it formed ? Write on the characteristic mineral assemblage of eclogite. 2+1+2=5

4. Answer ***any three*** of the following questions : 10×3=30

(a) How does a porphyroblastic texture differ from poikiloblastic texture ? What are the nature of pre-, syn- and post-kinematic growths of porphyroblast? Illustrate your answer with suitable diagrams. 5+5=10

(b) What is the difference between metamorphism and metasomatism? Briefly explain the role of fluids in metamorphism. 4+6=10

(c) Discuss mineralogical changes and relevant mineral reactions which occur during transformation of metabasic rocks from greenschist to amphibolite and amphibolite to granulite facies conditions. 5+5=10

(d) Write in detail on the relationship between deformation and metamorphism. How does deformation of rocks accelerate the rate of metamorphism ? 5+5=10

(e) What are isograde and what kind of mineral reaction used in isograde mapping ? What is net transfer reaction and how does it differ from ion-exchange reaction ? 5+5=10

(f) What are the mineralogical assemblage of charnockite and khondalite ? Explain briefly the origin of charnockite. 4+6=10

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