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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 : $1 \times 7 = 7$
- (a) Metamorphism is a
- (i) solid-state reconstitution
 - (ii) solid-liquid-state reconstitution
 - (iii) solid-liquid-gas-state reconstitution
 - (iv) liquid-state reconstitution

Contd.

(b) Granulite facies 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) hornblende + 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 : $2 \times 4 = 8$

- (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: $5 \times 3 = 15$

(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 : $10 \times 3 = 30$

(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 isograds and what kind of mineral reaction used in isograd mapping? What is net transfer reaction and how does it differ from ion-exchange reaction? $5+5=10$

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