2018

GEOLOGY

(Major)

Paper : 4·2

(Petrology—II)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose and write the correct answer : 1×7=7

(a) Which of the following statements is true?

(i) The composition of primary basalt is controlled by the depth of partial melting, segregation from mantle peridotite and degree of partial melting.

(ii) The composition of basalt reaching the earth's surface is not controlled by any subsequent crystal fractionation.

(iii) Phase diagrams do not help us to determine solubilities and sequences of precipitation.

(iv) The mineralogical composition of a magmatic rock does not depend upon the chemical composition of the magma and the pressure at which it crystallizes.

(b) Alkali feldspar rich metasomatic rock associated with carbonatites is known as

(i) dunites

(ii) fenites

(iii) lherzolite

(iv) kimberlite

(c) _____ are large sheet like mafic to ultramafic masses presumed to be ancient oceanic crust and upper mantle thrust onto the edge of the continents.

(i) Pisolites

(ii) Granodiorites

(iii) Restites

(iv) Ophiolites

(d) Framework grains in sandstones fall in the range of

(i) 0·03 mm—2·0 mm

(ii) 2·00 mm—5·0 mm

(iii) 0·01 mm—2·00 mm

(iv) 0·01 mm—0·02 mm

(e) _____ is responsible for lifting a sediment grain upward in a fluid and force it to move downward.

(i) Fluid lift force

(ii) Fluid drag force

(iii) Net fluid force

(iv) Gravitational force

(f) In 'ACF' diagram, 'F' stands for

(i) FeO + MgO + MnO

(ii) FeO – (MgO + MnO)/2

(iii) FeO + MgO – MnO

(iv) FeO + (MgO/CaO) + MnO

(g) _____ reaction involves reciprocal exchange of components between two or more minerals.

(i) Polymorphic transformation

(ii) Devolatilization

(iii) Ion exchange

(iv) Oxidation

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

(a) What does petrographic province signify?

(b) How does a phase and a component differ from each other?

(c) How does an oligomict conglomerate differ from a petromict conglomerate?

(d) How does albite-epidote hornfels facies differ from blueschist facies?

3. Answer the following : 5×3=15

(a) Write briefly about the granite-rhyolite family.

Or

Briefly write what happens when chemical constituents from the wall or roof of a magma chamber is incorporated into magma itself.

(b) Write briefly about the four principal allochems of limestone.

Or

Briefly write about the chemical factors of depositional sedimentary environment.

(c) Write briefly about progressive and retrogressive metamorphism.

Or

Briefly write about geothermo-barometry and its applications.

(Continued)

10×3=30

Answer the following :

4. Explain with sketches the phase equilibria system of diopside-anorthite. Add a note on their petrological significance. Write very briefly about incongruent melting. 5+2+3=10

Or

Discuss fractional crystallization. Add a very brief note on liquid immiscibility. 7+3=10

5. Write on the classification of sandstones in detail. How are epiclastic and volcaniclastic sandstones different from each other? Add a brief note on miscellaneous sandstones. 6+2+2=10

Or

What are the factors that influence changes in sedimentary facies? Briefly write on the different types of transitional sedimentary environment. 6+4=10

6. Describe the mineral assemblages that form due to regional metamorphism of basic rocks. Add a brief note on metasomatism. 6+4=10

Or

Write short notes on any *two* of the following : 5×2=10

(a) Charnockite

(b) Khondalite

(c) Gondite

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