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3 (SEM 4) GEL M2

2015

**GEOLOGY**

(Major)

Theory Paper : M-4.2

( Petrology-II )

Full Marks – 60

Time – 2½ hours

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

1. Choose the correct answer : 1×7=7
- (a) Viscosity of magma depend upon
- (i) Concentration of Si
  - (ii) Amount of dissolved gas
  - (iii) Amount of temperature
  - (iv) All of the above.

[Turn over

- (b) Out of the following rock which one is the volcanic equivalent of nepheline syenite ?
- (i) Rhyolite
  - (ii) Trachyte
  - (iv) Andesite
  - (v) Phonolite
- (c) Which one of the following is monomineralic rock ?
- (i) Pyroxenite
  - (ii) Andesite
  - (iii) Dunite
  - (iv) Syenite
- (d) When a Lacustrine environment is affected by marine conditions, then the environment is known as
- (i) Paludal
  - (ii) Paralic
  - (iii) Limnic
  - (iv) Estuarine

- (e) Which of the following facies is associated with tectonic activity ?
- (i) Arkosic
  - (ii) Mollasse
  - (iii) Flysch
  - (iv) All of the above
- (f) The process of separation of bands of the rocks of different composition by local metasomatism during high grade metamorphism is called
- (i) Metasomatic replacement
  - (ii) Metamorphic differentiation
  - (iii) Retrograde metamorphism
  - (iv) Metasomatism
- (g) Khondalite is a
- (i) Manganese bearing high grade metamorphic rock
  - (ii) Foliated garnet-silliminite bearing rock
  - (iii) Manganese rich gneissic rock
  - (iv) Potash feldspar, manganese-garnet, apatite bearing rock.

2. Answer the following briefly :  $2 \times 4 = 8$

- (a) Write the name of two types of binary phase diagram.
- (b) Give the Bowen's Reaction Series.
- (c) Define allochthonous and autochthonous sediments.
- (d) Write the differences between ACF and AKF diagram.

3. Answer the following :  $5 \times 3 = 15$

- (a) Define the term 'phase', 'component' and 'degree of freedom'. Describe the mineralogical phase rule.

Or

- (b) Describe briefly the ultrabasic and ultramafic rocks.
- (c) Describe the petrographic makeup of sandstone.

Or

- (d) Write a note on sedimentary facies.

(e) Petrography and origin of Khasigreen stone.

Or

(f) Discuss geothermobarometry and state its significance.

4. Answer the following :

(a) Define congruent and incongruent melting. Explain with neat sketches, the crystallisation behaviour in the Potash feldspar ( $\text{KAlSi}_3\text{O}_8$ ) – Albite ( $\text{NaAlSi}_3\text{O}_8$ ) – Silica ( $\text{SiO}_2$ ) system.

2+8=10

Or

(b) Define magma. Write about the composition of magma. Discuss the role of volatile constituents in magmatic differentiation.

1+3+6=10

(c) What is sedimentary environment ? Write a note on different types of depositional sedimentary environment.

2+8=10

Or

(d) State briefly the classification of sedimentary rocks.

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- (e) Name the mineral assemblages that form during contact thermal metamorphism of impure calcareous sediments. State the relevant mineral reactions that occur during progressive heating. 3+7=10

Or

- (f) Define prograde and retrograde metamorphism with the help of Barrovian zones. Describe the prograde metamorphism of pelitic sediments. 4+6=10