

This question paper contains 3 printed pages]

Roll No. 

--	--	--	--	--	--	--	--	--	--	--

S. No. of Question Paper : 813

Unique Paper Code : 219305

G

Name of the Paper : Metamorphic Petrology (GEHT-303)

Name of the Course : B.Sc. (Hons.) Geology

Semester : III

Duration : 3 Hours

Maximum Marks : 75

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Question No.1 is compulsory.

1. Answer the following :

1+1+1+1+4+1+1+1+1+1+1

(a) The foliation in a slate is called -----.

(b) Quartzite is a metamorphic rock composed of a dense network of interlocking

(i) Dolomite

(ii) Quartz

(iii) Calcite

(iv) Epidote

(c) Given a specific geotherm, higher grade rocks will occur at ..... levels.

(d) A metamorphic zone has ..... degree of freedom.

(e) Phyllites are ..... grained than slates, and when held up to the sunlight exhibit a marked ....., as rays of light reflect off the aligned crystals of ..... and .....

(f) High phengite content and low  $X_{Mg}$  will cause early/late appearance of biotite.

(g) The hornfels facies forms during ..... metamorphism.

(h) Sillimanite is a low/high temperature phase relative to andalusite?

P.T.O.

- (i) Metamorphic rocks are often found in association with :
- (i) volcanic eruptions
  - (ii) earthquakes
  - (iii) mountain building
- (j) The principal agents of metamorphism are :
- (i) heat and pressure
  - (ii) heat and magma
  - (iii) confining pressure and directed stress
- (k) The generally accepted temperature limits for metamorphism are :
- (i) metamorphism occurs at all temperatures
  - (ii) there are no temperature limits to metamorphism because it is a continuum
  - (iii) metamorphism is limited by pressure, not temperature
  - (iv) 200°C to the beginning of rock melting
- (l) Metamorphism of limestone may contribute to global warming by the release of :
- (i) oxygen
  - (ii) sulfuric acid
  - (iii) carbon dioxide
  - (iv) nitrous oxide
2. Describe briefly how metamorphism takes place under the following conditions :
- (a) contact of a granite intrusion in a carbonate terrain
  - (b) at subduction zone

7.5×2=15

3. Describe AFM projection for metamorphic rocks. Elaborate the basis of reduction of components to three pseudocomponents. Explain the idea of projection from a phase in this context. Show typical positions of biotite, almandine, chloritoid, staurolite and chlorite in a AFM diagram. 15
4. What are metamorphic zones, index minerals, and metamorphic isograds ? Write the minerals that would result from chlorite + biotite in a pelite as grade increases from low to medium grade. Draw relevant AFM diagrams. 15
5. Write notes on the following : 7.5×2=15
- (a) Metamorphic reactions
  - (b) Pre-, syn and post-kinematic textures
6. What is the concept of metamorphic facies and what is its use ? 15
7. Define the following : 15
- (a) Entropy
  - (b) Enthalpy
  - (c) Gibbs free energy
  - (d) Prograde metamorphism
  - (e) Open system
8. Answer the following : 6+3×3=15
- (a) Discuss the factors that control metamorphism ?
  - (b) What are
    - (i) eclogite
    - (ii) khonodalite
    - (iii) blue schist