

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1379

I

Unique Paper Code : 2192011102

Name of the Paper : Mineral Science

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

Semester : I – DSC-2

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question no. 1 is compulsory and attempt any 4 questions from the rest.

1. Answer the following questions : (1×18=18)

- (a) Indicate which crystal system corresponds to each of the given point groups 1, 432, 2/m, 4mm, 622, 6mm.
- (b) Name one sulfide ore mineral for each of the following metals Zn, Cu, Fe, Ni.
- (c) Name the polymorphs of Quartz, calcite, kyanite.

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- (d) Name the crystal system in which the following minerals crystallize: olivine, albite, hornblende, biotite, diopside, and quartz.
- (e) Name three isotropic and three anisotropic minerals.
- (f) What is understood by a crystal zone?
- (g) Give the most common habit of the following minerals: Diamond, Beryl, Serpentine
- (h) Name one dioctahedral and one trioctahedral mica.
- (i) Quartz is a common piezoelectric mineral. Name another piezoelectric mineral.
- (j) Name a monoclinic carbonate mineral.
- (k) Name the mineral which is opaque, shows magnetic properties, and has a black streak.
- (l) Name a mineral showing straight extinction.
- (m) What are the two subtypes of sulphates?
- (n) Define isogyre.
- (o) Define melatope.
- (p) Name a pleochroic mineral from the amphibole group of minerals.

- (q) Name a high-pressure polymorph of olivine found at mantle depths.
- (r) Name all the minerals in the albite-anorthite solid solution series of Feldspar group.
2. What is a silicon tetrahedron? Give its various combinations which form the basis of the classification of silicates. In which class will you put Feldspars? Discuss the classification of feldspars with a suitable diagram. (18)
3. What do you understand by solid solution in minerals? What are the different types of solid solutions exhibited by minerals? Give two examples of each type. (18)
4. What is symmetry in crystals? Explain the translation-free and translational symmetry elements exhibited by minerals with suitable diagrams and mineral examples. (18)
5. What are the general structural formula of garnet and olivine? How are they similar in terms of silicate structure? State the characteristics of divalent cation sites in atomic structures of both mineral groups. How are natural garnets and olivine classified? (18)

6. Write notes on the following : (6×3=18)
- (a) Extinction
 - (b) Zone and Zone axis
 - (c) Space lattice
 - (d) Uniaxial and Biaxial Mineral
 - (e) Optical indicatrix
 - (f) Pleochroism
7. Differentiate between the following giving suitable mineral examples :
- (a) Hardness and tenacity
 - (b) Color and lustre
 - (c) Cleavage and fracture
 - (d) Wave surface and Indicatrix
 - (e) Polymorphism and isomorphism
 - (f) Tectosilicates and phyllosilicates (18)
8. (i) Analyze the behaviour of two light rays vibrating in the same plane but with different frequencies.
- (ii) Explain the application of the principles mentioned above in the construction of polarizing microscopes. (18)