

3. Describe in detail different silicate structures on the basis of joining of SiO_4 tetrahedra and their respective Si:O ratio. Give one mineral example of each and respective rock type (one each) in which it is present.
4. Describe different polytypes in muscovite with suitable illustrations. What are the geological conditions under which each is likely to be found?
5. What are symmetry elements in 3D that involve translation? Discuss with suitable illustrations.
6. Identify the ions that occupy specific crystallographic sites in each of the following minerals, and indicate the corresponding crystallographic locations for these ions.
(a) Olivine (b) Garnet (c) Mica (both dioctahedral and trioctahedral) (6×3=18)
7. With suitable illustrations wherever applicable, write in detail about the physical properties of minerals on the basis of
(a) Interference of light (b) Mechanical properties
(c) Electrical properties (6×3=18)
8. What is the concept of stereographic projection of crystals? Discuss its application.

(200)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5827

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Unique Paper Code : 2192011102

Name of the Paper : Mineral Science DSC-2

Name of the Course : B.Sc. (Hons.) Geology, NEP-UGCF

Semester : I

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.
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1. Answer the followings : (1.5×12=18)
 - (a) Minerals belonging to _____, _____, and _____ system are biaxial.
 - (b) Angles between faces in the distorted crystal are the same as in the perfect crystal. This is Law of _____.

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- (c) In Moh's scale of hardness which mineral has hardness a little less than a pen knife? \The frequency with which a given face is observed is roughly directly proportional to the number of it contains in the lattice.
- (d) Mineral with $\bar{3}\frac{2}{m}$ symmetry belongs to _____ system and a common mineral crystallizing under this is _____.
- (e) The combination of a mirror reflection with a translation component parallel to the mirror, results in _____ operation.
- (f) Chalcopyrite structure can be derived from sphalerite structure, by regularly substituting _____ for _____ in sphalerite. This leads to _____ of the unit cell.
- (g) Give two examples of minerals belonging to mesosilicate group.
- (h) A crystal face has the following intercepts for the crystallographic axes: $1a_1, 1a_2, \frac{1}{2}a_3, \infty c$. The Miller-Bravais indices for the face is _____.
- (i) Which one of the following represent a closed form?
- (a) Tetragonal prism (b) Dihexagonal pyramid
- (c) Trigonal dipyramid (b) Ditetragonal pyramid

- (j) Which one of the following is a non-pleochroic crystal system?
- (a) Hexagonal (b) Triclinic (c) Cubic (d) Tetragonal
- (k) Double reflection phenomenon is shown by
- (a) Isotropic substances only
- (b) Anisotropic substances only
- (c) both isotropic and anisotropic substances
- (d) None of the above
- (l) Microcline shows cross hatchet appearance due to
- (a) Unidirectional twinning in albite law
- (b) Unidirectional twinning in pericline law
- (c) Twinning in two directions on the Albite law
- (d) Twinning in two directions: one on the albite law and the other on the pericline law
2. Answer the following : (6×3=18)
- (a) Explain the relationship between polymorphism and radius ratio?
- (b) Which type of minerals have anisodesmic bonds? What is its effect on physical property of minerals?
- (c) With examples explain isostructures and polymorphs.