2017

GEOLOGY

(Major)

Paper : 1·2

(Crystallography and X-ray Crystallography)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **all** questions

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

(a) A pyramid is described as a form whose face always cuts

(i) *a*-axis

(ii) *b*-axis

(iii) *c*-axis

(iv) All of the above

(b) The trigonal unit cell is designated to

(i) $a = b = c;\ \alpha = \beta = 90°;\ \gamma = 120°$

(ii) $a = b = c;\ \alpha = \beta = \gamma \neq 120°$

(iii) $a = b = c;\ \alpha = \beta = \gamma \neq 90°$

(iv) $a \neq b \neq c;\ \alpha = \beta = \gamma < 120° > 90°$

(c) The interfacial angles depend upon

(i) size of the crystal faces

(ii) shape of the crystal faces

(iii) form of the crystal

(iv) None of the above

(d) The maximum number of space lattices is found in

(i) orthorhombic system

(ii) cubic system

(iii) hexagonal system

(iv) tetragonal system

(e) A crystal twinned on the lattice plane is known as

(i) rotation twin

(ii) reflexion twin

(iii) inversion twin

(iv) contact twin

(f) The only symmetry that a triclinic crystal can display is

(i) centre of symmetry

(ii) planes of symmetry

(iii) axes of symmetry

(iv) None of the above

(g) In stereographic projection, the axis normal to the plane of projection is

(i) *a*-axis

(ii) *b*-axis

(iii) *c*-axis

(iv) None of the above

2. Give short answer of the following : 2×4=8

(a) Define crystal and amorphous substance.

(b) Write on the law of constancy of interfacial angle.

(c) Write on the crystallographic axes of orthorhombic system.

(d) Write on unit cell dimension.

3. Answer any *three* of the following : 5×3=15

(a) Describe the symmetry elements and forms of ditetragonal dipyramidal class of tetragonal system.

(b) Write on parameters and indices.

(c) Write on the determination of axial ratio of tetragonal crystal using stereographic projection.

(d) Write a note on point group.

(e) Write notes on skew axis and glide planes.

4. Answer the following : 10×3=30

(a) Define space lattice. What are the different types of lattice? Discuss the Bravais lattices. 2+2+6=10

Or

Describe the symmetry elements of the normal classes of orthorhombic, monoclinic and triclinic systems. Write the symmetry notations of Hermann-Mauguin for the normal classes of isometric and tetragonal systems. 6+4=10

(b) What do you mean by crystallographic projection? Discuss about the crystallographic projection of the normal class of monoclinic system. 4+6=10

Or

Discuss briefly the twin laws. Describe the twinning in feldspar group of minerals. 4+6=10

(c) What is Bragg's equation? Explain its role in the identification of crystal structure. Discuss briefly suitability of powder method in X-ray crystallography. 2+4+4=10

Or

Discuss about the space groups. Describe the space groups in triclinic system. 5+5=10

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