Revision of concepts of symmetry and group theory (Point groups)
2011-12 (II SEM)   updated Dec 2011

1. Draw a tetrahedron and determine (1) no. of edges (2) no. of faces
2. Draw a tetrahedral molecule (AB_4) and determine (1) no. of BAB angles
3. Define a point group.

4. Draw the group multiplication table for C_{2v} point group.

5. Draw the octahedron inscribed in a cube. Show the C_3 axes of the cube.

6. Draw a molecule having the S_2 symmetry element.

7. Using the C_{3v} point group, show that the C_3 and C_3^2 operations belong to the same class.

8. Find the point groups of the following
(a) Fluorobenzene   (b) 1,3 – dihydroxybenzene (c) 2,4,6-trinitrophenol

9. Draw a molecule with the (a) C_{3h}, (b) D_{2d} (c) C_{5h} (d) C_i and (e) C_4 point group.

10. Find the transformation matrix for combined operation of inversion followed by reflection about the xy plane.

11. Find the inverse of the following matrices

(a) 1 0 0   (b)   0 0 1   (c)   0 1 0
    0 1 0   1 0 0   0 0 1
    0 0 1   0 1 0   1 0 0

12. Which of the following molecules will show optical activity?

(a) bromochlorofluoromethane   (b) Fluorobenzene   (c) 1,3 – dihydroxybenzene
(d) 2,4,6-trinitrophenol   (e) chloroethylmethylmethane

13. Write down the formula of the simplest amine and alkene which are optically active.