Chapter 12

THREE DIMENSIONAL GEOMETRY

Any point on x – axis - > (x, 0, 0)

Any point on y – axis - > (0, y, 0)

Any point →¡on z – axis - > (0, 0, z)

Any point on XY - plane →(x, y, 0)

Any point on YZ - plane → (0, y, z)

Any point on ZX - plane → (x, 0,z)

Distance between two points P (x_1 , y_1, z_1) and Q (x_2 , y_2, z_2) is

$|PQ| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$

The co- ordinates of R which divides a line segment joining the points

P (x_1 , y_1, z_1) and Q (x_2 , y_2, z_2)

Internally and externally in the ratio m : n are respectively

R $\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}, \frac{mz_2+nz_1}{m+n}\right)$ and

S $\left(\frac{mx_2-nx_1}{m-n}, \frac{my_2-ny_1}{m-n}, \frac{mz_2-nz_1}{m-n}\right)$

The coordinates of the centroid of the triangle whose vertices are (x_1 , y_1, z_1) , (x_2 , y_2, z_2) and (x_3 , y_3, z_3) is

$$\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}, \frac{z_1 + z_2 + z_3}{3}\right)$$

TEXT BOOK QUESTIONS

*→ Exercise 12 .2 -- 3, 4, 5

→ Example – 7, 8,9, 10,11,12,13

**→ Exercise 12 .3 -- 3, 4, 5

→ Misc Q 1 to Q 6

Extra Questions:

1.Find the distance between (-3, 4, -6) and its image in the XY – plane.

(ans : 12 units)

2.Find the points on the y- axis which are at a distance of 3 units from the point (2, 3, -1)

(ans : (0, 1, 0), (0, 5, 0))

3.If A and B are the points (1, 2, 3) and (-1, 4 , -3) respectively then find the locus of a point P such that $PA^2 - PB^2 = 2k^2$

(ans : $2x - 2y + 6z + 6 + k^2 = 0$)

4. If the points A (1, 0 , -6), B (-3, p, q) and C (-5, 9, 6) are collinear, find the values of p and q.

(ans : p = 6 , q = 2)

5. Two vertices of a triangle are (2, -6 ,4) , (4, -2, 3) and its centroid is $\left(\frac{8}{2}, -1, 3\right)$, find the third vertex.

(ans : (2,5,2))