11 3D-GEOMETRY

1 OMQ + 1 VSAQ [1 M + 2M = 3 M]

CONCEPTS & FORMULAS

1. If P(x,y,z) is a point in 3D space then |x| denotes the perpendicular distance of P from the yz plane and |y|, |z| denote the perpendicular distances of P from zx plane, xy planes respectively.
2. The three coordinates planes divide the space into eight regions known as octants.
3. Any point on the x–axis is of the form P(x,0,0) i.e., its y,z coordinates are zeroes.
   - Any point on the y–axis is of the form (0,y,0)
   - Any point on the z–axis is of the form (0,0,z).
4. Any point on the xy plane is of the form P(x,y,0) i.e., its z–coordinate is zero.
   - Any point on the yz plane is of the form (0,y,z) .
   - Any point on the zx plane is of the form (x,0,z).
5. The distance of P(x,y,z) from the xy plane is |z|
6. The distance of P(x,y,z) from the X–axis is $\sqrt{y^2+z^2}$
7. The distance between the two points $A(x_1,y_1,z_1), B(x_2,y_2,z_2)$ is $AB=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2+(z_2-z_1)^2}$
   - The distance between O(0,0,0) and P(x,y,z) is $OP=\sqrt{x^2+y^2+z^2}$
8. If a point P collinear with $A(x_1,y_1,z_1)$, $B(x_2,y_2,z_2)$ divides the line segment $\overline{AB}$ in the ratio $l:m$ internally then $P=\left(\frac{lx_2+mx_1}{l+m},\frac{ly_2+my_1}{l+m},\frac{lz_2+mz_1}{l+m}\right)$
9. The centroid of the triangle formed by the points $A(x_1,y_1,z_1), B(x_2,y_2,z_2)\&C(x_3,y_3,z_3)$ is

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

TIT BITS

OCTANT→	I	II	III	IV	V	VI	VII	VIII
x	+	–	–	+	+	–	–	+
y	+	+	–	–	+	+	–	–
z	+	+	+	+	–	–	–	–