

Date
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Lecture notes-20
BCA I year I sem

Sub-Mathematics-II
Topic - Equation of Plane

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UNIT - 5
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Exp-25, 28, 29 Do itself P-317

Exp-30 Find the equation of plane through the line of intersection of the plane $x+2y-3z-6=0$ and $4x+3y-2z+2=0$ and passing through the origin.

Solution The equation of the plane through the line of intersection

$$P = 4x + 3y - 2z + 2 = 0$$

$$\text{and } Q = x + 2y - 3z + 6 = 0$$

$$\text{Then } P + \lambda Q = 0$$

$$\Rightarrow (4x + 3y - 2z + 2) + \lambda(x + 2y - 3z + 6) = 0$$

If the plane passing through the origin

$$\text{So } x = y = z = 0$$

$$\Rightarrow (0 + 0 - 0 + 2) + \lambda(0 + 0 - 0 + 6) = 0$$

$$\Rightarrow 2 + 6\lambda = 0 \Rightarrow \lambda = -\frac{1}{3}$$

$$\text{Then } (4x + 3y - 2z + 2) - \frac{1}{3}(x + 2y - 3z + 6) = 0$$

$$\Rightarrow 12x + 9y - 6z + 6 - x - 2y + 3z - 6 = 0$$

$$\Rightarrow 11x + 7y - 3z = 0$$

Ans

NOTE If $P = x + 2y - 3z + 6 = 0$ &

$$Q = 4x + 3y - 2z + 2 = 0 \text{ Then } \lambda = 3$$

And eqⁿ of plane is $13x + 11y - 9z = 0$ Ans

P-319 Exp-31, P-320 Exp-32 Do itself. Same as Exp-30

Exp-33 Find the equation of the plane through the points $(1, -2, 4)$ and $(3, -4, 5)$ and parallel to x -axis

Solution The equation of the plane through $(1, -2, 4)$ is
 $a(x-1) + b(y+2) + c(z-4) = 0$ — (1)

The plane also passes through $(3, -4, 5)$

$$\Rightarrow a(3-1) + b(-4+2) + c(5-4) = 0$$

$$\Rightarrow 2a - 2b + c = 0 \quad \text{--- (2)}$$

And the plane parallel to x -axis

Then $x=0$

$$\Rightarrow 1 \cdot x + 0 \cdot y + 0 \cdot z = 0$$

$$\Rightarrow a = 0 \quad \text{Put in (2)}$$

$$\Rightarrow 0 - 2b + c = 0 \Rightarrow c = 2b$$

Put the value of a & c in Eqⁿ (1)

$$\Rightarrow 0 + b(y+2) + 2b(z-4) = 0$$

$$\Rightarrow y + 2z - 6 = 0$$

Ans

Exp-34 Find the distance between the parallel planes $2x - y + 3z = 4$ and $6x - 3y + 9z = -13$

Solution Let $P(x, y, z)$ is any point on the plane $2x - y + 3z - 4 = 0$

$$\Rightarrow 2x - y + 3z - 4 = 0$$

$$\Rightarrow 2x - y + 3z = 4 \quad \text{--- (1)}$$

Then the distance between the given planes = length of perpendicular from point P to the plane $6x - 3y + 9z + 13 = 0$

$$= \frac{6x - 3y + 9z + 13}{\sqrt{(6)^2 + (-3)^2 + (9)^2}}$$

$$= \frac{3(2x - y + 3z) + 13}{\sqrt{126}}$$

$$= \frac{3(4) + 13}{\sqrt{126}} \quad \text{from Eqn (1)}$$

$$= \frac{25}{\sqrt{126}} \quad \text{Ans}$$

Ques-1, 3, 4, 6, 11 Do itself