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Lecture notes - 22
BCA I Year (II Sem)

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Subject - Mathematics - II
Topic - Straight line

Exp-4 Find the distance of the point (2,3,4) from the point where the line $\frac{x-3}{1} = \frac{y-4}{2} = \frac{z-5}{2}$ meets the plane $x+y+z=22$

Solution Given $\frac{x-3}{1} = \frac{y-4}{2} = \frac{z-5}{2} = r$ (Say)

Then point on the line $P(x,y,z)$

$P(r+3, 2r+4, 2r+5)$ If it also lies on the plane $x+y+z=22$

$\Rightarrow (3+r)+(2r+4)+(2r+5) = 22$

$\Rightarrow 12+5r = 22$

$\Rightarrow 5r = 10 \Rightarrow \boxed{r=2}$

Thus the required Co-ordinates are $P(5, 8, 9)$.

Then the distance between the points (2,3,4) and (5,8,9)

$= \sqrt{(5-2)^2+(8-3)^2+(9-4)^2}$

$= \sqrt{59}$ Ans

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V. Imp

Exp-5, P-326, Do itself

Exp-6 P-327 Do itself

Exp-5 Find the distance of the point (1,-2,3) from the ~~line~~ plane $x-y+z=5$ measured along a line parallel to $\frac{x}{2}=\frac{y}{3}=\frac{z}{-6}$

Solution The given plane is $x-y+z=5$ ——— (1)

The equation of line passing through (1,-2,3) and parallel to the line $\frac{x}{2}=\frac{y}{3}=\frac{z}{-6}$ is

$$\frac{x-1}{2}=\frac{y+2}{3}=\frac{z-3}{-6}=r \quad \text{——— (2)}$$

line meets the plane at a point whose Co-ordinates are $(2r+1, 3r-2, -6r+3)$

Then from (1)

$$2r+1-3r+2-6r+3=5$$

$$\Rightarrow -7r+6=5 \Rightarrow r=\frac{1}{7}$$

So Co-ordinates are $\left(\frac{9}{7}, \frac{-11}{7}, \frac{15}{7}\right)$

Then the distance between (1,-2,3) and $\left(\frac{9}{7}, \frac{-11}{7}, \frac{15}{7}\right)$ is

$$\sqrt{\left(\frac{9}{7}-1\right)^2+\left(\frac{-11}{7}+2\right)^2+\left(\frac{15}{7}-3\right)^2}$$

$$\Rightarrow \sqrt{\frac{4}{49}+\frac{9}{49}+\frac{36}{49}}=\sqrt{\frac{49}{49}}=1 \text{ Ans}$$

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P-329 Exercise-01

Q- 1, 3, 5, 6, 7, 8 Do itself

Exp-9 Find the Symmetrical form of the equation of line $3x+2y-z-4=0$ and $4x+y-2z+3=0$

Solution Let l, m, n are the direction cosines of the lines then we have

$$3l+2m-n=0 \quad , \quad 4l+m-2n=0$$

Or $$\frac{l}{-4+1} = \frac{m}{-4+6} = \frac{n}{3-8}$$

$$\Rightarrow \frac{l}{-3} = \frac{m}{2} = \frac{n}{-5}$$

Hence direction cosine of line are $(-3, 2, -5)$

$$\Rightarrow \sqrt{(-3)^2+(2)^2+(-5)^2} = \sqrt{38}$$

Then $l = \frac{-3}{\sqrt{38}}$, $m = \frac{2}{\sqrt{38}}$, $n = \frac{-5}{\sqrt{38}}$

Now put $z=0$ in Eqn.

$$3x+y-4=0 \quad , \quad 4x+y+3=0$$

$$\Rightarrow \frac{x}{10} = \frac{y}{-25} = \frac{1}{-5} \Rightarrow x=-2, \; y=5$$

Then the equation of line in Symmetric form is

$$\frac{x+2}{-3} = \frac{y-5}{2} = \frac{z-0}{-5}$$

Ans

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Exp-12 Find the equation of line through the point (1,2,3) parallel to the line $x-y+2z-5=0$ and $3x+y+z-6=0$

Solve itself

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Exp-11 Find the angle between the line $x-2y+z=0$, $x+2y-2z=0$ and

$x+2y+z=0$, $3x+9y+5z=0$

Do itself

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Exercise-02

Q- 2, 3