Q.1 Show that line $\frac{x-1}{4} = \frac{y-5}{-4} = \frac{z+1}{5}$

passes through the point $(-11, 17, -16)$

Convert this symmetric equation into simple form:-

$\frac{x-1}{4} \Rightarrow x-1 = 4t$

$\frac{y-5}{-4} = y-5 = -4t$

$\frac{z+1}{5} \Rightarrow 1+z = 5t$

put $(-11, 17, -16)$ into x, y, z

$-11-1 = 4t \Rightarrow -12/3 = 4t/1$

$17-5 = -4t \Rightarrow 12/3 = -4t$

$-16+1 = 5t \Rightarrow -15/3 = 5t/1$

$t = -3$
$t = -3$
$t = -3$
] passes through same point.

Q.2 The points P_1, P_2, P_3 $P_1(6, 9, 7)$ $P_2(9, 2, 0)$

$P_3(0, -5, -3)$

$\overrightarrow{P_1P_2} = \langle 9-6, 2-9, 0-7 \rangle \Rightarrow \langle 3, -7, -7 \rangle$

$\overrightarrow{P_2P_3} = \langle 0-9, -5-2, -3-0 \rangle \Rightarrow \langle -9, -7, -3 \rangle$

To check whether it is parallel or not.

$\frac{1}{-9}\frac{3}{3} = \frac{-7}{-7} = \frac{-7}{-3} \Rightarrow -\frac{1}{3} \neq 1 \neq 7/3$

these does not lie on the same line. and are not parallel.

Q.3 Find the intersection of

$x = -2$, $y = 4 + 2t$, $z = -3 + t$

with xz plane.

y is equal to 0 in xz-plane.

$0 = 4 + 2t$

$-2t = 4$

$t = -2$

Put t in z eq.

$z = -3 - 2$

$z = -5$

$(-2, 0, -5)$ will be the values.

Q.5 eq. of plane with x intercept a, y intercept b, z intercept c

$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$$

The eq represents a plane in three dimension. with x, y and z intercept along a, b and c.

Q.4 $x - z = 1$ and $y + 2z = 3$ and is perpendicular to plane $x + y - 2z = 1$

$x - z = 1 \rightarrow$ (i) Convert this into $\vec{v}_1 = \langle 1, 0, -1 \rangle$

$y + 2z = 3 \rightarrow$ (ii) $\vec{v}_2 = \langle 0, 1, 2 \rangle$

By taking cross product:-

$$\begin{vmatrix} i & j & k \\ 1 & 0 & -1 \\ 0 & 1 & 2 \end{vmatrix} \Rightarrow = (0+1)\hat{i} - \hat{j}(2+0) + \hat{k}(1-0)$$

$$= \hat{i} - 2\hat{j} + \hat{k} \Rightarrow \vec{v}_3 = \langle 1, -2, 1 \rangle$$

$\vec{v}_3 = \langle 1, -2, 1 \rangle$

$x + y - 2z = 1 \Rightarrow$ Convert this into normal ~~vector~~ form.

$\vec{v}_4 = \langle 1, 1, -2 \rangle$

To find $\vec{v}_5$ take cross product of $\vec{v}_3 \cdot \vec{v}_4$

$$\begin{vmatrix} i & j & k \\ 1 & -2 & 1 \\ 1 & 1 & -2 \end{vmatrix} \Rightarrow = (4-1)\hat{i} - \hat{j}(-2-1) + \hat{k}(1+2)$$

$$= 3\hat{i} + 3\hat{j} + 3\hat{k}$$

Now find points to find eq of plane.

put $z = 0$ in (i)

$x - 0 = 1 \Rightarrow x = 1$

$y + 2(0) = 3 \Rightarrow y = 3$

$z = 0$

$(1, 3, 0)$ are the points.

$$3(x-1)+3(y-3)+3(z-0)=0$$

$$3x-3+3y-9+3z-0=0$$

$$3x+3y+3z=9+3$$

$$3x+3y+3z=12$$

Divide 3 on bl sj -

$$\frac{3x}{3}+\frac{3y}{3}+\frac{3z}{3}=\frac{12}{3}4$$

$$\boxed{x+y+z=4}$$ Ans.