* Find the equ of a planes passing through the points (2, 3, 1) (1, 1, 3) and (2, 2, 3).

⇒ Given,

(2, 3, 1), (1, 1, 3) and (2, 2, 3)

The equ of any plane passing the point (2, 3, 1)

$$a(x-2)+b(y-3)+c(z-1)=0 \quad \text{——(i)}$$

Since it also passes through the points (1, 1, 3) and (2, 2, 3)

$$a(1-2)+b(1-3)+c(3-1)=0$$

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

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

again,

$$a(2-2)+b(2-3)+c(3-1)=0$$

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

$$\Rightarrow b-2c=0 \quad \text{——(iii)}$$

By cross multiplication of (ii) and (iii) we have,

$$a+2b-2c=0$$

$$0a+b-2c=0$$

$$\therefore \frac{a}{-4+2}=\frac{b}{0+2}=\frac{c}{1-0}$$

$$\Rightarrow \frac{a}{-2}=\frac{b}{2}=\frac{c}{1}$$

Putting these values of a_1, b_1, c_1 in (i) we have,

$$-2(x-2)+2(y-3)+1(z-1)=0$$

$$\Rightarrow -2x+4+2y-6+z-1=0$$

$$\therefore 2x-2y-z+3=0 \quad \text{Ans:-}$$

* Find the equ of the plane passing through the point $(2,2,1)$, $(9,3,6)$ and Parpendicular to the plane $2x+2y+6z-9=0$

$\Rightarrow$ The equ of any plane passing through the point $(2,2,1)$

$$a(x-2)+b(y-2)+c(z-1)=0 \quad \text{---(i)}$$

Since it also passes through the points $(9,3,6)$ so we have

$$a(9-2)+b(3-2)+c(6-1)=0$$

$$\Rightarrow 7a+b+5c=0 \quad \text{---(ii)}$$

Again the plane of (i) is Parpendicular to $2x+6y+6z-9=0$, so we have,

$$2a+6b+6c=0 \quad \text{---(iii)}$$

By cross multiplication of (ii) and (iii) we have,

$$7a+b+5c=0$$

$$2a+6b+6c=0$$

$$\Rightarrow \frac{a}{6-30}=\frac{b}{10-42}=\frac{c}{42-2}$$

$$\Rightarrow \frac{a}{-24}=\frac{b}{-32}=\frac{c}{40}$$

$$\Rightarrow \frac{a}{-3}=\frac{b}{-4}=\frac{c}{5}$$

Putting these value of a_1, b_1, c_1 in (i) we have

$$-3(x-2)-4(y-2)+5(z-1)=0$$

$$\Rightarrow -3x+6-4y+8+5z-5=0$$

$$\therefore 3x+4y-5z-9=0$$

Ans:-

*Find the equ of the plane passing through the lines of intersection of the plane $2x-y=0$ and $3z-y=0$ and perpendicular to the plane $4x+5y-3z+1=0$

$\Rightarrow$ Given,

$$2x-y=0 \quad \text{---- i}$$
$$3z-y=0 \quad \text{---- ii}$$
$$4x+5y-3z+1=0 \quad \text{---- iii}$$

The equ of any plane passing through the lines of intersection of the plane (i) and (ii) is,

$$2x-y+k(3z-y)=0$$
$$\Rightarrow 2x-y+3kz-ky=0$$
$$\Rightarrow 2x-(1+k)y+3kz=0 \quad \text{---- (iv)}$$

Since (iii) and (iv) are perpendicular so we have,

$$8-5(1+k)-9k=0$$
$$\Rightarrow -14k=-3$$
$$\therefore k=\frac{3}{14}$$

From (iv) we have,

$$2x-\left(1+\frac{3}{14}\right)y+3\cdot\frac{3}{14}\cdot z=0$$
$$\Rightarrow 2x-\frac{17y}{14}+\frac{9}{14}z=0$$
$$\therefore 28x-17y+9z=0$$

Ans:-

* Find the equ of the plane passing through the lines of intersection of the planes $x+2y+3z+4=0$ and $4x+3y+2z+1=0$ and the point $(1,2,3)$.

⇒ Given,

$$x+2y+3z+4=0 \quad \text{—— (i)}$$

$$4x+3y+2z+1=0 \quad \text{—— (ii)}$$

The equ of any plane passing through the lines of intersection of the planes (i) and (ii) is,

$$x+2y+3z+4+k(4x+3y+2z+1)=0 \quad \text{—— (iii)}$$

Since of also passes through the Point $(1,2,3)$ so we have,

$$1+2\cdot2+3\cdot3+4+k(4\cdot1+3\cdot2+2\cdot3+1)=0$$

$$\Rightarrow 18+k(17)=0$$

$$\therefore k=-\frac{18}{17}$$

from (iii) we have,

$$x+2y+3z+4+\left(-\frac{18}{17}\right)(4x+3y+2z+1)=0$$

$$\Rightarrow 17x+34y+51z+68-72x-54y-36z-18=0$$

$$\Rightarrow 11x+4y-3z-10=0$$

Ans:-

* Find the equ of the Plane which passes through the Point $(1,0,-1)$ and $(2,1,3)$ and is Perpendicular to the Plane. $2x+y+z=1$

$\Rightarrow$ The equ of any Plane passing through the Point $(1,0,-1)$ is,

$$a(x-1)+b(y-0)+c(z+1)=0 \quad \text{---(i)}$$

it also passes through the Point $(2,1,3)$ so we have

$$a(2-1)+b(1-0)+c(3+1)=0$$

$$\Rightarrow a+b+4c=0 \quad \text{---(ii)}$$

again the plane of (i) is Perpendicular to $2x+y+z=1$

$$2a+b+c=1 \quad \text{---(iii)}$$

Now by cross multiplication from (ii) and (iii) we hav

$$a+b+4c=0$$

$$2a+b+c=1$$

$$\Rightarrow \frac{a}{-3}=\frac{b}{7}=\frac{c}{-1}$$

Putting these value of a,b,c in (i) we have

$$-3(x-1)+7(y-0)-1(z+1)=0$$

$$\Rightarrow -3x+7y-z+2=0$$

$$\therefore 3x-7y+z-2=0$$

Ans:-

* Find the equ to the plane through the intersection of the planes $x-2y+3z+4=0$ and $2x-3y+4z-7=0$ and the Point $(1,-1,1)$.

⇒ Given,

$$x-2y+3z+4=0 \quad \text{—(i)}$$

$$2x-3y+4z-7=0 \quad \text{—(ii)}$$

The equ of any plane passing through the lines of intersection of the planes (i) and (ii) is

$$x-2y+3z+4+k(2x-3y+4z-7)=0 \quad \text{—(iii)}$$

Since if also passes through the Point $(1,-1,1)$ so we ha

$$1-2\cdot(-1)+3\cdot 1+4+k(2\cdot 1-3\cdot(-1)+4\cdot 1-7)=0$$

$$\Rightarrow 10+k(2)=0$$

$$\therefore k=-5$$

from (iii) we have,

$$x-2y+3z+4+(-5)\{2x-3y+4z-7\}=0$$

$$\Rightarrow -9x+13y-17z+39=0$$

$$\therefore 9x-13y+17z-39=0$$

Ans:-

* Find the equ of the plane which is perpendicular to the plane $5x+3y+6z+8=0$ and which contains the line of intersection of the planes $x+2y+3z-4=0$ and $2x+y-z+5=0$

$\Rightarrow$ Given,

$$x+2y+3z-4=0 \quad \text{——(i)}$$

$$2x+y-z+5=0 \quad \text{——(ii)}$$

$$5x+3y+6z+8=0 \quad \text{——(iii)}$$

The equ of any plane passing through the lines of intersection of the planes (i) and (ii) is,

$$x+2y+3z-4+k(2x+y-z+5)=0$$

$$\Rightarrow x+2y+3z-4+2kx+ky-kz+5k=0$$

$$\therefore (1+2k)x+(2+k)y+(3-k)z-4+5k=0 \quad \text{——(iv)}$$

Since (iii) and (iv) are perpendicular so we have,

$$(1+2k)\cdot 5+(2+k)\cdot 3+(3-k)\cdot 6=0$$

$$\Rightarrow 7k+29=0$$

$$\Rightarrow k=\frac{-29}{7}$$

From (iv) we have,

$$\left(1-\frac{58}{7}\right)x+2\left(-\frac{29}{7}\right)y+\left(3+\frac{29}{7}\right)z-4-\frac{145}{7}=0$$

$$\Rightarrow \frac{-51x}{7}-\frac{15y}{7}+\frac{50z}{7}-\frac{173}{7}=0$$

$\therefore 51x+15y-50z+173=0$ Ans:-