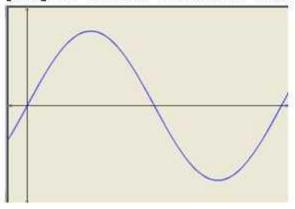
To obtain the graph of  $y = 3\sin x$  we first draw the graph of  $y = \sin x$  in the interval  $[0,2\pi]$ . The maximum and minimum values are 3 and -3 respectively.



We have,

$$y = 2 \sin \left( x - \frac{\pi}{4} \right)$$

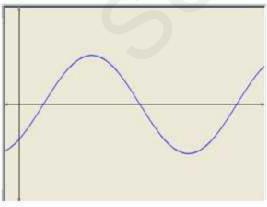
$$\Rightarrow \qquad (y-0) = 2\sin\left(x - \frac{\pi}{4}\right)$$

Shifting the origin at  $\left(\frac{\pi}{4},C\right)$ , we have

$$x = X + \frac{\pi}{4}$$
 and  $y = Y + L$ 

Substituting these values in (ii), we get

Thus we draw the graph of  $Y=2\sin X$  and shift it by  $\frac{\pi}{4}$  to the right to get the required graph.



$$y = 2\sin(2x - 1)$$

$$\Rightarrow (y-0) = 2\sin 2\left(x - \frac{1}{2}\right)$$

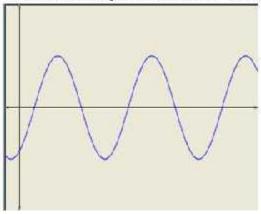
Shifting the origin at  $\left(\frac{1}{2}, C\right)$ , we have

$$x = x + \frac{1}{2}$$
 and  $y = Y = 0$ 

Substituting these values in (i), we get

$$Y = 2 \sin 2X$$

Thus we draw the graph of Y = 2sin 2X and shift it by 1/2 to the right to get the required graph.



We have,

$$y = 3\sin(3x + 1)$$

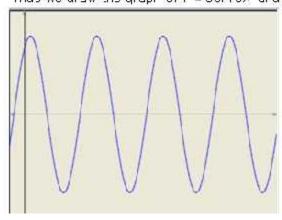
$$\Rightarrow (y-0) = 3\sin 3\left(x+\frac{1}{5}\right)$$

Shifting the crigin at  $\left(-\frac{1}{3},0\right)$ , we have

$$x - X - \frac{1}{3}$$
 and  $y - V + 0$ 

Substituting these values in (i), we get

Thus we draw the graph of  $Y = 3 \sin 3X$  and shift it by 1/3 to the left to get the required graph.



$$y = 3\sin\left(2x - \frac{\pi}{4}\right)$$
$$(y - C) = 3\sin\left(2x - \frac{\pi}{8}\right)$$

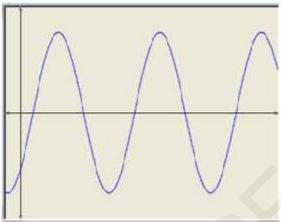
Shifting the orgin at  $\left(\frac{x}{8}, 3\right)$ , we have

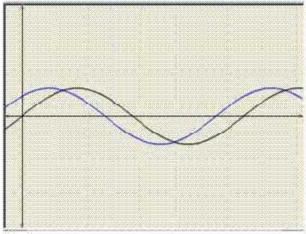
$$X = X + \frac{\pi}{8}$$
 and  $y = Y + C$ 

Substituting these values in  $\left(\dot{\eta}\right)$  , we get

$$Y = 3 \sin 2X$$

Thus we craw the graph of  $V=3\sin2X$  and shift it by  $\frac{\pi}{8}$  to the right to get the required graph.





$$\varphi = \sin\left(x + \frac{\pi}{4}\right)$$

 $\Rightarrow \qquad r - 0 - \sin\left(x - \frac{\pi}{4}\right)$ 

Sh fting the origin at  $\left(-\frac{\pi}{4},0\right)$ , we obtain

$$x=X-\frac{\pi}{4},\ y=Y+0$$

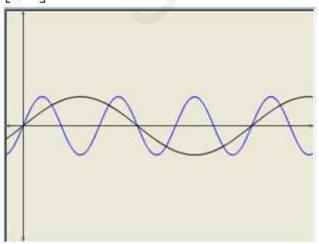
Substituting these values in (i), we get

$$Y = \sin X$$

Thus we draw the graph of V - sin X and shift it by  $\frac{\pi}{4}$  to the left to get the required graph.

(i)

To obtain the graph of  $y = \sin 3x$  we first draw the graph of  $y = \sin x$  in the interval  $[0,2\pi]$  and then divide the x-coordinates of the points where it crosses x-axis by 3.



We have.

$$y - \cos\left(x - \frac{\pi}{4}\right)$$

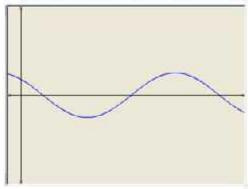
$$\Rightarrow y - f = \cos\left(x + \frac{\pi}{4}\right) \qquad ---\frac{\pi}{2}$$

Stifting the origin at  $\left(-\frac{\pi}{4},0\right)$ , we obtain

$$Y-X-\frac{n}{4}\,,\ Y-Y+0$$

Substituting these values in (3), we get

hus we draw the graph of  $Y = \cos X$  and shift to by  $\frac{\pi}{4}$  to the left to get the required graph



wie dave,

$$y = \cos\left(x - \frac{x^{2}}{4}\right)$$

$$\Rightarrow \qquad y = 0 = \cos\left(x - \frac{\pi}{2}\right)$$

---0

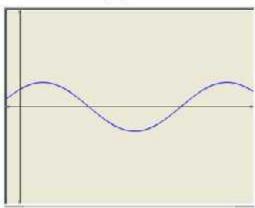
in fing the original  $\left(\frac{\mathbf{x}}{4},\Pi\right)$ , we notice

$$x = X + \frac{x}{4}, \ y = Y + 0$$

Substituting those values in ii), we get

$$Y = \cos X$$

Thus we draw the graph of r -  $\cos x$  and shift they  $\frac{\pi}{r}$  to the right to get the required graph .



W- hаон,

$$y=3\cos\left(2x-1\right)$$

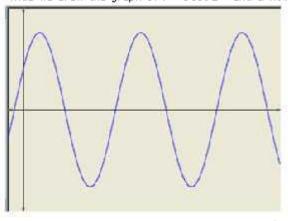
$$\Rightarrow \qquad \left(y - C\right) = 3\cos 2\left(x - \frac{1}{2}\right)$$

Shifting the crigin at  $\left(\frac{1}{2},0\right)$ , we have

$$x = x + \frac{1}{3}$$
 and  $y = y + \frac{1}{3}$ 

Substituting these values in  $\{j\}_i$  we get

Thus we draw the graph of  $Y = 3\cos 2X$  and shift it by 1/2 to the right to get the required graph.



we have,

$$y = 2\cos\left(y - \frac{\pi}{2}\right)$$

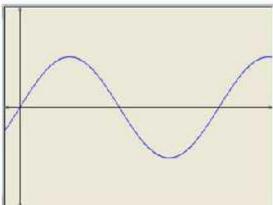
$$\Rightarrow \qquad \gamma - 0 = 2\cos\left(x - \frac{\pi}{2}\right)$$

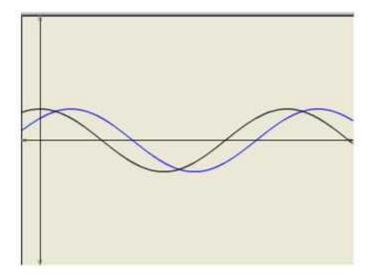
Shifting the origin at  $\left(\frac{\pi}{2},0\right)$  we obtain

$$x=\mathcal{S}+\frac{\pi}{2}\,,\ y=\gamma+C$$

Substituting these values in  $|\hat{j}\rangle$  , we get

Thus we draw the graph of  $V=2\cos X$  and shift it by  $\frac{u}{2}$  to the right to get the required graph.





We have,

$$y = \cos 2\left(x - \frac{x}{4}\right)$$

 $y - 0 = \cos 2\left(x - \frac{\pi}{4}\right)$ 

---()

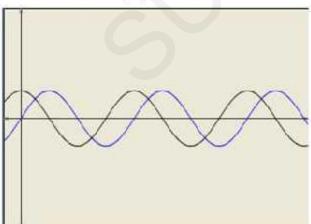
Shifting the origin at  $\left(\frac{\pi}{4}, \Pi\right)$ , we obtain

$$\mathcal{X}=X+\frac{\pi}{4},\ y=Y+0$$

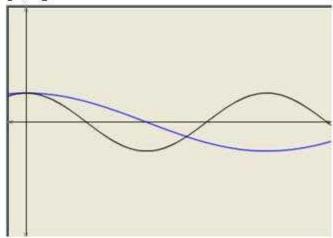
Substituting these values n (i), we get

$$Y = \cos 2X$$

Thus we draw the graph of  $Y=\cos2X$  and shift it by  $\frac{\pi}{4}$  to the right to get the required graph.



To obtain the graph of  $y = \cos\frac{x}{2}$  we first draw the graph of  $y = \cos x$  in the interval  $[0,2\pi]$  and then divide the x-coordinates of the points where it crosses x-axis by 1/2.



We know that

$$y = \sin^2 x = \frac{1 - \cos 2x}{2} = \frac{1}{2} - \frac{1}{2} \cos 2x$$

We have,

$$y = \frac{1}{2} - \frac{1}{2}\cos 2x$$

$$\Rightarrow y - \frac{1}{2} - -\frac{1}{2}\cos 2x \tag{i}$$

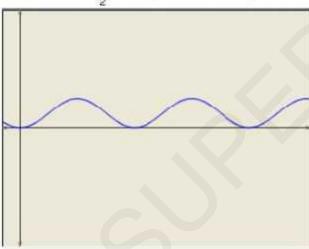
Shifting the origin at  $\left(0, -\frac{1}{2}\right)$ , we obtain

$$x=X,\ y=Y+\frac{1}{2}$$

Substituting these values in (i), we get

$$Y = -\frac{1}{2}\cos 2X.$$

Thus we draw the graph of  $Y = \cos 2x$ , adjust the maximum and minimum values to 1/2 and -1/2 and shift it by  $\frac{1}{2}$  up to get the required graph.



We know that

$$y = \cos^2 x = \frac{1 + \cos 2x}{2} = \frac{1}{2} + \frac{1}{2}\cos 2x$$

We have,

$$y = \frac{1}{2} + \frac{1}{2}\cos 2x$$

$$\Rightarrow y - \frac{1}{2} = \frac{1}{2}\cos 2x \qquad ---(i)$$

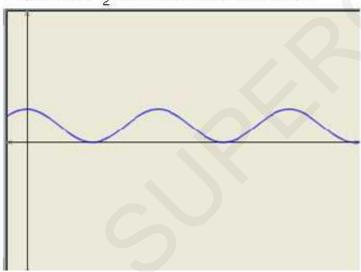
Shifting the origin at  $\left(0, -\frac{1}{2}\right)$ , we obtain

$$x = X$$
,  $y = Y + \frac{1}{2}$ 

Substituting these values in (i), we get

$$Y = -\frac{1}{2}\cos 2X$$

Thus we draw the graph of  $Y=\omega s2X$ , adjust the max mum and minimum values to 1/2 and -1/2 and shift it by  $\frac{1}{2}$  down to get the required graph.



$$y = \sin^2\left(x - \frac{\pi}{4}\right)$$

$$\Rightarrow y - 0 = \sin^2\left(x - \frac{\pi}{4}\right) \qquad ---(i$$

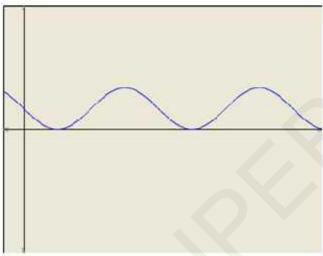
Shifting the crigin at  $\left(\frac{\pi}{4}, J\right)$ , we obtain

$$x=X+\frac{\pi}{4},\ y=Y+0$$

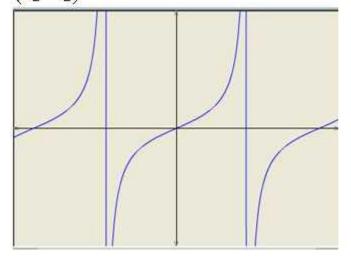
Substituting these values in (i), we get

$$Y = \sin^2 X$$

Thus we draw the graph of  $Y=\sin^2 X$  and shift it by  $\frac{\pi}{4}$  to the right to get the required graph.

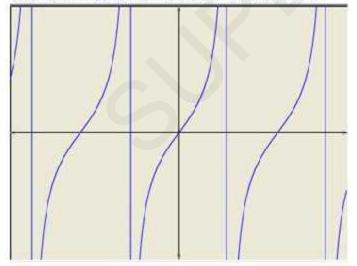


To obtain the graph of  $y = \tan 2x$  we first draw the graph of  $y = \tan x$  in the interval  $\left(-\frac{\pi}{2}, -\frac{\pi}{2}\right)$  and then divide the x-coordinates of the points where it crosses x-axis by 2.

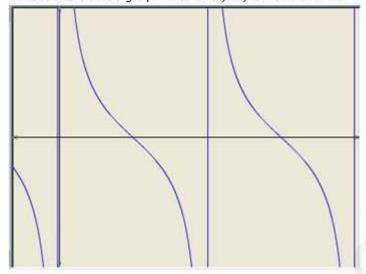


## Q5

To obtain the graph of y=2 tan 3x we first craw the graph of y=tan x in the interval  $\begin{pmatrix} \mathfrak{q} & \mathfrak{p} \\ 2 & \mathfrak{p} \end{pmatrix}$  and their divide the x-coordinates of the points where it crosses x-axis by 3. We then stratch the graph vertically by a factor of 2.



To obtain the graph of  $y = 2 \cot 2x$  we first draw the graph of  $y = \cot x$  in the interval  $(0,\pi)$  and then divide the x-coordinates of the points where it crosses x-axis by 2. We then stretch the graph vertically by a factor of 2.



We have,

$$y = \cos 2\left(x - \frac{\pi}{6}\right)$$
$$y - 0 = \cos 2\left(x - \frac{\pi}{6}\right) \qquad ---(i)$$

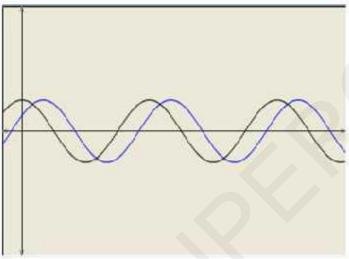
Shifting the origin at  $\left(\frac{\pi}{\delta},0\right)$ , we obtain

$$x=X+\frac{\pi}{6}\,,\ y=Y+0$$

Substituting these values in (i), we get

$$Y = \cos 2X$$
.

Thus we draw the graph of  $Y=\cos 2x'$  and shift it by  $\frac{\pi}{6}$  to the right to get the required graph.



We know that

$$y = \sin^2 x = \frac{1 - \cos 2x}{2} = \frac{1}{2} - \frac{1}{2} \cos 2x$$

We have,

$$y = \frac{1}{2} - \frac{1}{2} \cos 2x$$

$$\Rightarrow \qquad y - \frac{1}{2} = -\frac{1}{2} \cos 2x \qquad ---(i)$$

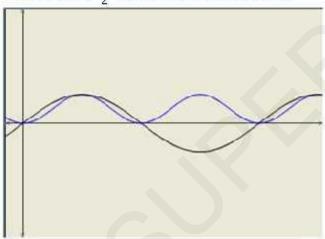
Shifting the origin at  $\left(C, -\frac{1}{2}\right)$ , we obtain

$$X = X, \ y = Y + \frac{1}{2}$$

Substituting these values in (i), we get

$$Y = -\frac{1}{2}\cos 2X.$$

Thus we draw the graph of  $Y = \cos 2X$ , adjust the maximum and minimum values to 1/2 and 1/2 and shift it by  $\frac{1}{2}$  up to get the required graph.



Q9

