

$$c) \quad V^2 = 100x$$

$$4Py = 100x$$

$$P = 100/4$$

$$P = 25$$

$$F = (25, 0)$$

axis of Parabola: axis $y=0$

$$D \cdot E = (m = -25)$$

d)

$$\text{Major} = 10$$

$$M = 8$$

$$c = 0$$

$$c^2 = a^2 - b^2$$

$$= 3.21$$

As

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

$$a > b$$

$$a^2 = 90$$

$$b^2 = 8$$

$$a = 3.21, \quad b = 2.21$$

$$a > b$$

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

$$V = (\pm 3.21, 0)$$

$$V = (0, \pm 2.21)$$

$$F = (\pm c, 0) \quad F = (\pm 0.6210)$$

b)

center of γ

$$(0, b)$$

$$x^2 + y^2 = r^2$$

$$x^2 + (y-b)^2 = r^2$$

$$(4)^2 + (-b)^2 = r^2$$

And

$$(0)^2 + (2-b)^2 = r^2$$

$$\cancel{4^2 + (-b)^2 = r^2}$$

$$\cancel{b^2 + 4 = r^2}$$

Comparing

$$(b-2)^2 = b^2 + 4$$

$$(-2)(2b-2) = 16$$

$$b = -3$$

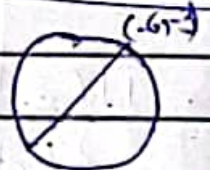
So

$$r^2 = 4^2 + 3^2$$

$$r^2 = 25$$

$$r = 5$$

a)



$$(-2, -1)$$

$$M = \left(\frac{-2-6}{2}, \frac{-1-3}{2} \right)$$

$$= (-4, -2)$$

$$(x+4)^2 + (y+2)^2 = r^2$$

$$\text{Put } (-2, -1)$$

$$\frac{x-x_0}{a} = \frac{y-y_0}{b} = \frac{z-z_0}{c} = 0$$

$$\frac{x-2}{-11} = \frac{y-3}{-12} = \frac{z+3}{20} = d$$

$$x = 11d + 2, \quad y = -12d + 3, \quad z = 20d - 3$$

$$11x - 12y + 20z = 16$$

$$11(11d + 2) - 12(-12d + 3) + 20(20d - 3) = 16$$

$$121d + 22 + 144d - 36 + 400d - 60 = 16$$

$$665d = 90 \quad d = 18/133$$

Question c'

$$e) \left(\frac{x}{25} \right)^2 + \left(\frac{y}{16} \right)^2 = 1$$

$$a = 25$$

$$a^2 = (5)^2$$

$$b = 16$$

$$b = (4)^2$$

$$a > b$$

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

$$\text{Major} = v(\pm a, 0) (\pm 5, 0)$$

$$\text{Minor} = (a, \pm b) (0, \pm 4)$$

$$F = (\pm c, 0) = (\pm 3, 0)$$

$$c = a^2 - b^2$$

$$c^2 = 9, \quad c = 3$$

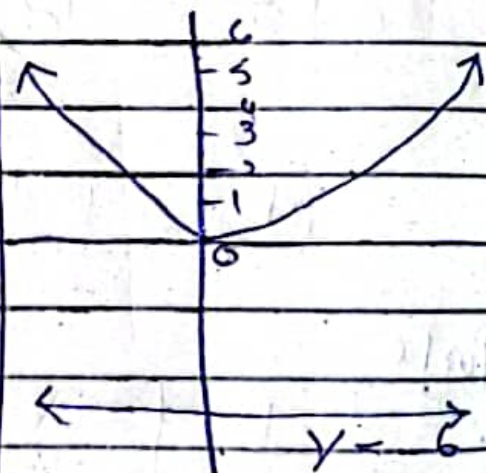
b)

$$x^2 - 24y$$

$$4py = 24y$$

$$p = 6$$

$$V = (0, 0)$$



$$F(0, 6), y_0 = 3, x_0 = 0$$

$$(y-k)^2 = 4p(x-h)$$

$$(x)^2 = 4p(x)$$

$$(\frac{x}{6})^2 = 1$$

Equation

$$ax + by + cz = d$$
$$\bullet (-11)x + (-12)y + 20z = d$$

$$-11x + (-12)y + 20z = d$$

Putting $A = (4, 4, 1)$

$$-11(4) + (-12)(4) + 20 = d$$
$$d = -70$$

$$-11x - 12y + 20z = -70$$

Part :- b

As it is from origin $(0, 0, 0)$

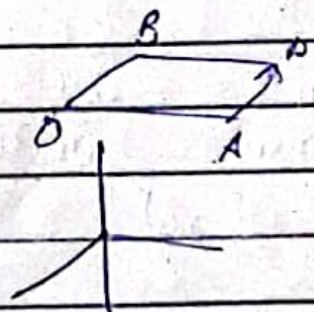
$$d = \frac{-70}{\sqrt{(-11)^2 + (-12)^2 + (20)^2}}$$

$$d = \frac{70}{26.65}$$

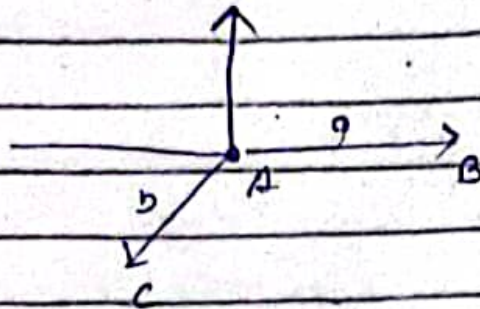
$$d = 2.629$$

Part c

$$D =$$



$$A = (4i + 4j + k), B = (-4j + 3k - 4k) \\ C = (4i - j - 2k)$$



$$a = AB$$

$$b = AC$$

$$a = OB - OA = (-4 + 3 - 4) - (4 + 4 + 1) \\ = (-4 - 4 + 3 - 4 - 4 - 1) \\ = (-8 - 1 - 5)$$

$$b = AC = OC - OA = (4 - 1 - 2) - (4 + 4 + 1) \\ = (4 - 4 - 1 - 4 - 2 - 1) \\ = (0 - 5 - 3)$$

$$a \times b = \begin{vmatrix} i & j & k \\ -8 & -1 & -5 \\ 0 & -5 & -3 \end{vmatrix}$$

$$\begin{vmatrix} i & -1 & -5 \\ -5 & -3 & \end{vmatrix} - j \begin{vmatrix} -8 & -5 \\ 0 & -3 \end{vmatrix} + k \begin{vmatrix} -8 & -1 \\ 0 & -5 \end{vmatrix}$$

$$i(3 - 25) - j(24) + 40k$$

$$= -22i - 24j + 40k = 0$$

$$-11i - 12j + 20k = 0$$

(Q3)

$$u_1 = x(t + y) + z(-2z - y)$$

$$u_2 = (y + t) + y(-2j + k)$$

Shortest

$$a_1 = t + j$$

$$b_1 = -2j - j$$

$$a_2 = j + tk$$

$$b_2 = -2j + k$$

$$a_2 - a_1 = j(0) + tk - t - j = -t + tk$$

$$b_1 \times b_2 = \begin{vmatrix} j & j & k \\ -2 & -1 & 0 \\ 0 & -2 & 1 \end{vmatrix}$$

$$= j(1 - 0) - j(-2 - 0) + k(4)$$

$$= j + 2j + 4k$$

$$|b_1 \times b_2| = \sqrt{21}$$

$$d = \frac{(b_1 \times b_2) \cdot (a_2 - a_1)}{|b_1 \times b_2|}$$

$$= \frac{(j + 2j + 4k) \cdot (-t + tk)}{\sqrt{21}}$$

$$= \frac{-t + 4t}{\sqrt{21}}$$

$$\left| \frac{3t}{\sqrt{21}} \right| = \sqrt{21}$$

$$3t = 21$$

$$-1 = 21/3$$

$$\Rightarrow \boxed{t=7}$$

Q2)

$$A = (7j + 4j - k)$$

$$C = (2j + 7j + 3k)$$

$$B = (11j + 3j)$$

$$D = (2j + 7j + 2k)$$

$$AB \times CD = (1-2)j + (4-12)j - 4k \checkmark$$

unit vector \Rightarrow

$$\frac{AB \times CD}{|AB \times CD|}$$

$$= \frac{(-3j + 2j + 4k)}{\sqrt{(-3)^2 + (2)^2 + 4^2}} = \frac{-j + 4k}{\sqrt{31}}$$

$$31-30$$

$$\sqrt{(1-2)^2 + (4-12)^2 + 16} = 3$$

$$j^2 - 5j + 4 = 0$$

ii) $j=1, 4$

$AB \times BD$

$$j=1, n = 5j + 13j - 7k$$

$$j=4, n_2 = 8j + 25j - 7k$$

ABD

$\nabla AB \times BD$

$$\cos \theta = \frac{|n_1 \cdot n_2|}{|n_1||n_2|}$$

$$= \frac{12}{13}$$

$$= 12.1^\circ$$

$AB \times CD =$

$$\begin{vmatrix} j & j \\ 4 & -1 \\ 0 & -1 \end{vmatrix}$$

$$\begin{vmatrix} -1 & 1 \\ -1 & 2 \end{vmatrix} = j \begin{vmatrix} 4 & -1 \\ 0 & -1 \end{vmatrix} - j \begin{vmatrix} 0 & -1 \\ -1 & 2 \end{vmatrix}$$

$$(2, 3) = \frac{10 - 5j - 24 + 8j - 16}{\sqrt{(2-1)^2 + (12-4)^2 + 4^2}} = 3$$

$$\sqrt{(2-1)^2 + (12-4)^2 + 4^2}$$

$$AB = OB - OA = (11j + 3j) - (7j + 4j - k)$$

$$= (4j - j + k)$$

$$CD = OD - OC = 2j + 7j + 2k - (2j + 6j + 3k) = (0 - j + (-1)k)$$

$$x^2 = 5$$

$$x = \sqrt{5}$$

$$\sqrt{(x+4)^2 + (y+2)^2} = \sqrt{5}$$

Q1(c)

$$OD = (\overset{a}{2}, \overset{b}{3}, \overset{c}{-3}) - (\overset{x_0}{0}, \overset{y_0}{0}, \overset{z_0}{0})$$

$$\frac{x-x_0}{a} = \frac{y-y_0}{b} = \frac{z-z_0}{c}$$

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

$$x = 2\lambda, \quad y = 3\lambda, \quad z = -3\lambda$$

$$-11x - 12y + 20z = 16$$

$$\textcircled{C} \Rightarrow \left(\frac{72}{59}, \frac{108}{59}, \frac{-216}{59} \right)$$

$$-11(2\lambda) + 20(-3\lambda) - 12(3\lambda) = 16$$

$$-22\lambda - 60\lambda - 36\lambda = 16$$

$$-118\lambda = 16$$

$$118\lambda = -16$$

$$\lambda = \frac{-16}{118} = \frac{-8}{59}$$

$$x = 2\left(\frac{-8}{59}\right)$$

$$y = 3\left(\frac{-8}{59}\right)$$

$$z = -3\left(\frac{-8}{59}\right)$$

$$= \frac{-16}{59}$$

$$y = \frac{-24}{59}$$

$$z = \frac{24}{59}$$

Assignment #1.

Multi cal.

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FA21-BEE-109.