

**Q2 (a) If  $\sin y = x \sin(a + y)$ , prove that  $\frac{dy}{dx} = \frac{\sin^2(a + y)}{\sin a}$ .**

**Answer**

$$\Rightarrow \frac{dy}{dx} = \frac{\sin^2(a + y)}{\sin a}$$

$$\Rightarrow \text{If } \sin y = x \sin(a + y)$$

Differentiating both sides w.r.t x, we get

$$\Rightarrow \frac{d}{dx}(\sin y) = \frac{d}{dx}(x \sin(a + y))$$

$$\Rightarrow \cos y \frac{dy}{dx} = 1 \cdot \sin(a + y) + x \cos(a + y) \cdot \frac{dy}{dx}$$

$$\Rightarrow \cos y \frac{dy}{dx} - x \cos(a + y) \cdot \frac{dy}{dx} = \sin(a + y)$$

$$\Rightarrow (\cos y - \frac{\sin y}{\sin(a + y)} \cos(a + y)) \frac{dy}{dx} = \sin(a + y)$$

$$\Rightarrow [\sin y = x \sin(a + y), x \frac{\sin y}{\sin(a + y)}]$$

$$\Rightarrow \left( \frac{\sin(a + y) \cos y - \cos(a + y) \sin y}{\sin(a + y)} \right) \frac{dy}{dx} = \sin(a + y)$$

$$\Rightarrow \frac{\sin(a + y - y)}{\sin(a + y)} \frac{dy}{dx} = \sin(a + y)$$

$$\Rightarrow \frac{dy}{dx} = \frac{\sin^2(a + y)}{\sin a}$$

$\Rightarrow$  Alternative ----

$\Rightarrow$  Since we have  $\sin y = x \sin(a + y)$

$$x = \frac{\sin y}{\sin(a + y)}$$

$\Rightarrow$  Differentiating both sides w.r.t 'y'

$$\Rightarrow \frac{dy}{dx} = \frac{\sin(a + y) \cos y - \cos(a + y) \sin y}{\sin^2(a + y)}$$

$$\Rightarrow \frac{\sin(a + y - y)}{\sin^2(a + y)}$$

$$\Rightarrow \frac{dy}{dx} = 1 / \frac{dy}{dx} = \frac{1}{\sin a / \sin^2(a + y)} = \frac{\sin^2(a + y)}{\sin a}$$

**Q 2 (B) Prove that the straight line  $\frac{x}{a} + \frac{y}{b} = 1$  touches the curve  $y = be^{-x/a}$  at the point where the curve crosses the axis of y.**

**Answer**

$$y = be^{-x/a}$$

$$\Rightarrow \frac{dy}{dx} = be^{-x/a} (-1/a)$$

$$\Rightarrow \frac{-b}{a} e^{-x/a}$$

$$\Rightarrow \left(\frac{dy}{dx}\right)_{(0, b)} = -\frac{b}{a} e^{-0/a} = \frac{-b}{a}$$

so, the equation of the tangent at(0, b) is

$$\Rightarrow y - b = -\frac{b}{a}(x - 0)$$

$$\Rightarrow ay - ab = -bx$$

$$\Rightarrow bx + ay = ab$$

Dividing both side unit 'ab'

$$\Rightarrow \frac{bx}{ab} + \frac{ay}{ab} = \frac{ab}{ab}$$

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

Hence  $\frac{x}{a} + \frac{y}{b} = 1$  touch as the curve  $y = be^{-x/a}$  at(0, b)

**Q3 (a) Evaluate  $\int \frac{1}{\sqrt{x(1-2x)}} dx$**

**Answer**

$$\int \frac{1}{\sqrt{x(1-2x)}} dx = \int \frac{1}{\sqrt{x-2x^2}} dx$$

$$\Rightarrow \frac{1}{\sqrt{2}} \int \frac{1}{\sqrt{-\left(x^2 - \frac{x}{2} + \left(\frac{1}{4}\right)^2 - \left(\frac{1}{4}\right)^2\right)}} dx$$

$$\Rightarrow \frac{1}{\sqrt{2}} \int \frac{1}{\sqrt{\left(\frac{1}{4}\right)^2 - \left(x - \frac{1}{4}\right)^2}} dx$$

$$\Rightarrow \frac{1}{\sqrt{2}} \sin^{-1} \left( \frac{x - 1/4}{1/4} \right) + c$$

$$\Rightarrow \frac{1}{\sqrt{2}} \sin^{-1} (4x - 1) + c$$

Q3 (b) Evaluate  $\int_0^{\pi/2} \frac{\cos \theta}{(1 + \sin \theta)(2 + \sin \theta)} d\theta$

Answer

$$\int_0^{\pi/2} \frac{\cos \theta}{(1 + \sin \theta)(2 + \sin \theta)} d\theta$$

$$\Rightarrow \text{Put } \sin \theta = t, \text{ so that } \cos \theta d\theta = dt$$

$$\text{when } \theta = 0, t = \sin 0 = 0$$

$$\text{when } \theta = \pi/2, t = \sin \pi/2 = 1$$

$$\text{when } \theta = \pi/2, t = \sin \pi/2 = 1$$

$$\Rightarrow I = \int_0^1 \frac{1}{(1+t)(2+t)} dt$$

$$\Rightarrow \frac{1}{(1+t)(2+t)} = \frac{A}{1+t} + \frac{B}{2+t}$$

$$\Rightarrow 1 = A(2+t) + B(1+t)$$

$$\Rightarrow \text{put } t = -1, \text{ we get}$$

$$1 = A(2-1)$$

$$A = 1$$

$$\Rightarrow \text{put } t = -2, \text{ we get}$$

$$1 = B(1-2)$$

$$B = -1$$

$$\Rightarrow \frac{1}{(1+t)(2+t)} = \frac{1}{1+t} - \frac{1}{2+t}$$

$$\Rightarrow I = \int_0^1 \left( \frac{1}{1+t} - \frac{1}{2+t} \right) dt$$

$$\Rightarrow I = (\log(1+t)) \Big|_0^1 - (\log(2+t)) \Big|_0^1$$

$$\Rightarrow (\log(1+1) - \log(1+0)) - (\log(2+1) - \log(2+0))$$

$$\Rightarrow (\log 2 - \log 1) - (\log 3 - \log 2)$$

$$\Rightarrow \log 2 - \log 3 + \log 2$$

$$\Rightarrow 2 \log 2 - \log 3$$

$$\Rightarrow \log 2^2 - \log 3$$

$$\Rightarrow \log 4 - \log 3$$

$$= \log(4/3)$$

**Q4 (a) Prove that** 
$$\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$$

**Answer**

*LHS*

$$\text{let } \Delta = \begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$$

$$\text{let } \Delta \Rightarrow \begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix}$$

Applying  $R_1 - R_1 + R_2 + R_3$ , we get

$$\Delta \Rightarrow \begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix}$$

$$\Rightarrow (a+b+c) \begin{vmatrix} 1 & 1 & 1 \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix}$$

$\Rightarrow$  Applying  $C_3 - C_3 - C_1, C_2 - C_2 - C_1$

$$\Rightarrow (a+b+c) \begin{vmatrix} 1 & 0 & 0 \\ 2b & -a-b-c & 0 \\ 2c & 0 & -a-b-c \end{vmatrix}$$

$$\Rightarrow (a+b+c)^3 \begin{vmatrix} 1 & 0 & 0 \\ 2b & -1 & 0 \\ 2c & 0 & -1 \end{vmatrix} \text{ (taking } (a+b+c) \text{ common from } C_2 \text{ \& } C_3$$

Expanding from  $R_1$

$$\Rightarrow (a+b+c)^3, 1 \begin{vmatrix} -1 & 0 \\ 0 & -1 \end{vmatrix} = (a+b+c)^3 = R.H.S$$

**Q4 (b) Apply Cramer's rule to solve the following system of linear equations**

$$x + y + z = -1$$

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

$$x + 3y + 4z = -6$$

**Answer**

$$x + y + z = -1$$

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

$$x + 3y + 4z = -6$$

$$\Delta = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 3 & 4 \end{vmatrix}$$

Expanding by ' $R_1$ '

$$\Rightarrow 1(8 - 9) - 1(4 - 3) + 1(3 - 2)$$

$$\Rightarrow (-1) - 1(1) + 1(1)$$

$$\Rightarrow -1 - 1 + 1(1)$$

$$\Rightarrow \Delta_1 = \begin{vmatrix} -1 & 1 & 1 \\ -4 & 2 & 3 \\ -6 & 3 & 4 \end{vmatrix}$$

$\Rightarrow$  Expanding by  $R_2$

$$\Rightarrow 1(8 - 9) - 1(16 + 18) + 1(-12 + 12)$$

$$\Rightarrow -1(-1) - 1(2) + 0$$

$$\Rightarrow 1 - 2 = -1$$

$$\Rightarrow \Delta_2 = \begin{vmatrix} 1 & -1 & 1 \\ 1 & 4 & 3 \\ 1 & -6 & 4 \end{vmatrix}$$

Expanding by  $R_1$

$$\Rightarrow 1(-16 + 18) + 1(4 - 3) + 1(-6 + 4)$$

$$\Rightarrow 1(2) + 1(1) + 1(-2)$$

$$\Rightarrow 2 + 1 - 2 = 1$$

$$\Rightarrow \& \Delta_3 = \begin{vmatrix} 1 & 1 & -1 \\ 1 & 2 & -4 \\ 1 & 3 & -6 \end{vmatrix}$$

Expanding by  $R_1$

$$\Rightarrow 1(-12 + 12) - 1(-6 + 4) - 1(3 - 2)$$

$$\Rightarrow 1(0) - 1(-2) - 1(1)$$

$$\Rightarrow 2 - 1 = 1$$

$$\Rightarrow x = \Delta_1/\Delta = -1/-1 = 1$$

$$\Rightarrow y = \Delta_2/\Delta = 1/-1 = -1$$

$$\Rightarrow z = \Delta_3/\Delta = 1/-1 = -1$$

**Q5 (a) Solve**  $x \frac{dy}{dx} + \cot y = 0$ , **given that**  $y = \frac{\pi}{4}$  **when**  $x = \sqrt{2}$

**Answer**

$$x \frac{dy}{dx} + \cot y = 0$$

$$x \frac{dy}{dx} = -\cot y$$

by Separating the variables , we have

$$\Rightarrow \frac{dx}{x} = -\tan y dy$$

Integrating both sides :-

$$\int \frac{1}{x} dx = -\int \tan y dy$$

$$\log |x| = \log |\cos y| + \log |c|$$

$$\log |x| = \log |c \cos y|$$

Taking antilog both sides :-

$$x = c \cos y$$

$$\text{when } y = \frac{\pi}{4}, x = \sqrt{2}$$

$$\sqrt{2} = c \cos \frac{\pi}{4}$$

$$\sqrt{2} = c \cdot \frac{1}{\sqrt{2}}$$

$$c = 2$$

$$x = 2 \cos y$$

**Q5 (b) Solve**  $\frac{dy}{dx} + y \sec x = \tan x$

**Answer**

the given differential equation is

$$\frac{dy}{dx} + \sec x y = \tan x \dots \dots \dots (1)$$

This is a linear equation of the form  $\frac{dy}{dx} + py = Q$ , where

$$P = \sec x, Q = \tan x$$

$$\Rightarrow \text{we have I.F} = e^{\int \sec x dx} = e^{\log(\sec x + \tan x)}$$

$$= \sec x + \tan x$$

multiplying both sides of (1) by  $\sec x + \tan x$  we get

$$\frac{dy}{dx} (\sec x + \tan x) + \sec x (\sec x + \tan x) y = (\tan x (\sec x + \tan x))$$

integrating w.r.t x, we get

$$y(\sec x + \tan x) = \int \tan x (\tan x + \sec x) dx$$

$$\text{(using } y(\text{I.F}) = \int Q(\text{I.F}) dx + c$$

$$= \int \sec x \tan x dx + \int \tan^2 x dx + c$$

$$= y(\sec x + \tan x) = \sec x + \tan x - x + c$$

=

**Q 6(a) Prove that**  $\cos^2 A + \cos^2(A + 120^\circ) + \cos^2(A - 120^\circ) = \frac{3}{2}$

**Answer**

*LHS*

$$\begin{aligned} & \Rightarrow \cos^2 A + \cos^2(A + 120^\circ) + \cos^2(A - 120^\circ) \\ & \Rightarrow \frac{1 + \cos 2A}{2} + \frac{1 + \cos(2A + 240^\circ)}{2} + \frac{1 + \cos(2A - 240^\circ)}{2} \\ & \Rightarrow \frac{3}{2} + \frac{1}{2}(\cos 2A + \cos(2A + 240^\circ) + \cos(2A - 240^\circ)) \\ & \Rightarrow \frac{3}{2} + \frac{1}{2}(\cos 2A + 2 \cos \frac{4A}{2} \cos \frac{480^\circ}{2}) \\ & \Rightarrow \frac{3}{2} + \frac{1}{2}(\cos 2A + 2 \cos 2A \cos 240^\circ) \\ & \Rightarrow \frac{3}{2} + \frac{1}{2}(\cos 2A + 2 \cos 2A \cos(180^\circ + 60^\circ)) \\ & \Rightarrow \frac{3}{2} + \frac{1}{2}(\cos 2A - 2 \cos 2A \cos 60^\circ) \\ & \Rightarrow \frac{3}{2} + \frac{1}{2}(\cos 2A - 2 \cos 2A(\frac{1}{2})) \\ & \Rightarrow \frac{3}{2} + \frac{1}{2}(0) = \frac{3}{2} \text{ RHS} \end{aligned}$$

**Q 6(b) If**  $A + B + C = \pi$ , **prove that**  $\cot \frac{A}{2} + \cot \frac{B}{2} + \cot \frac{C}{2} = \cot \frac{A}{2} \cot \frac{B}{2} \cot \frac{C}{2}$

**Answer**

We have  $A + B + C = \pi$

$$\Rightarrow \frac{A}{2} + \frac{B}{2} + \frac{C}{2} = \frac{\pi}{2}$$

$$\Rightarrow \frac{A}{2} + \frac{B}{2} = \frac{\pi}{2} - \frac{C}{2}$$

Taking 'tan' both sides :-

$$\Rightarrow \frac{\tan \frac{A}{2} + \tan \frac{B}{2}}{1 - \tan \frac{A}{2} \tan \frac{B}{2}} = \cot \frac{C}{2} = \frac{1}{\tan \frac{C}{2}}$$

cross multiplication, we get

$$\Rightarrow \tan \frac{A}{2} \tan \frac{C}{2} + \tan \frac{B}{2} + \tan \frac{C}{2} = 1 - \tan \frac{A}{2} \tan \frac{B}{2}$$

$$\Rightarrow \tan \frac{A}{2} \tan \frac{B}{2} + \tan \frac{B}{2} \tan \frac{C}{2} + \tan \frac{C}{2} \tan \frac{A}{2} = 1$$

Dividing both sides with  $\tan \frac{A}{2} \tan \frac{B}{2} \tan \frac{C}{2}$  we get

$$\Rightarrow \frac{\tan \frac{A}{2} \tan \frac{B}{2}}{\tan \frac{A}{2} \tan \frac{B}{2} \tan \frac{C}{2}} + \frac{\tan \frac{B}{2} \tan \frac{C}{2}}{\tan \frac{A}{2} \tan \frac{B}{2} \tan \frac{C}{2}} + \frac{\tan \frac{C}{2} \tan \frac{A}{2}}{\tan \frac{A}{2} \tan \frac{B}{2} \tan \frac{C}{2}} = \frac{1}{\tan \frac{A}{2} \tan \frac{B}{2} \tan \frac{C}{2}}$$

$$\Rightarrow \frac{1}{\tan \frac{C}{2}} + \frac{1}{\tan \frac{A}{2}} + \frac{1}{\tan \frac{B}{2}} = \frac{1}{\tan \frac{A}{2} \tan \frac{B}{2} \tan \frac{C}{2}}$$

$$\Rightarrow \cot \frac{A}{2} + \cot \frac{B}{2} + \cot \frac{C}{2} = \cot \frac{A}{2} \cot \frac{B}{2} \cot \frac{C}{2}$$

Q7 (a) Find the term independent of 'x' in the expansion of  $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$

Answer

In the expansion of  $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$ , Trh is equal to

$$\begin{aligned} & 9C_r \left(\frac{3x^2}{2}\right)^{9-r} \left(-\frac{1}{3x}\right)^r \\ \Rightarrow & 9C_r \left(\frac{3}{2}\right)^{9-r} x^{18-2r} \left(-\frac{1}{3x}\right)^r x^{-r} \\ \Rightarrow & 9C_r \left(\frac{3}{2}\right)^{9-r} \left(-\frac{1}{3}\right)^r x^{18-3r} \end{aligned}$$

let Trh be the term independent of 'x'

$$\Rightarrow 18 - 3r = 0 \text{ or } r = 6$$

Required term

$$\begin{aligned} Tr_h = T_{6+1} &= 9C_6 \left(\frac{3}{2}\right)^{9-6} \left(-\frac{1}{3}\right)^6 x^{18-3(6)} \\ \Rightarrow & 84 \left(\frac{27}{8}\right) \left(\frac{1}{729}\right) x^0 = \frac{7}{18} \end{aligned}$$

Q7 (b) If the 5<sup>th</sup> term of a G.P. is 16 and the 10<sup>th</sup> term is  $\frac{1}{2}$ , find the G.P. Also find

its 15<sup>th</sup> term.

Answer

let 'a' be the first term and 'r' be the common ratio of the G.P

$$T_n = ar^{n-1}, n \in N$$

$$\text{we have } T_5 = ar^{5-1} = 16$$

$$\& T_{10} = ar^{10-1} = \frac{1}{2}$$

$$\Rightarrow ar^4 = 16 \ \& \ ar^9 = \frac{1}{2}$$

$$\Rightarrow \frac{ar^9}{ar^4} = \frac{1/2}{16} = \frac{1}{32}$$

$$\Rightarrow r^5 = \frac{1}{32} = \left(\frac{1}{2}\right)^5$$

$$\Rightarrow r = \frac{1}{2}$$

$$\Rightarrow ar^4 = 16$$

$$\Rightarrow a\left(\frac{1}{2}\right)^4 = 16;$$

$$\Rightarrow a = 16 * 16 = 256$$

The G.P. is 256, 256 (1/2), 256(1/2)<sup>2</sup>..... or 256, 128, 64 .....

$$\text{Also } T_{15} = ar^{14} = 256 (1/2)^{14} = 1/64$$



**Q8 (a) A line passes through (3, 4) and the sum of its intercepts on the axis is 14, find the equation of the line.**

**Answer**

Let x intercept of the line = a  
y intercept of the line = 14 - a

∴ The equation of a line in intercept form is  $\frac{x}{a} + \frac{y}{14-a} = 1$ .....(1)

This line passes through (3, 4)

$$\Rightarrow \frac{3}{a} + \frac{4}{14-a} = 1$$

$$\Rightarrow \frac{3(14-a) + 4a}{a(14-a)} = 1$$

$$\Rightarrow 3(14-a) + 4a = a(14-a)$$

$$\Rightarrow 42 - 3a + 4a = 14a - a^2$$

$$\Rightarrow a^2 - 13a + 42 = 0$$

$$\Rightarrow a^2 - 6a - 7a + 42 = 0$$

$$\Rightarrow a(a-6) - 7(a-6) = 0$$

$$\Rightarrow (a-6)(a-7) = 0$$

$$\Rightarrow a = 6, 7$$

**CASE - 1**

$$\Rightarrow a = 6$$

$$\text{then } b = 14 - 6 = 8$$

∴ Equation of line will be

$$\Rightarrow \frac{x}{6} + \frac{y}{8} = 1$$

**CASE - 2**

$$\Rightarrow a = 7$$

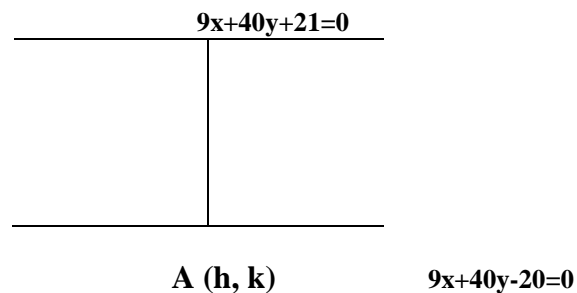
$$\text{then } b = 14 - 7 = 7$$

∴ Equation of line will be

$$\Rightarrow \frac{x}{7} + \frac{y}{7} = 1$$

**Q8 (b) Find the distance between the lines  $9x + 40y - 20 = 0$  and  $9x + 40y + 21 = 0$**

**Answer**



The given lines are

$$9x + 40y - 20 = 0 \dots\dots\dots(1)$$

$$9x + 40y + 21 = 0 \dots\dots\dots(2)$$

Scope of line (1) = scop of line (2),.  $\therefore$  The lines are parallel let A(h,k) lies on the line

$$9h+40k-20=0 \therefore 9h+40k-20=0\dots\dots\dots(3)$$

$\therefore$  Distance from A (h,k) on line  $9h+40k-21=0$

$$\text{is } = > \left| \frac{9h + 40k + 21}{\sqrt{81 + 1600}} \right| = \left| \frac{20 + 21}{\sqrt{1681}} \right| = \left| \frac{41}{41} \right|$$

**Q9 (a) Find the equation of the circle whose centre is the point (1,-2) and which passes through the centre of the circle  $x^2 + y^2 + 2y - 3 = 0$**

**Answer** Let the equation of the required circle be

$$\Rightarrow x^2 + y^2 + 2gx + 2fy + c = 0 \dots\dots\dots(1)$$

$$\Rightarrow \text{Centre is } (-g, -f) = (1, -2)$$

$$\therefore -g = 1, -f = -2$$

$$g = -1, f = 2$$

$$\therefore (1) \Rightarrow x^2 + y^2 - 2x + 4y + c = 0 \dots\dots\dots(2)$$

$$\text{the given circle is } x^2 + y^2 + 2y - 3 = 0 \dots\dots\dots(3)$$

$$\Rightarrow x^2 + y^2 + 2(0)x + 2(1)y - 3 = 0$$

$$\therefore \text{centre of this circle is } (0, -1)$$

the required circle () passes through (0,-1)

$$(0)^2 + (-1)^2 - 2(0) + 4(-1) + c = 0$$

$$0 + 1 - 0 - 4 + c = 0$$

$$c = 3$$

$\therefore$  the equation of required circle is

$$x^2 + y^2 - 2x + 4y - 3 = 0$$

**Alternative**

the centre of the reqd. circle is (1,-2)

$$\text{the given circle is } x^2 + y^2 + 2y - 3 = 0$$

then centre of this circle is(0,-1)

$\therefore$  The required circle is to pass through(0,-1)

$\therefore$  The radius of reqd.circle = distance between (1,-2)(0,-1)

$$\Rightarrow \sqrt{(1-0)^2 + (-2+1)^2}$$

$$\Rightarrow \sqrt{(1+1)} = \sqrt{2}$$

$\Rightarrow$  the equation of the reqd. circle is

haveing centre (1,-2) &  $r = \sqrt{2}$

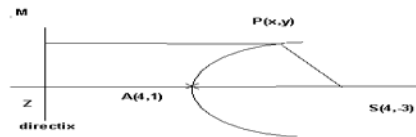
$$(x-1)^2 + (y-(-2))^2 = (\sqrt{2})^2$$

$$\Rightarrow x^2 + 1 - 2x + y^2 + 4 + 4y = 2$$

$$\Rightarrow x^2 + y^2 - 2x + 4y + 3 = 0$$

**Q9 (b) Find the equation of the parabola whose focus is (4,-3) and whose vertex is (4,1).**

**Answer**



Let A (4, 1) be the vertex and s (4,-3) be the focus let the axis meets the directrix at Z.

Let the Co-ordinates of Z be (x,y)

Since A is the mid pt of SZ. , We have

$$\frac{x_1 + 4}{2} = 4, \frac{y_1 - 3}{2} = 1$$

$$x_1 + 4 = 4, y_1 - 3 = 2$$

$$x_1 = 4, y_1 = 5$$

$$\therefore Z(4,5)$$

$$\text{Slope of } SZ = \frac{-3-5}{4-4} = \frac{-8}{0} \text{ (not defined)}$$

Also directrix is  $\perp$  to axis

$\therefore$  Slope of directrix = 0

equation of directrix passing through (4,5) and slope = 0

$$y - 5 = 0(x - 4)$$

$$y - 5 = 0$$

let p(x, y) be any pt on the parabola draw PM  $\perp$  an the directrix.

$$\therefore PS = PM$$

$$\sqrt{(x-4)^2 + (y+3)^2} = \left| \frac{y-5}{\sqrt{(1)^2 + (0)^2}} \right|$$

Squaring both sides :-

$$x^2 + 16 - 8x + y^2 + 9 + 6y = y^2 + 25 - 10y$$

$$\Rightarrow x^2 - 8x + 16y = 0$$

### Text Books

**1. Applied Mathematics for Polytechnics, H. K. Dass, 8th Edition, CBS Publishers & Distributors.**

**2. A Text book of Comprehensive Mathematics Class XI, Parmanand Gupta, Laxmi Publications (P) Ltd, New Delhi.**

**3. Engineering Mathematics, H. K. Dass, S, Chand and Company Ltd, 13th Edition, New Delhi.**