



## DEPARTMENT OF MATHEMATICS

### UNIT-III PARTIAL DIFFERENTIAL EQUATIONS

Type '1

It is of the form  $f(p, q) = 0$ .  
Complete Integral  
Here the solution is  $z = ax + by + c$

(1) solve:  $p^2 + q^2 = 4$

Here solution is  $z = ax + by + c$ .

$$f(p, q) = p^2 + q^2 - 4 = 0$$

$$\Rightarrow f(a, b) = a^2 + b^2 - 4 = 0$$

$$\Rightarrow a^2 + b^2 = 4$$

$$\Rightarrow b^2 = 4 - a^2$$

$$b = \pm \sqrt{4 - a^2}$$

$\therefore$  Complete soln. is  $z = ax \pm (\sqrt{4 - a^2})y + c$ .

(2) solve:  $\sqrt{p} + \sqrt{q} = 1$

soln. is  $z = ax + by + c$ .

$$f(p, q) = \sqrt{p} + \sqrt{q} - 1 = 0$$

$$f(a, b) = \sqrt{a} + \sqrt{b} - 1 = 0$$

$$\Rightarrow \sqrt{a} + \sqrt{b} = 1$$

$$\Rightarrow b = (1 - \sqrt{a})^2$$

$$z = ax \pm (\sqrt{a})y + c$$



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$$\textcircled{3} \quad p+q+pq=0$$

$$f(p, q) = p+q+pq=0$$

$$f(a, b) = a+b+ab=0$$

$$\Rightarrow a+b+ab=0$$

$$\Rightarrow a(1+b)+b=0$$

$$\Rightarrow b = -a(1+b)$$

$$\Rightarrow a = -\frac{b}{1+b}$$

$$\therefore z = -\frac{b}{1+b}x + by + c$$

$$\textcircled{5} \quad p=q^2$$

$$f(p, q) = p-q^2=0$$

$$f(a, b) = a-b^2=0$$

$$\Rightarrow a = b^2$$

$$\therefore z = b^2x + by + c$$