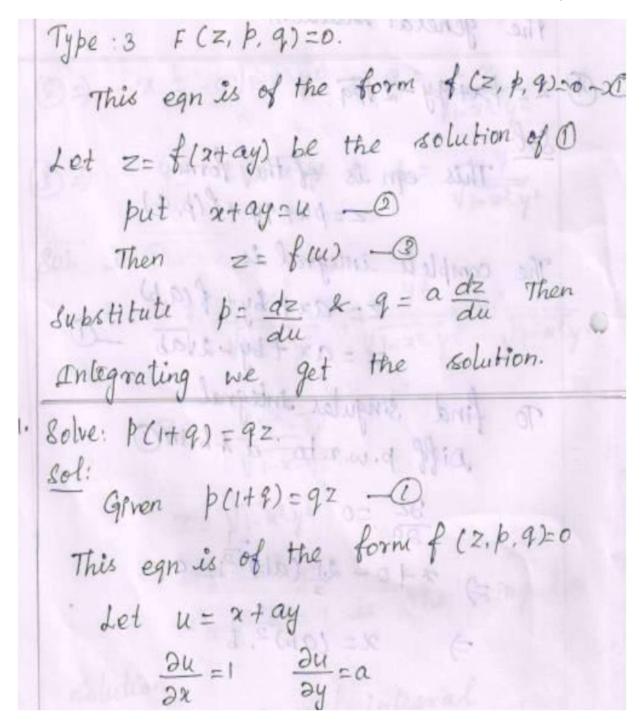




#### **TOPIC: 5 - SOLUTION OF STANDARD TYPES OF FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS**







$$P = \frac{dz}{du} = \frac{9}{2} = \frac{a}{2} \frac{dz}{du}$$

$$O = \frac{dz}{du} \left(1 + \frac{a}{2} \frac{dz}{du}\right) = \frac{az}{du}$$

$$\therefore 1 + \frac{a}{2} \frac{dz}{du} = \frac{az}{dz}$$

$$\frac{a}{2} \frac{dz}{du} = \frac{az}{az}$$

$$\frac{du}{dz} = \frac{a}{az}$$

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$$2 - \frac{a}{az}$$

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$$2 - \frac{a}{az}$$

$$3 - \frac{a}{az}$$

$$4 - \frac{a}{az}$$





Sol: Given 
$$z^2 = 1+p^2+q^2$$
.

Sol: Given  $z^2 = 1+p^2+q^2 = 0$ 

This eqn is of the form  $f(z, p, q) = 0$ 

Let  $u = x + ay$ 

$$\frac{\partial u}{\partial x} = 1 \quad \frac{\partial u}{\partial y} = a$$

$$p = \frac{dz}{du} \quad q = a \frac{dz}{du}$$

$$0 = 2^2 = 1 + \left(\frac{dz}{du}\right)^2 + a^2 \left(\frac{dz}{du}\right)^2$$

$$(\frac{dz}{du})^{2} + (1 + a^{2}) = z^{2} - 1$$

$$(\frac{dz}{du})^{2} = \frac{z^{2} - 1}{a^{2} + 1}$$

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$$(\frac{dz}{du})^{2} = \frac{z^{2} - 1}{a^{2} + 1}$$

$$(\frac{dz}{du})^{2} = \sqrt{a^{2} + 1}$$

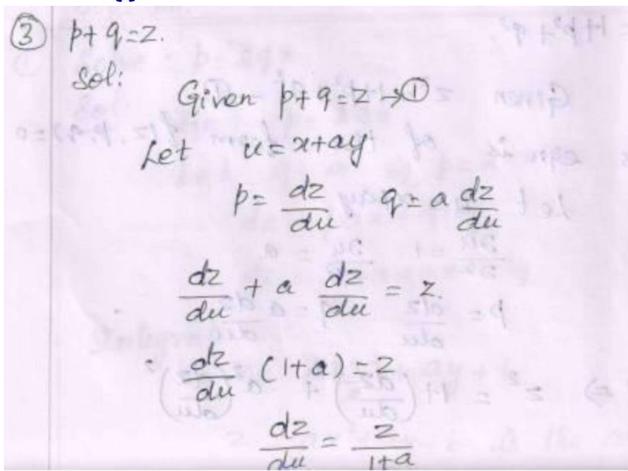
$$(\frac{dz}{du})^{2} = \frac{z^{2} - 1}{a^{2} + 1}$$

$$(\frac{dz}{du})^{2} = \frac{du}{du}$$

$$(\frac{dz}{du})^{2} = \frac{du}$$







(1+a)  $\frac{dz}{z} = du$ (1+a)  $\int \frac{dz}{z} = \int du$ (1+a)  $\log z = u + b$ (1+a)  $\log z = x + ay + b$ . is the





Solice: 
$$P(1-q^2) = q(1-2)$$

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Let  $U = \alpha + \alpha y$ 

$$P = \frac{d^2}{du} = q = a \frac{d^2}{du}$$

$$\frac{d^2}{du} \left(1 - o^2 \left(\frac{d^2}{du}\right)^2\right) = a \frac{d^2}{du} \left(1 - 2\right)$$

$$1 - a^2 \left(\frac{d^2}{du}\right)^2 = a \frac{d^2}{du} \left(1 - 2\right)$$

$$= a - az$$

$$a^2 \left(\frac{d^2}{du}\right)^2 = -a + az + 1$$

$$a \frac{d^2}{du} = \sqrt{1 - a + az}$$

$$\frac{a}{\sqrt{1 - a + az}}$$

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a 
$$(1-a+az)^{\frac{1}{2}}$$
  $dz = du$ 

Antegrating we get
$$\frac{a(1-a+az)^{\frac{1}{2}}}{\frac{1}{2}} = u+b$$

$$\frac{1}{2}g$$

$$2(1-a+az)^{\frac{1}{2}} = x+ay+b \text{ is the complete solution.}$$





Type:civ) (102) 1- 5 Equation containing 2,4, p.q. i) Attach 2 4 p in one side ii) Attach yfq in other side iii) Let it be equal to k iv) find p kg V) dz= pdx + qdy and and and vi) Integrate we get the complete solution. complete solulion @ Solve: p+9 = x+y = d d d d d d d d sol: Gn p-2=y-q=k P-x=k, y-q=k P= 2+K g= y-K dz=pdx+qdy dz = (2+1)dx+ (y-K)dy Integrating,  $Z = \frac{\alpha^2}{3} + K\alpha + \frac{y^2}{2} - Ky + b \text{ is the}$ complete solution Diff p.w.r. to b, 0=1 is absend There is no singular solution O Solve: pq=xy

pq=xy

Integrale.





$$\frac{\beta}{\chi} = \frac{q}{q} = k (6ay)$$

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$$\frac{\beta}{\chi} = \frac{\gamma}{\chi} + \frac{$$





$$Z = \sqrt{K} \int \frac{\alpha}{\sqrt{1+\alpha^2}} dx + K \int y dy + b$$

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