

SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution) Coimbatore-641035.

UNIT-III PARTIAL DIFFERENTIAL EQUATIONS

Solution of First Order Partial Differential Equations

Type 3
$$f(z, p, q) = 0$$

J. 8014e $p(1+q) = qz$

J. 8014e
$$P(1+9) = 92$$

Soln. $G(y)$ $P(1+9) = 92$ (1)

Let
$$u = x + \alpha y$$

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$$u = x + \alpha y$$

Then $b = \frac{\partial z}{\partial x} = \frac{dz}{du}$.



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Type-
$$\overline{m}$$
 $f(x, p, q) = 0$

J. solve $p(1+q) = qx \rightarrow (1)$

Sol_m:

Let $u = x + \alpha y$

Then $P = \frac{dx}{du}$ and $Q = \alpha \frac{dx}{du}$.

(1) $\Rightarrow \frac{dx}{du} \left(1 + \alpha \frac{dx}{du}\right) = \alpha \frac{dx}{du} = \alpha x$
 $1 + \alpha \frac{dx}{du} = \alpha x$
 $\alpha \frac{dx}{du} = \alpha x - 1$
 $\frac{dx}{du} = \frac{\alpha x - 1}{\alpha x}$
 $\frac{du}{dx} = \frac{\alpha}{\alpha x - 1}$
 $du = \frac{\alpha}{\alpha x - 1}$
 $du = \frac{\alpha}{\alpha x - 1}$
 $du = \frac{\alpha}{\alpha x - 1}$
 $dx = \frac{\alpha}{\alpha x - 1}$

Solve
$$x^2 = 1 + p^2 + q^2$$

Solve $x^2 = 1 + p^2 + q^2 \rightarrow (1)$
Let $u = x + ay$

$$P = \frac{dx}{du}$$
, $9 = a \frac{dx}{du}$



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Difficient partial differential equations

$$x^{2} = 1 + \left(\frac{dx}{du}\right)^{2} + \left(\frac{dx}{du}\right)^{2}$$

$$x^{2} = \left(\frac{dx}{du}\right)^{2} \left(1 + \alpha^{2}\right) + 1$$

$$x^{2} - 1 = \left(\frac{dx}{du}\right)^{2} \left(1 + \alpha^{2}\right)$$

$$\left(\frac{dx}{du}\right)^{2} = \frac{x^{2} - 1}{1 + \alpha^{2}}$$

$$\frac{dx}{du} = \sqrt{\frac{x^{2} - 1}{1 + \alpha^{2}}} = \sqrt{\frac{x^{2} - 1}{1 + \alpha^{2}}}$$

$$\frac{dx}{\sqrt{2} - 1} = \frac{du}{\sqrt{1 + \alpha^{2}}}$$

$$\frac{dx}{\sqrt{1 + \alpha^{2}}} = \frac{du}{\sqrt{1 + \alpha^{2}}}$$

$$\frac{dx}{\sqrt{1 + \alpha^{2}}} = \frac{1}{\sqrt{1 + \alpha^{2}}}$$

$$\frac{dx}{\sqrt{1 + \alpha^{2}}} =$$