



(An Autonomous Institution)
Coimbatore-641035.

UNIT-III PARTIAL DIFFERENTIAL EQUATIONS

Solution of First Order Partial Differential Equations

TYPE-IT claseaut's Form Z= >x+9y+f(p,9)

working Rule:

Complete Integral:

Replace $b \rightarrow a$ and $q \rightarrow b$

Strigular Integral:

 $\frac{\partial x}{\partial a} = 0$ and $\frac{\partial x}{\partial b} = 0$

aeneral Integral:

Put $b = \phi(a)$ 90 Complete Integral.

J. Solve Z= Px+9y+ Pg

80/n. :

Gryn. x = px + 94+ pq -> (1)

Complete Integral:

x= ax+by+ab [Replace P>a contegral: 4(2) 9>b

strigular Integral:

 $\frac{\partial x}{\partial a} = 0$ and $\frac{\partial x}{\partial b} = 0$

x+b=0 y+a=0

b = -x a = -9

Subs- a & b 9n (2)

マニーリスースタータ(-ス)

z = - xy

aeneral Integral:

Subs b= p(a) 90 (2),

 $z = ax + \phi(a)y + a \phi(a) \rightarrow (3)$

WKT OX =0

> x+ p'(a) y +a p'(a) + p(a) = 0 - (4)

Elamanate (a) Hw (4)8 (3), we get

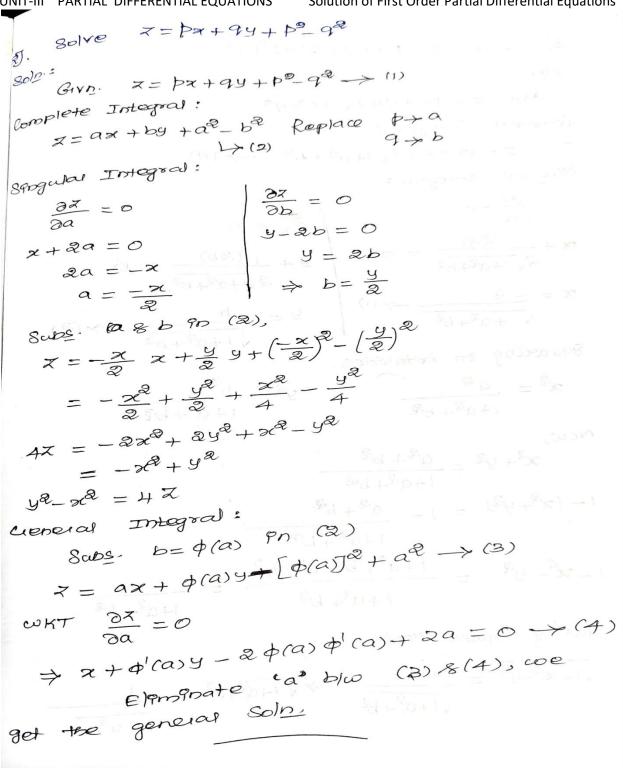
the general Soln.





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$$Z = ax + by + \sqrt{1 + a^2 + b^2} \rightarrow (A)$$

Strigular Integral:
$$\frac{\partial x}{\partial a} = 0$$

$$x + \frac{1}{2\sqrt{1 + a^2 + b^2}} = 0$$

$$x = -\frac{a}{\sqrt{1 + a^2 + b^2}} \rightarrow (1)$$

$$y = -\frac{b}{\sqrt{1 + a^2 + b^2}} \rightarrow (2)$$
Squaring to book as the

Squasting on bothstrates.
$$a^2 = \frac{a^2}{1+a^2+b^2}$$

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

$$y^3 = \frac{b^2}{1+a^3+b^3}$$

$$y^{2} = b^{2}$$

$$1 + a^{2} + b^{2}$$

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

$$1 - (x^2 + y^2) = 1 - \frac{a^2 + b^2}{110^2 + b^2}$$

Now,

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

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

Taking square most,

$$\sqrt{1-x^2-y^2} = \frac{1}{\sqrt{1+x^2+b^2}} \Rightarrow \sqrt{1+x^2+b^2} = \frac{1}{\sqrt{1-x^2-y^2}}$$





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$$(3) \Rightarrow y = -\alpha \sqrt{1-x^2-y^2} \Rightarrow \alpha = -x$$

$$(3) \Rightarrow y = -b \sqrt{1-x^2-y^2} \Rightarrow b = -y$$

$$(3) \Rightarrow x = -x^2 \qquad y^2 \qquad y^2$$