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Subject = Mathematic II

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⊗ B.Tech (E)

Q1 Estimate the general solution of
~~_____~~ $y' = (x+2)y$.

Ans
Solution :-

$$y' + (x+2)y^2 = 0$$

$$y' = -(x+2)y^2$$

$$\frac{dy}{dx} = \del{_____} -(x+2)y^2$$

$$\int \frac{1}{y^2} dy = - \int (x+2) dx$$

$$\int y^{-2} dy = - \int (x+2) dx$$

$$\frac{y^{-1}}{-1} = - \left[\frac{x^2}{2} + 2x \right] + C_1$$

$$y^{-1} = \frac{x^2}{2} + 2x + C_1$$

$$y^{-1} = \frac{x^2}{2} + 2x + C$$

$$y = \frac{1}{\frac{x^2}{2} + 2x + C} \quad \underline{\underline{Ans}}$$

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Q2

Find the general solution of
 $x^2 dx + y^2 dy = 0$

Ans

Solution so

$$x^2 dx + y^2 dy = 0$$

$$\cancel{Mdx} + Ndy = 0$$

$$M = x^2, N = y^2$$

$$\frac{2M}{2y} = 0 \quad \cancel{2N} = 0$$

$$\frac{2M}{2y} = \frac{2N}{2x}$$

So D.E is Exact

$$u = \int M dx + K(y)$$

$$u = \int M dx + K(y)$$

$$u = \frac{x^3}{3} + K(y) \text{ ————— } \textcircled{1}$$

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$$\frac{du}{dy} = 0 + \frac{dy}{dy} k(y)$$

Now,

$$\frac{du}{dy} = N = y^2$$

$$N = \frac{d}{dy} k(y)$$

$$y^2 = \frac{d}{dy} k(y)$$

$$\int d k(y) = \int y^2 dy$$

$$k(y) = \frac{y^3}{3} + C$$

Put in eq (i)

$$u = \frac{x^4}{4} + \frac{y^3}{3} + C \quad \underline{\underline{\text{Ans}}}$$

Q 3

Find the general solution of

$$yy' + 4x = 0$$

Ans

Solution:

$$yy' + 4x = 0$$

$$y \frac{dy}{dx} = -4x$$

$$\int y \, dy = \int -4x \, dx$$

$$\frac{y^2}{2} = \frac{-4x^2}{2} + C$$

$$\frac{y^2}{2} = -2x^2 + C$$

when $x = 0$, $y = 3$

$$\frac{(3)^2}{2} = -2(0)^2 + C$$

$$\boxed{\frac{9}{2} = C}$$

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So particular,

$$\frac{y'}{2} = -2x^2 + \frac{9}{2}$$

$$y' = -4x^2 - 9$$

$$y = -\sqrt{4x^2 + 9} \quad \underline{\underline{\text{Ans}}}$$

