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Class. BS(CS)-4B

Quiz #1

Q1:

Part (i)

SOLUTION OF A DIFFERENTIAL EQUATION:

A Solution of differential equation is a Solution b/w the dependent & independent variable not involving the derivative such that this relation & the derivatives obtained from it satisfies the given differential equation.

EXAMPLE:

$y = ce^{2x}$ is a Solution of differential equation

$\frac{d}{dx}y - 2y = 0$

Part (ii)

PARTICULAR SOLUTION OF A DIFFERENTIAL EQUATION:

A Solution oblained from the general Solution by giving particular values to a Constant is called a particular Solution.

Q2: $Ax^2 + By^2 = 1$ → (1)

$\Rightarrow 2Ax + 2Byy' = 0$

$\Rightarrow Ax + Byy' = 0$

Multiply x on b.s

$Ax^2 + Bxyy' = 0$ → (2)

Subtract eq (2) & eq (1)

$\Rightarrow Bxyy' - By^2 = -1$

$\Rightarrow xyy' - y^2 = -\frac{1}{B}$

Differentiating wrt x.

$x\frac{d(yy')}{dx} + yy' - 2yy' = 0$

$x(yy'' + y' \cdot y') - yy' = 0$

$\Rightarrow xy\frac{d^2y}{dx^2} + x\left(\frac{dy}{dx}\right)^2 - y\frac{dy}{dx} = 0$

Q3:

$$y = x^2 + Ae^{2x} + Be^{3x} \rightarrow (1)$$

$$\frac{dy}{dx} = \frac{d}{dx}(x^2 + Ae^{2x} + Be^{3x})$$

$$y' = 2x + Ae^{2x} \cdot 2 + Be^{3x} \cdot 3 \rightarrow (2)$$

$$y'' = 2 + 4Ae^{2x} + 9Be^{3x} \rightarrow (3)$$

Eq (2) & eq (1)

$$y = x^2 + Ae^{2x} + Be^{3x}$$

$$y' = 2x + 2Ae^{2x} + 3Be^{3x}$$

$$2y = 2x^2 + 2Ae^{2x} + 2Be^{3x}$$

$$y' = 2x \,(1)\, 2Ae^{2x} \,(1)\, 3Be^{3x}$$

$$y' - 2y = 2x - 2x^2 + Be^{3x} \rightarrow (4)$$

eq (3) and (1)

$$y'' = 2 + 4Ae^{2x} + 9Be^{3x}$$

$$4y = (1)\,4x^2 \,(1)\, 4Ae^{2x} \,(1)\, 4Be^{3x}$$

$$y'' - 4y = 2 - 4x^2 + 5Be^{3x} \rightarrow (5)$$

Substract (4) & (5).

$y'' - 4y = 2 - 4x^2 + 5Be^{3x}$

$\oplus 5y' \ominus 10y \oplus 10x \oplus 10x^2 \oplus 5Be^{3x}$

$y'' - 5y' + 6y = 2 - 10x + 6x^2$

$y'' - 5y' + 6y = 6x^2 - 10x + 2$

Ans..