BRAIN INTERNATIONAL SCHOOL

SUBJECT : MATHEMATICS CLASS : XII OCT 2024

CHAPTER : DIIFERENTIAL EQUATIONS

Q1. Write the order and degree of the differential equation $x\frac{dy}{dx} - \cos\left(\frac{d^2y}{dx^2}\right) = 0$.

Q2. Write the order and degree of the differential equation $y = px + \sqrt{1+p^2}$, where $p = \frac{dy}{dx}$.

Q3. Show that the differential equation of which $y = 2(x^2 - 1) + ce^{-x^2}$ is a solution, is $\frac{dy}{dx} + 2xy = 4x^3$.

Q4. Show that the differential equation of which $cy^2 = 1 + 8y^2 \tan x$ is a solution, is $cos^2x\frac{dy}{dx} = 4y^3$.

Q5. Solve each of the following differential equations.

(i) $\sqrt{4-x^2}\,dy + \sqrt{4+y^2}\,dx = 0$

(ii) $e^{\frac{dy}{dx}} = (x+2)$

(iii) $sin^{-1}\left(\frac{dy}{dx}\right) = x + y$

(iv) $\sqrt{1+x^2+y^2+x^2y^2}\ + xy\frac{dy}{dx} = 0$

(v) $\frac{dy}{dx} = \frac{3\left(e^{2x}+e^{4x}\right)}{e^x+e^{-x}}$

(vi) $cos^2\,(x-2y) = 1 - 2\frac{dy}{dx}$

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

(viii) $y + \frac{d}{dx}(xy) = x(\sin x + \log x)$

(ix) $\frac{dy}{dx} + \frac{3x^2}{1+x^3}\ y = \frac{sin^2x}{1+x^3}$

(x) $2x\frac{dy}{dx} = y + 6x^{\frac{5}{2}} - 2\sqrt{x}$

Q6. Find the differential equation of the family of curves given by $y^2 - 2my + x^2 = m^2$.

Q7. Show that $y = \frac{a-x}{1+ax}$ is a solution of the differential equation $(1+x^2)\frac{dy}{dx} + (1+y^2) = 0$

Q8. Solve the differential equation : $\frac{dy}{dx} = \frac{x+y+1}{2x+2y+3}$.

Q9. Solve the differential equation : $(2x + y^3)\frac{dy}{dx} = y$.