DIFFERENTIAL EQUATION

1. The differential equation $\left(\frac{d^2y}{dx^2}\right)^2 - \left(\frac{dy}{dx}\right)^{1/2} = y^3$ has the degree

(a) 1/2 (b) 2 (c) 3 (d) 4

2. The order of the differential equation whose general solution is given by $y = (C_1 + C_2)\cos(x + C_3) - C_4 e^{x+C_5}$ where C_1, C_2, C_3, C_4, C_5 are arbitrary constants, is

(a) 5 (b) 4 (c) 3 (d) 2

3. The degree of the differential equation $3\frac{d^2y}{dx^2} = \left\{1 + \left(\frac{dy}{dx}\right)^2\right\}^{3/2}$ is

(a) 1 (b) 2 (c) 3 (d) 6

4. The order of the differential equation $y\left(\frac{dy}{dx}\right) = x\sqrt{\left[\frac{dy}{dx} + \left(\frac{dy}{dx}\right)^3\right]}$ is

(a) 1 (b) 2 (c) 3 (d) 4

5. The order and degree of the differential equation $\left[4 + \left(\frac{dy}{dx}\right)^2\right]^{2/3} = \frac{d^2y}{dx^2}$ are

(a) 2, 2 (b) 3, 3 (c) 2, 3 (d) 3, 2

6. The degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^{2/3} + 4 - 3\frac{d^2y}{dx^2} + 5\frac{dy}{dx} = 0$ is

(a) 1 (b) 2 (c) 3 (d) None of these

7. The differential equation of the family of circles with fixed radius *r* and with centre on *y*-axis is

(a) $y^2(1 + y_1^2) = r^2 y_1^2$ (b) $y^2 = r^2 y_1 + y_1^2$ (c) $x^2(1 + y_1^2) = r^2 y_1^2$ (d) $x^2 = r^2 y_1 + y_1^2$

8. The differential equation of all parabolas having their axis of symmetry coinciding with the axis of *X* is

(a) $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 0$ (b) $x\frac{d^2x}{dy^2} + \left(\frac{dx}{dy}\right)^2 = 0$ (c) $y\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$ (d) None of these

9. The function $f(\theta) = \frac{d}{d\theta}\int_0^\theta \frac{dx}{1 - \cos\theta\cos x}$ satisfies the differential equation

(a) $\frac{df}{d\theta} + 2f(\theta)\cot\theta = 0$ (b) $\frac{df}{d\theta} - 2f(\theta)\cot\theta = 0$ (c) $\frac{df}{d\theta} + 2f(\theta) = 0$ (d) $\frac{df}{d\theta} - 2f(\theta) = 0$

10. The solution of $\frac{dy}{dx} + \sqrt{\left(\frac{1-y^2}{1-x^2}\right)} = 0$ is

(a) $\tan^{-1}x + \cot^{-1}x = C$ (b) $\sin^{-1}x + \sin^{-1}y = C$ (c) $\sec^{-1}x + \text{cosec}^{-1}x = C$ (d) None of these

11. The solution of the differential equation $\sqrt{a+x}\frac{dy}{dx} + xy = 0$ is

(a) $y = Ae^{\frac{2}{3}(2a-x)\sqrt{x+a}}$ (b) $y = Ae^{-\left(\frac{2}{3}\right)(a-x)\sqrt{x+a}}$ (c) $y = Ae^{\frac{2}{3}(2a+x)\sqrt{x+a}}$ (d) $y = Ae^{-\frac{2}{3}(2a-x)\sqrt{x+a}}$

Where *A* is an arbitrary constant

12. The solution of the given differential equation $\frac{dy}{dx} + 2xy = y$ is

(a) $y = ce^{x-x^2}$ (b) $y = ce^{x^2-x}$ (c) $y = ce^x$ (d) $y = ce^{-x^2}$

13. The general solution of $y^2dx + (x^2 - xy + y^2)dy = 0$

(a) $\tan^{-1}\left(\frac{x}{y}\right) + \log y + c = 0$ (b) $2\tan^{-1}\left(\frac{x}{y}\right) + \log x + c = 0$ (c) $\log(y + \sqrt{x^2+y^2}) + \log y + c = 0$ (d) $\sinh^{-1}\left(\frac{x}{y}\right) + \log y + = 0$

14. The solution of the differential equation $(x^2 + y^2)dx = 2xy\,dy$ is

(a) $x = c(x^2 + y^2)$ (b) $x = c(x^2 - y^2)$ (c) $x + c(x^2 + y^2) = 0$ (d) None of these

15. The solution of the equation $x\frac{dy}{dx} = y - x\tan\left(\frac{y}{x}\right)$ is

(a) $x\sin\left(\frac{x}{y}\right) + c = 0$ (b) $x\sin y + c = 0$ (c) $x\sin\left(\frac{y}{x}\right) = c$ (d) None of these