All Branches Hinglish

Subject : Engineering Mathematics

Chapter : Differential Equation

Topic : Introduction & formation of DE

DPP-01

1. The differential $\frac{d^2y}{dx^2}+\frac{dy}{dx}+\sin y=0$ is

(a) linear (b) non-linear

(c) homogeneous (d) of degree two

2. The necessary and sufficient condition for the differential equation of the form $M(x, y)\,dx + N(x, y)\,dy = 0$ to be exact is

(a) $M = N$ (b) $\frac{\partial M}{\partial x}=\frac{\partial N}{\partial y}$

(c) $\frac{\partial M}{\partial y}=\frac{\partial N}{\partial x}$ (d) $\frac{\partial^2 M}{\partial x^2}=\frac{\partial^2 N}{\partial y^2}$

3. Match each of the items A, B, C with an appropriate item from 1, 2, 3, 4 and 5

(A) $a_1\frac{d^2y}{dx^2}+a_2y\frac{dy}{dx}+a_3y=a_4$

(B) $a_1\frac{d^3y}{dx^3}+a_2y=a_3$

(C) $a_1\frac{d^3y}{dx^2}+a_2x\frac{dy}{dx}+a_3x^2y=0$

(1) non-linear differential equation

(2) linear differential equation with constant coefficients

(3) linear homogeneous differential equation

(4) non-linear homogeneous differential equation

(5) non-linear first order differential equation

(a) A-1, B-2, C-3 (b) A-3, B-4, C-2

(c) A-2, B-4, C-3 (d) A-3, B-1, C-2

4. The differential equation $y'' + (y^3 \sin x)^5\, y' + y = \cos x^3$ is

(a) homogeneous

(b) non-linear

(c) second order linear

(d) non-homogeneous with constant coefficients

5. Biotransformation of an organic compound having concentration (x) can be modeled using an ordinary differential equation $\frac{dx}{dt}+kx^2=0$, where k is the reaction rate constant. If $x = a$ at $t = 0$, the solution of the equation is

(a) $x = ae^{-kt}$ (b) $\frac{1}{x}=\frac{1}{a}+kt$

(c) $x = a(1-e^{-kt})$ (d) $x = a + kt$

6. The following differential equation has

$$3\left(\frac{d^2y}{dt^2}\right)+4\left(\frac{dy}{dt}\right)^3+y^2+2=x$$

(a) degree = 2, order = 1

(b) degree = 1, order = 2

(c) degree = 4, order = 3

(d) degree = 2, order = 3

7. The equation of the curve, for which the angle between the tangent and the radius vector is twice the vectorial angle is $r^2 = A \sin 2\theta$. This satisfies the differential equation

(a) $r\frac{dr}{d\theta}=\tan 2\theta$ (b) $r\frac{d\theta}{dr}=\tan 2\theta$

(c) $r\frac{dr}{d\theta}=\cos 2\theta$ (d) $r\frac{d\theta}{dr}=\cos 2\theta$

8. The differential equation of the family of circles of radius r whose center lies on the x-axis is

(a) $y\frac{dy}{dx}+y^2+r^2$

(b) $y\left(\frac{dy}{dx}+1\right)=r^2$

(c) $y^2\left[\left(\frac{dy}{dx}\right)+1\right]=r^2$

(d) $y^2\left[\left(\frac{dy}{dx}\right)^2+1\right]=r^2$

9. If $x = A\cos(mt - \alpha)$, then the differential equation satisfying this relation is

(a) $\frac{dx}{dt}=1-x^2$ (b) $\frac{d^2x}{dt^2}=-\alpha^2 x$

(c) $\frac{d^2x}{dt^2}=-m^2 x$ (d) $\frac{dx}{dt}=-m^2 x$

10. The solution of the differential equation $2x\frac{dy}{dx}=2-y$ is

(a) $y=2-\sqrt{\frac{c}{x}}$ (b) $y=2+\sqrt{\frac{c}{x}}$

(c) $y=2-c\sqrt{x}$ (d) $y=2+c\sqrt{x}$

Answer Key

1. (b)	**6. (b)**
2. (c)	**7. (b)**
3. (a)	**8. (d)**
4. (b)	**9. (c)**
5. (b)	**10. (a)**

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