RK VISION ACADEMY

NEET | IIT – JEE | FOUNDATION

CBSE PRACTICE PAPER (2024)

(Mathematics)

Grade : XII **Marks: 40 marks**

Chapter: DIFFENTIAL EQUATION Set-1 **Time: 90 minutes**

SECTION A

(This section comprises of Multiple-choice questions (MCQ) of 1 mark each.)

1. The order and degree of the differential equation $\sqrt{\frac{dy}{dx}} - 4\frac{dy}{dx} - 7x = 0$ are

(a)1 and 1/2 (b)2 and 1 (c)1 and 1 (d)1 and 2

2. The differential equation of all circles in the first quadrant which touch the coordinate axes is of order

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

3. The differential equation of the family of curves represented by the equation $x^2y = a$, is

(a) $\frac{dy}{dx} + \frac{2y}{x} = 0$ (b) $\frac{dy}{dx} + \frac{2x}{y} = 0$ (c) $\frac{dy}{dx} - \frac{2y}{x} = 0$ (d) $\frac{dy}{dx} - \frac{2x}{y} = 0$

4. The differential equation of all straight lines passing through the point $(1, -1)$ is

(a) $y = (x+1)\frac{dy}{dx} + 1$ (b) $y = (x+1)\frac{dy}{dx} - 1$ (c) $y = (x-1)\frac{dy}{dx} + 1$ (d) $y = (x-1)\frac{dy}{dx} - 1$

5. The solution of the differential equation $x\cos y dy = (xe^x \log x + e^x)dx$ is

(a) $\sin y = \frac{1}{x}e^x + c$ (b) $\sin y + e^x \log x + c = 0$ (c) $\sin y = e^x \log x + c$ (d)None of these

6. The solution of the differential equation $(1+x^2)\frac{dy}{dx} = x$ is

(a) $y = \tan^{-1} x + c$ (b) $y = -\tan^{-1} x + c$ (c) $y = \frac{1}{2}\log_e (1+x^2) + c$ (d) $y = -\frac{1}{2}\log_e (1+x^2) + c$

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

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

8. The solution of the equation $\frac{dy}{dx} = \frac{x+y}{x-y}$ is

(a) $c(x^2+y^2)^{1/2} + e^{\tan^{-1}}$ (b) $c(x^2+y^2)^{1/2} = e^{\tan^{-1}(y/x}$ (c) $c(x^2-y^2) = e^{\tan^{-1}(y/x)}$ (d) None of these

9. Integrating factor of the differential equation $\frac{dy}{dx} + y\tan x - \sec x = 0$ is

(a) $e^{\sin x}$ (b) $\frac{1}{\sin x}$ (c) $\frac{1}{\cos x}$ (d) $e^{\cos x}$

10 Solution of $\cos x\frac{dy}{dx} + y\sin x = 1$ is

(a) $y\sec x\tan x = c$ (b) $y\sec x\tan x = c$ (c) $y\tan x = \sec x + c$ (d) $y\tan x = \sec x\tan x + c$

SECTION B

(This section comprises of very short answer type-questions (VSA) of 2 marks each.)

11 Find the differential equation of all non vertical lines in a plane.

12 Solve the differential equation $\frac{dy}{dx}$ + 2xy = y

13 Solve: ydx – xdy = x^2ydx

SECTION C

(This section comprises of short answer type questions (SA) of 3 marks each)

14 Solve : x $\frac{dy}{dx}$ = y(log y -log x +1).

15 Find the equation of a curve passing through origin if the slope of the tangent to the curve at any point (x, y) is equal to the square of the difference of the abcissa and ordinate of the point.

16 Find the equation of the curve through the point (1, 0) if the slope of the tangent to the curve at any point (x, y) is $\frac{y-1}{x^2+x}$

SECTION D

(This section comprises of long answer-type questions (LA) of 5 marks each)

17 Find the equation of a curve passing through the point (1, 1) if the perpendicular distance of the origin from the normal at any point P(x, y) of the curve is equal to the distance of P from the x – axis

18 Solve $x^2\frac{dy}{dx} - xy$ = 1 + cos $\frac{y}{x}$, x ≠ 0 and x = 1, y = $\frac{\pi}{2}$.

19 State the type of the differential equation for the equation. xdy – ydx = $\sqrt{x^2+y^2}dx$ and solve it.