Career Makers

Assignment
+2 Class

It's all about believing
Topic: - Differential equations

1. Verify that y = 3 cos (log x) + 4 sin (log x) is a solution of the D.E. $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+y=0$.
2. Form the D.E. of the following family of curves: $xy = A e^x + Be^{-x} + x^2$.
3. Obtain the D.E. from $y = e^x (a \cos x + b \sin x)$, where a and b are arbitrary constants.
4. Form D.E. corresponding to the equation $y = ae^{3x} + be^{-2x}$, where a and b are arbitrary constants.
5. Form the D.E. of family of circles touching y –axis at origin.
6. Form the D.E. of the family of parabolas having vertex at origin and axis.
7. Form the D.E. representing the family of ellipse having foci on x-axis and centre at the origin.
8. Find the D.E. of all circles having centre on x-axis and passing through origin.
9. Find D.E. of all circles which pass through origin and whose centre lie on y – axis.
10. Find D.E. of family of circles touching x-axis at origin.
11. Form the D.E. of the family of circles in the second quadrant and touching the coordinate axes.
12. Let f(x) be a solution of $\frac{2+\sin x}{1+y}\frac{dy}{dx}=-\cos x$. Also when x = 0, y = 1. Find $y\left(\frac{\pi}{2}\right)$.
13. A normal to a given curve at point (x, y) on the curve passes through point (2, 0). If the curve contains the point (2, 3), find its equation.
14. The slope of the tangent at a point P(x, y) on a curve is $-\frac{x}{y}$. If the curve passes through the point (3, -4), find the equation of the curve.
15. Solve the following initial value problems: $\frac{dy}{dx}$ = cos (x + y -1), given that x = 0, y = 1.
16. Solve the following D.E. $\frac{dy}{dx}$ = $(3x – 2y + 1)^2$.
17. Solve the D.E. equation: $y\,dx + \left(2\sqrt{xy}-x\right)dy = 0$.
18. Solve $y\,dx + x\left(\log\frac{y}{x}\right)dy – 2x\,dy = 0$.
19. Solve the following D.E. $(1 + x^2)\,dy + 2xy\,dx = \cot x\,dx$; $x \neq 0$.
20. Solve $(x^2 + 1)\frac{dy}{dx} + 2xy = \sqrt{x^2+4}$.
21. Find particular solution of following D.E. satisfying the given conditions: $\frac{dy}{dx}$ + 2y tan x = sin x; y = 0 when x = $\frac{\pi}{3}$.
22. Find general solution of the D.E. $\sqrt{1+x^2+y^2+x^2y^2}+xy\frac{dy}{dx}=0$.
23. Show that the differential equation $xdy – ydx = \sqrt{x^2+y^2}\,dx$ is homogeneous, and solve it.
24. Find the particular solution of the D.E. cos x dy = sin x (cos x – 2y) dx, given that y = 0 when x = $\frac{\pi}{3}$.
25. Find the particular solution of the D.E. $\frac{dy}{dx}$ = 1 + x = y + xy, given that y = 0 when x = 1.
26. Solve the D.E. $(1 + x)^2\frac{dy}{dx} + y = e^{\tan^{-1}x}$.
27. Find the particular solution of the D.E. $x(1 + y^2)dx – y(1 + x^2)\,dy = 0$, given that y = 1 when x = 0.

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28. Find the particular solution of the D.E. log $\left(\frac{dy}{dx}\right) = 3x + 4y$, given that y = 0 when x = 0

Multiple Choice Question:-

29. If m and n are order and degree of $\left(\frac{d^2y}{dx^2}\right)^5 + 4\frac{\left(\frac{d^2y}{dx^2}\right)^3}{\frac{d^3y}{dx^3}} = x^2 - 1$, then (a) m = 3, n = 2 (b) m = 3, n = 3 (c) m = 3, n = 5 (d) m = 3, n = 1.

30. The number of arbitrary constants in the general solution of a D.E. of fourth order is: (a) 0 (b) 2 (c) 3 (d) 4.

31. The degree and order of D.E. of family of all parabolas whose axis x – axis are respectively: (a) 2, 3 (b) 2, 1 (c) 1, 2 (d) 3, 2.

32. The D.E. equation whose solution is $Ax^2 + By^2 = 1$, where A and B are arbitrary constants is of: (a) second order and second degree (b) first order and second degree (c) first order and first degree (d) second order and first degree.

33. Find the I.F for the following D.E $x\log x\frac{dy}{dx} + y = 2\log x$

34. Find the particular solutions of the D.E $x^2dy = (2xy + y^2)dx$ **given that y=1 when x=1**

35. Find the particular solutions of the D.E $(1+x^2)\frac{dy}{dx} = (e^{m\tan^{-1}x} - y)$ **given that y=1 when x=0**

Answer

2. x y – x^2 + 2 **3.** $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$ **4.y_2 – y_1 – 6y = 0.** **5.$y^2 = x^2 + 2xy\frac{dy}{dx}$** **6.$x\frac{dy}{dx} = 2y$**

7.$x(y\,y_2 + y_1^2) - yy_1 = 0$ **8.$y^2 = x^2 + 2xy\frac{dy}{dx}$** **9.$(x^2 - k^2)\left(\frac{dy}{dx}\right)^2 + x^2 = 0$** **10.$(x^2 - k^2)\left(\frac{dy}{dx}\right)^2 + x^2 = 0$**

11.$(x + y)^2 [1+(y')^2] = [x + yy']^2$ **12.** $\frac{1}{3}$ **13.$x^2 + y^2 - 4x - 5 = 0$** **14.$x^2 + y^2 = 25$** **15.** $\tan\left(\frac{x+y-1}{2}\right) = x$

16. $\frac{1}{2\sqrt{6}}\log\left|\frac{\sqrt{3}+\sqrt{2}(3x-2y+1)}{\sqrt{3}-\sqrt{2}(3x-2y+1)}\right| = x + c$ **17. A y =** $e^{-\sqrt{\frac{x}{y}}}$**, where A =** $\pm$ **18. log** $\frac{y}{x}$ **- 1= c y** **19. Y $(1 + x^2)$ = log |sin x | + c** **20.y $(x^2 + 1)$ =** $\frac{x\sqrt{x^2+4}}{2}$ **+2 log |x +** $\sqrt{x^2+4}$ **| + c** **21.y = cos x – 2 $\cos^2$ x**

22. $\sqrt{1+x^2} + \frac{1}{2}\log\left|\frac{\sqrt{1+x^2}-1}{\sqrt{1+x^2}+1}\right| + \sqrt{1+y^2} = A$ **24.cos x – 2 $\cos^2$x** **25.** $x + \frac{x^2}{2} - \frac{3}{2}$ **26.** $y = \frac{e^{\tan^{-1}x}}{2} + Ce^{-\tan^{-1}x}$

27. $\sqrt{2x^2+1}$ **28. 0 29.d 30.d 31.c 32.d 33.logx**