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Numerical Question Bank for JEE Main

Differential Equations – Questions

1. 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

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

3. The differential equations of all circles passing through origin and having their centers on the *x*-axis is $\frac{dy}{dx} = \frac{y^A - x^B}{2xy}$. Find A+B.

4. The differential equation for the family of curves $x^2 + y^2 - 2ay = 0,$ where *a* is an arbitrary constant, is $(x^2 - y^2)y' = Axy$ **.** Find A.

5. The solution of the differential equation $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$ is $(\tan x)^A = c \cot y$. Find A.

6. If $\frac{dy}{dx} = 1 + x + y + xy$ and $y(-1) = 0,$ then function *y* is $e^{(1+x)^2/A} - 1$. Find A.

7. The solution of $y' = 1 + x + y^2 + xy^2$, $y(0) = 0$ is $y = \tan\left(x + \frac{x^A}{B}\right)$. Find A-B.

8. If $y(t)$ is a solution of $(1 + t)\frac{dy}{dt} - ty = 1$ and $y(0) = -1,$ then $y(1)$ is equal to N. Find -2N.

9. The solution of the equation $x\frac{dy}{dx} = y - x\tan\left(\frac{y}{x}\right)$ is $x\sin\left(\frac{Ay}{x}\right) = c$. Find A.

10. Solution of the equation $ydx - xdy + \log x dx = 0$ is A $y = cx - (B + \log x)$. Find A+B.

11. An integrating factor of the differential equation $\frac{dy}{dx} + \frac{2xy}{1 - x^2} = \frac{x}{\sqrt{1 - x^2}}$ is $(1 - x^A)^{-B}$. Find A+B.

12. Solution of the differential equation $y' = y\tan x - 2\sin x,$ is Ay Cos x = cos Bx + c. Find A+B.

13. The solution of the differential equation $(1 + y^2) + \left(x - e^{\tan^{-1} y}\right)\frac{dy}{dx} = 0,$ is $Axe^{\tan^{-1} y} = e^{B\tan^{-1} y} + k$. Find A – B.

14. If the gradient of the tangent at any point (*x*, *y*) of a curve which passes through the point $\left(1, \frac{\pi}{4}\right)$ is $\left\{\frac{y}{x} - \sin^2\left(\frac{y}{x}\right)\right\},$ then equation of the curve is $y = Ax\cot^{-1}(\log Bx\, e)$. Find A+2B.

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

16. The differential equation representing the family of curves $y^2 = 2c(x + \sqrt{c})$, where *c* is a positive parameter, is of what order?

17. The order of the differential equation whose general solution is given by $y = C_1 e^{2x+C_2} + C_3 e^x + C_4 \sin(x + C_5)$ is

18. A solution of the differential equation $\left(\frac{dy}{dx}\right)^2 - x\frac{dy}{dx} + y = 0$ is y = Ax – B. Find A+B.

19. The rate of increase of bacteria in a certain culture is proportional to the number present. If it doubles in 5 hours then in 25 hours, its number would be N times original. Find N.

20. If $y\cos x + x\cos y = \pi$, then $y''(0)$ is Nπ. Find N.