

DIFFERENTIAL EQUATIONS

Assignment 4 Practice by O.P. GUPTA • M. +91-9650350480

Q01. The degree of the differential equation $x^2 \frac{d^2y}{dx^2} = \left(x \frac{dy}{dx} - y \right)^3$ is

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

Q02. The integrating factor of the differential equation $(x + 3y^2) \frac{dy}{dx} = y$ is

(a) x (b) $\frac{1}{x}$ (c) $\frac{1}{y}$ (d) $-\frac{1}{y}$

Q03. The order and degree of the differential equation $\left(\frac{dy}{dx} \right)^3 + \left(\frac{d^3y}{dx^3} \right)^3 + 5x = 0$ are respectively

(a) 3; 6 (b) 3; 3 (c) 3; 9 (d) 6; 3

Q04. The integrating factor of the differential equation $x \frac{dy}{dx} = 2x^2 + y$ is

(a) x (b) $-x$ (c) $\frac{1}{x}$ (d) $-\frac{1}{x}$

Q05. The integrating factor of the differential equation $x \frac{dy}{dx} - y = \log x$ is

(a) $-\frac{1}{x}$ (b) $-x$ (c) $\frac{1}{x}$ (d) x

Q06. How many arbitrary constants are there in the particular solution of the differential equation $\frac{dy}{dx} = -4xy^2$; $y(0) = 1$?

(a) 1 (b) 2 (c) 3 (d) 0

Q07. If $\frac{dy}{dx} = \frac{x^3 - y^n}{x^2y + xy^2}$ is homogeneous, then value of n must be

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

Q08. For $\frac{dy}{dx} - y = x e^x$, the integration factor is given by $f(x)$. Then $f'(0) =$

(a) e^{-x} (b) 1 (c) -1 (d) None of these

(where $f'(x)$ denotes the derivative of $f(x)$ w.r. to x)

Q09. For the differential equation $\frac{dy}{dx} - y = x e^x$, the solution is given by $y = f(x)$. Then the function $f(x)$ equals

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

(c) $y = e^x \left(c + \frac{x^2}{2} \right)$ (d) None of these

Q10. To solve the differential equation given by $x^2 \frac{dy}{dx} - xy = 1 + \cos\left(\frac{y}{x}\right)$, (where $x \neq 0$), we must substitute

(a) $x = v$

(b) $x = vy$

(c) $e^x = v$

(d) $y = v$

Q11. Integration factor for $\frac{dx}{dy} - x = \sin^2 y$ is

(a) e^y

(b) $\frac{1}{e^y}$

(c) e^x

(d) $\frac{1}{e^x}$

Q12. Find the general solution of the differential equation $\frac{dy}{dx} = a$, where a is an arbitrary constant.

Q13. Write the general solution of differential equation $\frac{dy}{dx} = e^{x+y}$.

Q14. Find the particular solution of the differential equation $\frac{dy}{dx} = y \tan x$, when $y(0) = 1$.

Q15. Solve the following differential equation: $\frac{dy}{dx} = x^3 \operatorname{cosec} y$, given that $y(0) = 0$.

Q16. Write the integrating factor of the differential equation $x \frac{dy}{dx} + 2y = x^2$.

Q17. Write the degree of the differential equation $1 + \left(\frac{dy}{dx} \right)^2 = x$.

Q18. Find the general solution of the differential equation $\frac{dy}{dx} + \frac{1}{x} = \frac{e^y}{x}$.

Q19. Find the general solution of the differential equation $e^{y-x} dy = dx$.

Q20. Solve the differential equation $xdy - ydx = \sqrt{x^2 + y^2} dx$.

Q21. Solve the differential equation $x \sin\left(\frac{y}{x}\right) \frac{dy}{dx} + x - y \sin\left(\frac{y}{x}\right) = 0$. Given that $x = 1$ when $y = \frac{\pi}{2}$.

Q22. Find the general solution of the differential equation $y e^{\frac{x}{y}} dx = \left(x e^{\frac{x}{y}} + y^2 \right) dy$, $y \neq 0$.

Q23. Find the particular solution of the differential equation

$$\cos y dx + (1 + e^{-x}) \sin y dy = 0, \text{ given that } y = \frac{\pi}{4} \text{ when } x = 0.$$

Q24. For the differential equation given below, find a particular solution satisfying the given condition $(x+1) \frac{dy}{dx} = 2e^{-y} + 1$; $y = 0$ when $x = 0$.

Q25. Find the general solution of the differential equation $x^2 y dx - (x^3 + y^3) dy = 0$.

Q26. Find the particular solution of the differential equation $\frac{dy}{dx} + y \sec x = \tan x$, where $x \in \left[0, \frac{\pi}{2} \right]$

given that $y = 1$, when $x = \frac{\pi}{4}$.

Q27. Find the general solution of the following differential equation: $x dy - (y + 2x^2) dx = 0$.

Q28. Solve the differential equation: $\left(1 + e^{\frac{y}{x}} \right) dy + e^{\frac{y}{x}} \left(1 - \frac{y}{x} \right) dx = 0$, $x \neq 0$.

Q29. Find the general solution of the differential equation $y e^y dx = (y^3 + 2x e^y) dy$.

Q30. Find the particular solution of the differential equation

$x \frac{dy}{dx} = y - x \tan\left(\frac{y}{x}\right)$, given that $y = \frac{\pi}{4}$ at $x = 1$.

Q31. Solve : $x \frac{dy}{dx} = y - x \cos^2\left(\frac{y}{x}\right)$.

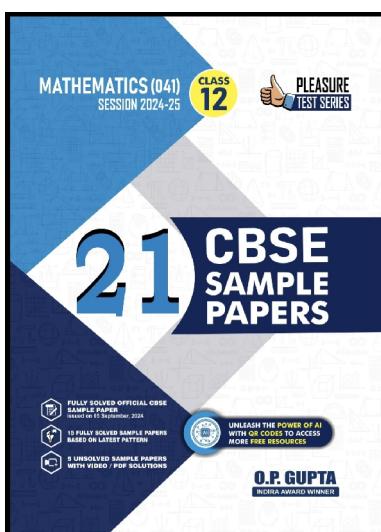
Q32. If $\frac{ax}{y} = b \log|x| + C$ is the solution of D.E. $\frac{dy}{dx} = \frac{2xy - y^2}{2x^2}$ then, find the value of a and b.

Q33. Find the general solution of the following differential equation :

$$x^2 \frac{dy}{dx} - xy = 1 + \cos\left(\frac{y}{x}\right), x \neq 0.$$

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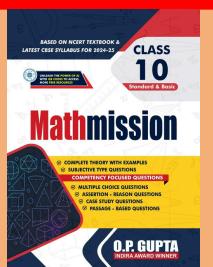
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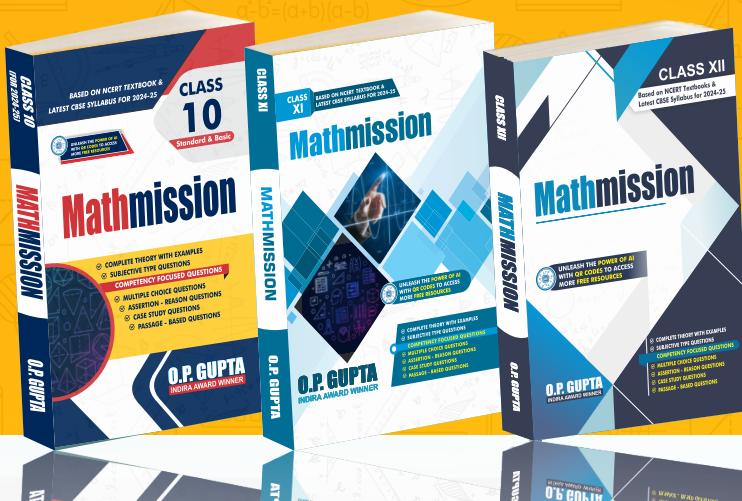
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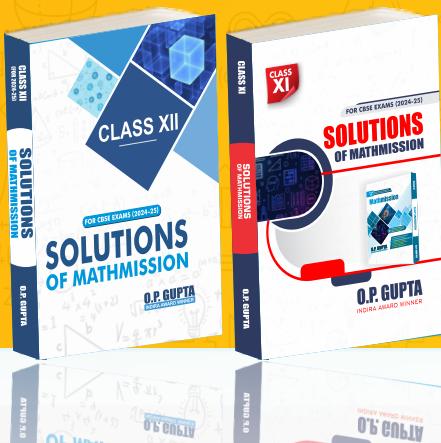


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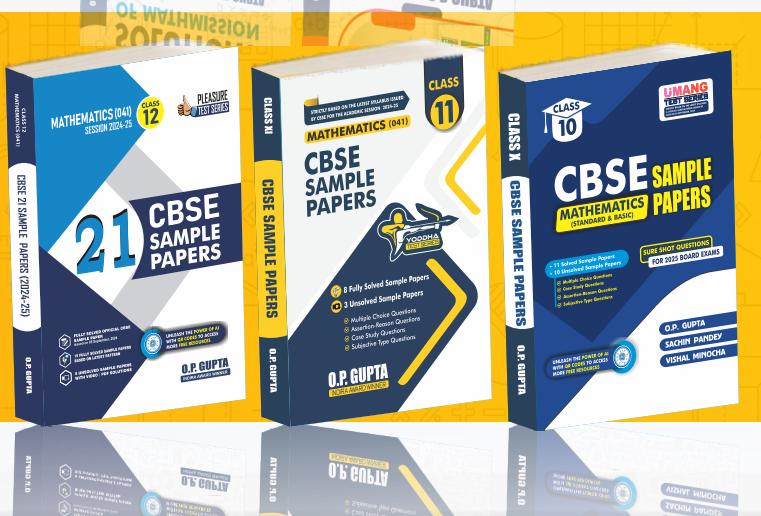
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