

# 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  $x dy - y dx = \sqrt{x^2 + y^2} dx$ .

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

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

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

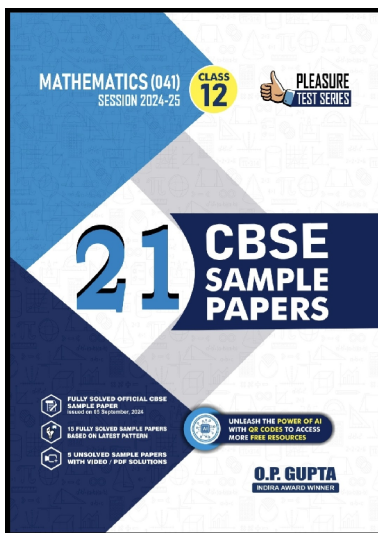
Q32. If  $\frac{ax}{y} = b \log|x| + C$  is the solution of D.E.  $\frac{dy}{dx} = \frac{2xy - y^2}{2x^2}$  then, find the value of a and b.

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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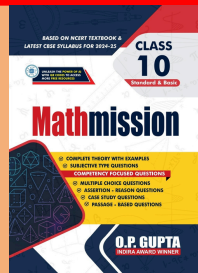
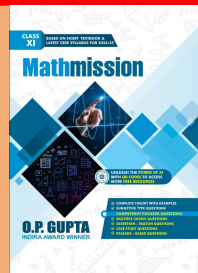
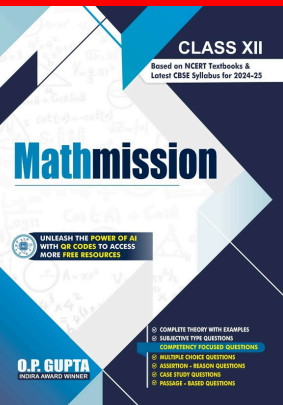
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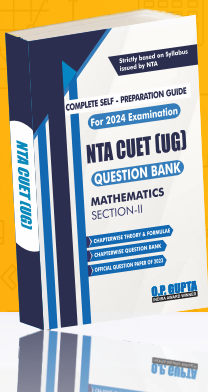


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