

4. Find the solution of the differential equation $\frac{dy}{dx} = x^3 e^{-2y}$.

2 Marks Questions

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

6. Solve the differential equation $\cos\left(\frac{dy}{dx}\right) = a, (a \in R)$.

4 Marks Questions

7. Solve the differential equation $(x+1)\frac{dy}{dx} = 2e^{-y} - 1; y(0) = 0$

8. Solve the following differential equation, $x dy - y dx = \sqrt{x^2 + y^2} dx$, given that $y=0$ when $x=1$

9. Solve the differential equation $(1+x^2)\frac{dy}{dx} + 2xy - 4x^2 = 0$, subject to the initial condition $y(0) = 0$.

10. Solve the differential equation $\frac{dy}{dx} - \frac{2xy}{1+x^2} = x^2 + 2$

11. Solve the following differential equation $x \frac{dy}{dx} = y - x \tan\left(\frac{y}{x}\right)$

12. Solve the differential equation $\frac{dy}{dx} = -\left[\frac{x + y \cos x}{1 + \sin x}\right]$.

13. Find the particular solution of the differential equation $e^x \tan y dx + (2 - e^x) \sec^2 y dy = 0$, given that $y = \frac{\pi}{4}$ when $x = 0$.

1 Mark Questions

1. Find the integrating factor of the differential equation $\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right) \frac{dx}{dy} = 1$.

2. Write the integrating factor of the following differential equation. $(1 + y^2) + (2xy - \cot y) \frac{dy}{dx} = 0$.

3. Write the solution of the differential equation $\frac{dy}{dx} = 2^{-y}$.

14. Find the particular solution of the differential equation $\frac{dy}{dx} + 2y \tan x = \sin x$, given that $y = 0$, when $x = \frac{\pi}{3}$.

15. Solve the differential equation $(x^2 - y^2) dx + 2xy dy = 0$.

16. Find the particular solution of the differential equation

$$(1 + x^2) \frac{dy}{dx} + 2xy = \frac{1}{1 + x^2}, \text{ given that } y = 0, \text{ when } x = 1.$$

17. Show that the family of curves for which $\frac{dy}{dx} = \frac{x^2 + y^2}{2xy}$, is given by $x^2 - y^2 = cx$.

18. Prove that $x^2 - y^2 = c(x^2 + y^2)^2$ is the general solution of the differential equation $(x^3 - 3xy^2) dx = (y^3 - 3x^2y) dy$, where c is a parameter.

19. Solve the differential equation $x \frac{dy}{dx} + y = x \cdot \cos x + \sin x$, given that $y = 1$ when $x = \frac{\pi}{2}$.

20. Solve the differential equation $(\tan^{-1} x - y) dx = (1 + x^2) dy$.

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

22. Find the general solution of the differential equation

$$\frac{dy}{dx} - y = \sin x$$

23. Find the particular solution of the differential equation

$$(1 - y^2)(1 + \log |x|) dx + 2xy dy = 0$$

given that $y = 0$, when $x = 1$.

24. Find the general solution of the following differential equation

$$(1 + y^2) + (x - e^{\tan^{-1} y}) \frac{dy}{dx} = 0$$

25. Find the particular solution of differential equation $\frac{dy}{dx} = -\frac{x + y \cos x}{1 + \sin x}$ given that

$y = 1$, when $x = 0$.

26. Find the particular solution of the differential equation

$$2ye^{x/y} dx + (y - 2xe^{x/y}) dy = 0, \text{ given that } x = 0, \text{ when } y = 1.$$

Or Show that the differential equation

$$2ye^{x/y} dx + (y - 2xe^{x/y}) dy = 0 \text{ is}$$

homogeneous. Find the particular solution of this differential equation, given that $x = 0$, when $y = 1$.

27. Solve the differential equation

$$y + x \frac{dy}{dx} = x - y \frac{dy}{dx}$$

28. Solve the following differential equation

$$y^2 dx + (x^2 - xy + y^2) dy = 0$$

29. Solve the following differential equation

$$(\cot^{-1} y + x) dy = (1 + y^2) dx$$

30. Solve the following differential equation.

$$x \frac{dy}{dx} + y - x + xy \cot x = 0, x \neq 0$$

31. Find the particular solution of the differential equation satisfying the given condition.

$$x^2 dy + (xy + y^2) dx = 0, \text{ when } y(1) = 1$$

32. If $y(x)$ is a solution of the differential equation $\left(\frac{2 + \sin x}{1 + y}\right) \frac{dy}{dx} = -\cos x$ and

$$y(0) = 1, \text{ then find the value of } y\left(\frac{\pi}{2}\right).$$

33. Find the particular solution of the differential equation

$$\frac{dy}{dx} = \frac{x(2 \log |x| + 1)}{\sin y + y \cos y}$$

given that $y = \frac{\pi}{2}$, when $x = 1$.

34. Solve the following differential equation

$$(x^2 - 1) \frac{dy}{dx} + 2xy = \frac{2}{x^2 - 1}, x \neq 1$$

35. Find the particular solution of the differential equation

$$e^x \sqrt{1 - y^2} dx + \frac{y}{x} dy = 0,$$

given that $y = 1$, when $x = 0$.

36. Solve the following differential equation

$$\operatorname{cosec} x \log |y| \frac{dy}{dx} + x^2 y^2 = 0.$$

37. Solve the following differential equation.

$$x \cos \left(\frac{y}{x} \right) \frac{dy}{dx} = y \cos \left(\frac{y}{x} \right) + x; x \neq 0$$

38. Find the particular solution of the differential equation

$$x \frac{dy}{dx} - y + x \operatorname{cosec} \left(\frac{y}{x} \right) = 0$$

39. Find the particular solution of the differential equation

$$\frac{dy}{dx} = 1 + x + y + xy,$$

given that $y = 0$ when $x = 1$.

40. Solve the differential equation

$$(1 + x^2) \frac{dy}{dx} + y = e^{\tan^{-1} x}.$$

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

42. Find the particular solution of the differential equation $x(1 + y^2) dx - y(1 + x^2) dy = 0$, given that $y = 1$, when $x = 0$

43. Solve the differential equation

$$x \log |x| \frac{dy}{dx} + y = \frac{2}{x} \log |x|.$$

44. Solve the differential equation

$$\frac{dy}{dx} + y \cot x = 2 \cos x, \text{ given that } y = 0,$$

when $x = \frac{\pi}{2}$.

45. Solve the differential equation

$$(x^2 - yx^2) dy + (y^2 + x^2 y^2) dx = 0, \text{ given}$$

that $y = 1$, when $x = 1$

46. Solve the following differential equation:

$$x \cos \left(\frac{y}{x} \right) (y dx + x dy) = y \sin \left(\frac{y}{x} \right) (x dy - y dx)$$

Or Solve the following differential equation.

$$\left(x \cos \frac{y}{x} + y \sin \frac{y}{x} \right) y$$

$$- \left(y \sin \frac{y}{x} - x \cos \frac{y}{x} \right) x \frac{dy}{dx} = 0$$

47. Solve the following differential equation

$$\frac{dy}{dx} - y = \cos x, \text{ given that if } x = 0, y = 1.$$

48. Find the particular solution of the following differential equation, given that $x = 2, y = 1$

$$x \frac{dy}{dx} + 2y = x^2, (x \neq 0).$$

49. Find the particular solution of differential equation $\frac{dy}{dx} + y \cot x = 2x + x^2 \cot x$

$x \neq 0$, given that $y = 0$, when $x = \frac{\pi}{2}$.

50. Solve the following differential equation $\frac{dy}{dx} + y \cot x = 4x \operatorname{cosec} x$, given that $y = 0$, when $x = \frac{\pi}{2}$.

51. Find the particular solution of the following differential equation

$$xy \frac{dy}{dx} = (x+2)(y+2); y = -1 \text{ when } x = 1.$$

52. Solve the following differential equation $2x^2 \frac{dy}{dx} - 2xy + y^2 = 0$

53. Solve the following differential equation $\frac{dy}{dx} = 1 + x^2 + y^2 + x^2 y^2$, given that $y = 1$, when $x = 0$.

54. Solve the following differential equation $\frac{dy}{dx} + y \sec x = \tan x$, $(0 \leq x < \frac{\pi}{2})$

55. Solve the following differential equation $x(x^2 - 1) \frac{dy}{dx} = 1$, $y = 0$, when $x = 2$.

56. Solve the following differential equation $(1 + x^2) dy + 2xy dx = \cot x dx$, where $x \neq 0$.

57. Find the particular solution of the following differential equation $x \frac{dy}{dx} - y + x \sin\left(\frac{y}{x}\right) = 0$, given that when $x = 2$, $y = \pi$.

58. Solve the following differential equation. $\left[x \sin^2\left(\frac{y}{x}\right) - y \right] dx + x dy = 0$

59. Solve the following differential equation. $(1 + y^2)(1 + \log|x|) dx + x dy = 0$

60. Solve the following differential equation. $e^x \tan y dx + (1 - e^x) \sec^2 y dy = 0$

61. Show that the following differential equation is homogeneous and then solve it. $y dx + x \log\left|\frac{y}{x}\right| dy - 2x dy = 0$

62. Solve the following differential equation. $(y + 3x^2) \frac{dx}{dy} = x$

63. Solve the following differential equation. $x dy - (y + 2x^2) dx = 0$

64. Solve the following differential equation. $x dy + (y - x^3) dx = 0$

65. Find the particular solution of the differential equation $(1 + e^{2x}) dy + (1 + y^2) e^x dx = 0$, given that $y = 1$, when $x = 0$

66. Solve the following differential equation. $xy \log\left|\frac{y}{x}\right| dx + \left[y^2 - x^2 \log\left|\frac{y}{x}\right| \right] dy = 0$

67. Find the particular solution of the differential equation satisfying the given condition $\frac{dy}{dx} = y \tan x$, given that $y = 1$, when $x = 0$.

68. Solve the following differential equation. $(x^2 + 1) \frac{dy}{dx} + 2xy = \sqrt{x^2 + 4}$

69. Solve the following differential equation. $(x^3 + x^2 + x + 1) \frac{dy}{dx} = 2x^2 + x$

6 Marks Questions

70. Find the particular solution of the differential equation $(x - y) \frac{dy}{dx} = x + 2y$, given that when $x = 1$, $y = 0$.

- 71.** Find the particular solution of the differential equation $\frac{dy}{dx} = \frac{xy}{x^2 + y^2}$ given that $y = 1$, when $x = 0$
- 72.** Show that the differential equation $\left[x \sin^2\left(\frac{y}{x}\right) - y \right] dx + x dy = 0$ is homogeneous. Find the particular solution of this differential equation, given that $y = \frac{\pi}{4}$, when $x = 1$.
- 73.** Solve the differential equation $\frac{dy}{dx} - 3y \cot x = \sin 2x$, given $y = 2$ when $x = \frac{\pi}{2}$.
- 74.** Find the particular solution of the differential equation $(\tan^{-1} y - x) dy = (1 + y^2) dx$, given that $x = 1$ when $y = 0$.
- 75.** Show that the differential equation $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$ is homogeneous and also solve it.
- 76.** Solve the following differential equation. $\sqrt{1 + x^2 + y^2 + x^2 y^2} + xy \frac{dy}{dx} = 0$
- 77.** Solve the following differential equation. $\left[y - x \cos\left(\frac{y}{x}\right) \right] dy + \left[y \cos\left(\frac{y}{x}\right) - 2x \sin\left(\frac{y}{x}\right) \right] dx = 0$
- 78.** Find the particular solution of the differential equation $(3xy + y^2) dx + (x^2 + xy) dy = 0$, for $x = 1$ and $y = 1$.
- 79.** Find the particular solution of the following differential equation given that $y = 0$, when $x = 1$: $(x^2 + xy) dy = (x^2 + y^2) dx$.
- 80.** Show that the differential equation $x \frac{dy}{dx} \sin\left(\frac{y}{x}\right) + x - y \sin\left(\frac{y}{x}\right) = 0$ is homogeneous. Find the particular solution of this differential equation, given that $x = 1$ when $y = \frac{\pi}{2}$.
- 81.** Find the particular solution of the differential equation $\frac{dx}{dy} + x \cot y = 2y + y^2 \cot y$, ($y \neq 0$), given that $x = 0$, when $y = \frac{\pi}{2}$.
- 82.** Find the particular solution of the differential equation $(\tan^{-1} y - x) dy = (1 + y^2) dx$, given that $x = 0$, when $y = 0$.