MATHS

BOOKS - NCERT MATHS (HINGLISH)

DIFFERENTIAL EQUATIONS

Differential Equations

1. Find the solution of $\frac{dy}{dx} = 2^{y-x}$

Watch Video Solution

2. Find the differential equation of all non-vertical lines in a plane.

Watch Video Solution

3. If $\frac{dy}{dx} = e^{-2y}$ and $y = 0$ when $x = 5$, then the value of x for $y = 3$ is

Watch Video Solution

4. Solve the following differential equation:

$$\left(x^2 - 1\right)\frac{dy}{dx} + 2xy = \frac{1}{x^2 - 1};\ |x| \neq 1$$

A. $y.\left(x^2-1\right)=\log\left(\frac{x-1}{x+1}\right)+K$

B. $y=\frac{1}{2}\log\left(\frac{x-1}{x+1}\right)+K$

C. $\left(x^2-1\right)=\frac{1}{2}\log\left(\frac{x-1}{x+1}\right)+K$

D. $y.\left(x^2-1\right)=\frac{1}{2}\log\left(\frac{x-1}{x+1}\right)+K$

Answer: D

Watch Video Solution

5. Solution of $\frac{dy}{dx}+2xy=y$ is (a) $(b)(c)y=c(d)e^e(f)x-(g)x^{((h)2(i))(j)(k)}(l)(m)$ (n) (b)

$(o)(p)y = c(q)e^{r}(s)(t)x^{((u)2(v))(w)-x(x)}(y)(z)$

(aa) (c) $(d)(e)y = c(f)e^{(g)x(h)}(i)(j)$ (k) (d)

$(l)(m)y = c(n)e^{o}(p) - (q)x^{((r)2(s))(t)(u)}(v)(w)$

(x)

Watch Video Solution

6. Find the general solution of $\frac{dy}{dx} + ay = e^{mx}$

Watch Video Solution

7. Solve the following differential equation:

$\frac{dy}{dx} + 1 = e^{x+y}$

Watch Video Solution

8. Solve $ydx - xdy = x^2ydx$.

Watch Video Solution

9. Solve the differential equation $\frac{dy}{dx} = 1 + x + y^2 + xy^2$, when y=0 and x=0.

Watch Video Solution

10. Find the general solution of $\left(x + 2y^3\right)\frac{dy}{dx} = y$

A. $x^2 = y^3 + Cy$

B. $x = y^2 + Cy$

C. $2x = y^3 + Cy$

D. $x = y^3 + Cy$

Answer: D

Watch Video Solution

11. If $y(x)$ is a solution of the differential equation $\left(\frac{2+\sin x}{1+y}\right)\frac{dy}{dx} = -\cos x$ and $y(0) = 1$, then find the value of $y\left(\frac{\pi}{2}\right)$.

Watch Video Solution

12. If $y(t)$ is a solution of $(1+t)\frac{dy}{dx} - ty = 1 and y(0) = -1$ then show that $y(1) = -\frac{1}{2}$.

Watch Video Solution

13. Form the differential equation having $y = \left(\sin^{-1} x\right)^2 + A\cos^{-1} x + B, where A and B$ are arbitrary constants, as its general solution.

Watch Video Solution

14. Find the differential equation of all the circles which pass through the origin and whose centres lie on y-axis.

Watch Video Solution

15. The equation of curve passing through origin and satisfying the differential equation $(1+x^2)\frac{dy}{dx}+2xy=4x^2$, is

Watch Video Solution

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

Watch Video Solution

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

$$(1y2) + \frac{\left(x - e^{\tan \hat{} \left(\left(-1_{\mathrm{y}}\right)\right)}\right) dy}{dx} = 0$$

Watch Video Solution

18. Find the genergal solution of

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

Watch Video Solution

19. Solve the following differential equations:

$(x + y)(dx - dy) = dx + dy$

Watch Video Solution

20. Solve $2(y + 3) - xy\frac{dy}{dx} = 0$, given that $y(1) = -2$

Watch Video Solution

21. Solve the differential equation $dy = \cos x(2\text{-}y \operatorname{cosec} x)dx$ given that

$y = 2$, when $\mathrm{x}d = \frac{\pi}{2}$

Watch Video Solution

22. From the differential equation by eliminating A and B in $Ax^2 + By^2 = 1$

Watch Video Solution

23. Solve the following differential equation: $\left(1 + y^2\right)\tan^{-1} dx + 2y\left(1 + x^2\right)dy = 0$

Watch Video Solution

24. Find the differential equation of system of cocentric circles with centre (1,2)

Watch Video Solution

25. If $y + \frac{d}{dx}(xy) = x(\sin x + \log x), f \in dy(x)\cdot$

Watch Video Solution

26. Find the general solution of the differential equation $(1 + \tan y)(dx - dy) + 2xdy = 0$

Watch Video Solution

27. Solve: $\frac{dy}{dx} = \sin(x+y) + \cos(x+y)$

Watch Video Solution

28. Find the general solution of $\frac{dy}{dx} - 3y = \sin 2x$

View Text Solution

29. The slope of the tangent at (x, y) to a curve passing through a point $(2, 1)$ is $\frac{x^2 + y^2}{2xy}$, then the equation of the curve is

A. $2(x^2 - y^2) = 3x$

B. $2(x^2 + y^2) = 3x$

C. $(x^2 + y^2) = 3x$

D. $(x^2 + y^2) = 2x$

Answer: A

Watch Video Solution

30. Find the equation of the curve through the point (1,0), if the slope of the tangent to the curve at any point (x,y) is $\frac{y-1}{x^2+x}$

View Text Solution

31. Find the equation of the curve passing through origin if the slope of the tangent to the curve at any point $(x, y) is$ equal to the square of the difference of the abscissa and ordinate of the point.

Watch Video Solution

32. Find the eqution of the curve passing through the point (1,1), if the tangent drawn at any point P(x,y) on the curve meets the coordinate axes at A and B such that P is the mid point of AB.

Watch Video Solution

33. Solve $x\frac{dy}{dx} = y(\log y - \log x + 1)$

Watch Video Solution

34. The degree of the potential equation $\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^2 = x\sin\left(\frac{dy}{dx}\right)is$

A. 1

B. 2

C. 3

D. not defined

Answer: D

Watch Video Solution

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

A. 4

B. $\frac{3}{2}$

C. not defined

D. 2

Answer: D

Watch Video Solution

36. The order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{1/4} + x^{1/5} = 0$ respectively are

A. 2 and 4

B. 2 and 2

C. 2 and 3

D. 3 and 3

Answer: A

Watch Video Solution

37. If $y = e^{-x}(A\cos x + B\sin x)$ then y is a situation of

A. $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} = 0$

B. $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$

C. $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = 0$

D. $\frac{d^2y}{dx^2} + 2y = 0$

Answer:

Watch Video Solution

38. The differential equation for $y = A\cos\alpha x + B\sin\alpha x$, where A and B are arbitary constant is

A. $\frac{d^2y}{dx^2} - \alpha.^2 y = 0$

B. $\frac{d^2y}{dx^2} + \alpha.^2 y = 0$

C. $\frac{d^2y}{dx^2} + \alpha y = 0$

D. $\frac{d^2y}{dx^2} - \alpha y = 0$

Answer: B

Watch Video Solution

39. The solution of differential equation xdy-ydx=0 represents

A. a reactangular hyperbola

B. parabola whose vertex is at orgin

C. straight line passing through origin

D. a circle whose centre is at origin

Answer: C

Watch Video Solution

40. The integrating factor of differential equation $\cos x \frac{dy}{dx} + y \sin x = 1$ is

A. cos x

B. tan x

C. sec x

D. sin x

Answer: C

Watch Video Solution

41. The solution of differential equation $\cos x \frac{dy}{dx} + y \sin x = 1$

A. $\tan x + \tan y = k$

B. $\tan x - \tan y = k$

C. $\frac{\tan x}{\tan y} = k$

D. $\tan x . \tan y = k$

Answer: D

View Text Solution

42. The family $y = Ax + A^3$ of curves is represents by differential equation of degree

A. 1

B. 2

C. 3

D. 4

Answer:

Watch Video Solution

43. The integrating factor of $\frac{xdy}{dx} - y = x^4 - 3x$is

A. x

B. log x

C. $\frac{1}{x}$

D. $-x$

Answer:

Watch Video Solution

44. The solution of $\frac{dy}{dx} - y = 1, y(0) = 1$ is given by

A. $xy = -e^x$

B. $xy = -e^{-x}$

C. $xy = -1$

D. $y = 2e^x - 1$

Answer: D

Watch Video Solution

45. The number of solution of $\frac{dy}{dx} = \frac{y+1}{x-1}$ when $y(1) = 2$ is

A. none

B. one

C. two

D. inifinite

Answer:

Watch Video Solution

46. Which of the following is a second order differential equatoin

A. $(y')^2 + x = y^2$

B. $y'y'' + y = \sin x$

C. $y''' + (y'')^2 + y = 0$

D. $y' = y^2$

Answer:

Watch Video Solution

47. The integrating factor of differential euation $(1-x^2)\frac{dy}{dx} - xy = 1$is

A. $-x$

B. $\frac{x}{1+x^2}$

C. $\sqrt{1-x^2}$

D. $\frac{1}{x}\log(1-x^2)$

Answer: C

Watch Video Solution

48. $\tan^{-1} x + \tan^{-1} y = C$ is general solution of the differential equation

A. $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$

B. $\frac{dy}{dx} = \frac{1+x^2}{1+y^2}$

C. $(1+x^2)dy + 1(1+y^2)dx = 0$

D. $(1+x^2)dx + 1(1+y^2)dy = 0$

Answer:

Watch Video Solution

49. The differential equation $y\frac{dy}{dx} + x = C$ represents

A. family of hyperbolas

B. family of parabolas

C. family of ellipses

D. family of circles

Answer: D

Watch Video Solution

50. The general solution of $e^x \cos y dx - e^x \sin dy = 0$ is

A. $e^x \cos y = k$

B. $e^x \sin y = k$

C. $e^x = k \cos y$

D. $e^x = k \sin y$

Answer:

Watch Video Solution

51. The degree of differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 + 6y^5 = 0$ is

A. 1

B. 2

C. 3

D. 5

Answer:

Watch Video Solution

52. The solution of $\frac{dy}{dx} + y = e^{-x}, y(0) = 0$ is

A. $y = e^{x}(x - 1)$

B. $y = xe^{-x}$

C. $y = xe^{-x} + 1$

D. $y = (x + 1)e^{-x}$

Answer: B

Watch Video Solution

53. The integrating factor of differential equation $\frac{dy}{dx} + y\tan x - \sec x = 0$ is

A. cos x

B. sec x

C. $e^{\cos x}$

D. $e^{\sec x}$

Answer:

Watch Video Solution

54. The solution of differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ is

A. $y = \tan^{-1} x$

B. $y = x = k(1+xy)$

C. $x = \tan^{-1} y$

D. $\tan(xy) = k$

Answer:

Watch Video Solution

55. The integrating factor of differential equation $\frac{dy}{dx} + y = \frac{1+y}{x}$ is

A. $\frac{x}{x^x}$

B. $\frac{e^x}{x}$

C. xe^x

D. e^x

Answer: B

Watch Video Solution

56. $y = ae^{mx} + b^{-mx}$ satisfies which of the following differential equation?

A. $\frac{dy}{dx} + my = 0$

B. $\frac{dy}{dx} - my = 0$

C. $\frac{d^2y}{dx^2} - m^2y = 0$

D. $\frac{d^2y}{dx^2} + m^2y = 0$

Answer:

Watch Video Solution

57. The solution the differential equation

$\cos x \sin y \, dx + \sin x \cos y \, dy = 0$ is

A. $\frac{\sin x}{\sin y} = C$

B. $\sin x \sin y = C$

C. $\sin x + \sin y = C$

D. $\cos x \cos y = C$

Answer: B

Watch Video Solution

58. The solution of $x\frac{dy}{dx} + y = e^x$ is

A. $y = \frac{e^x}{x} + \frac{C}{x}$

B. $y = \frac{e^x}{x} + \frac{k}{x}$

C. $y = xe^x + k$

D. $x = \frac{e^y}{y} + \frac{k}{y}$

Answer: A

Watch Video Solution

59. The differential equation of the family of curves of $x^2 + y^2 - 2ay = 0$ where a is arbitary constant, is

A. $\left(x^2 - y^2\right)\frac{dy}{dx} = 2xy$

B. $2\left(x^2 + y^2\right)\frac{dy}{dx} = xy$

C. $2\left(x^2 - y^2\right)\frac{dy}{dx} = xy$

D. $\left(x^2 - y^2\right)\frac{dy}{dx} = 2xy$

Answer:

Watch Video Solution

60. The family $y = Ax + A^3$ of curves is represents by differential equation of degree

A. 3

B. 2

C. 1

D. not defined

Answer:

Watch Video Solution

61. The general solution of $\frac{dy}{dx} = 2xe^{x^2-y}$ is

A. $e^{x^2-y} = C$

B. $e^{-y} + e^{x^2} = C$

C. $e^{y} + e^{x^2} + C$

D. $e^{x^2+y} = C$

Answer:

Watch Video Solution

62. The curve for which the slope of the tangent at any point is equal to the ration of the abcissa to the cordinates of the point is

A. an ellipse

B. parabola

C. circle

D. rectangular hyperbola

Answer:

Watch Video Solution

63. The general solution of differential equation $\frac{dy}{dx} = e^{\frac{x^2}{2}} + xy$ is

A. $y = Ce^{-x^2/2}$

B. $y = Ce^{x^2/2}$

C. $y = (x + C)e^{x^2/2}$

D. $y = (C - x)e^{x^2/2}$

Answer:

Watch Video Solution

64. The solution of equation $(2y-1)dx-(2x+3)dy=0$ is

A. $\frac{2x-1}{2y+3}=k$

B. $\frac{2y+1}{2x-3}=k$

C. $\frac{2x+3}{2y-1}=k$

D. $\frac{2x-1}{2y-1}=k$

Answer: C

Watch Video Solution

65. The differential equation for which $y = a\cos x + b\sin x$ is a solution is

A. $\frac{d^2y}{dx^2} + y = 0$

B. $\frac{d^2y}{dx^2} - y = 0$

C. $\frac{d^2y}{dx^2} + (a+b)y = 0$

D. $\frac{d^2y}{dx^2} + (a-b)y = 0$

Answer:

Watch Video Solution

66. The solution of $\frac{dy}{dx} + y = e^{-x}, y(0) = 0$is

A. $y = e^{-x}(x - 1)$

B. $y = xe^{x}$

C. $y = xe^{-x} + 1$

D. $y = xe^{-x}$

Answer: D

Watch Video Solution

67. The order and degree of differential equation:

$$\left(\frac{d^3y}{dx^3}\right)^2 - 3\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^4 = y^4 \text{are}$$

A. 1,4

B. 3,4

C. 2,4

D. 3,2

Answer:

Watch Video Solution

68. The order and degree of differential equation:

$$\left[1+\left(\frac{dy}{dx}\right)^2\right]=\frac{d^2y}{dx^2\text{are}}$$

A. $2, \frac{3}{2}$

B. 2,3

C. 2,1

D. 3,4

Answer: C

Watch Video Solution

69. The differential equation of family of curves of $y^2 = 4a(x + a)$is

A. $y^2 = 4\frac{dy}{dx}\left(\frac{x + dy}{dx}\right)$

B. $2y\frac{dy}{dx} = 4a$

C. $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 0$

D. $2x\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 - y = 0$

Answer:

Watch Video Solution

70. Which of the following is a general solution of

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$$

A. $y = (Ax + B)e^x$

B. $y = (Ax + B)e^{-x}$

C. $y = Ax^x + Be^{-x}$

D. $y = A\cos x + B\sin x$

Answer: A

Watch Video Solution

71. The general solution of $\frac{dy}{dx} + y\tan x = \sec x$ is

A. $y\sec x = \tan x + C$

B. $y\tan x = \sec x + C$

C. $\tan x = y\tan x + C$

D. $x\sec x = \tan y + C$

Answer: A

Watch Video Solution

72. The solution of differential equation $\frac{dy}{dx} + \frac{y}{x} = \sin x$ is

A. $x(y + \cos x) = \sin x + C$

B. $x(y - \cos x) = \sin x + C$

C. $xy \cos x = \sin x + C$

D. $x(y + \cos x) = \cos + C$

Answer: B

Watch Video Solution

73. The general solution of differential equation $\frac{dy}{dx} = e^{\frac{x^2}{2}} + xy$ is

A. $(y+1) = k(e^x + 1)$

B. $y + 1 = e^x + 1 + k$

C. $y = \log\{(y+1)(e^x+1)\}$

D. $y = \log\left\{\frac{e^x + 1}{y+1}\right\} + k$

Answer:

Watch Video Solution

74. The solution of differential equation $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$ is

A. $y = e^{x-y} - x^2 e^{-y} + C$

B. $e^y - e^x = \frac{x^3}{3} + C$

C. $e^x + e^y = \frac{x^3}{3} + C$

D. $e^x - e^y = \frac{x^3}{3} + C$

Answer: B

Watch Video Solution

75. The solution of differential equation $\frac{dy}{dx} + \frac{2xy}{1+x^2} = \frac{1}{(1+x^2)^2}$ is

A. $y(1+x^2) = C + \tan^{-1} x$

B. $\frac{y}{1+x^2} = C + \tan^{-1} x$

C. $y \log(1+x^2) = C + \tan^{-1} x$

D. $(1+x^2) = C + \sin^{-1} x$

Answer: A

Watch Video Solution

76. (i) The degree of the differential equation $\frac{d^2y}{dx^2} + e^{dy/dx} = 0$ is...

(ii) The degree of the differential equation $\sqrt{1 + \left(\frac{dy}{dx}\right)^2} = x$ is.....

(iii) The number of arbitrary constant in the general solution of differential equation of order three is..

(iv) $\frac{dy}{dx} + \frac{y}{x \log x} = \frac{1}{x}$ is an equation of the type....

(v) General solution of the differential equation of the type is givven by...

(vi) The solution of the differential

$\frac{xdy}{dx} + 2y = x^2$ is....

(vii) The solution of $\left(1 + x^2\right)\frac{dy}{dx} + 2xy - 4xy^2 = 0$ is...

(viii) The solution of the differential equation $ydx + (x + y)dy = 0$ is ....

(ix) Genergal solution of $\frac{dy}{dx}\Bigg) + y = \sin x$ is....

(x) The solution of differential equation cot y $dx = xdy$ is....

(xi) The integrating factor of $\frac{dy}{dx} + y = \frac{1 + y}{x}$ is.....

Watch Video Solution

77. State True and False for the following

(i) Integrating factor of the differential of the form $\frac{dx}{dy} + p_1 x = Q_1$ is given by $e^{\int P_1 dy}$.

(ii) Solution of the differential equation of the type $\frac{dx}{dy} + P_1 x = Q_1$ is given by $x \cdot IF = \int (IF) \times Q_1 dy$. (iii) Correct substitution for the solution of the differential equation of the type $\frac{dy}{dx} = f(x, y)$, where $f(x, y)$ is homogeneous function of zero degree is y = vx.

(iv) Correct substitution for the solution of the differential equation of the type $\frac{dy}{dx} = g(x, y)$, where $g(x, y)$ is a homogeneous function of the

degree zero is $x = vy$.

(v) Number of arbitrary constants in the particular solution of a differential equation of order two is two.

(vi) The differential equation representing the family of circles $x^2 + (y - a)^2 = a^2$ will be of order two.

(vii) The solution of $\frac{dy}{dx} = \left(\frac{y}{x}\right)^{1/3}$ is $y^{2/3} - x^{2/3} = c$

(viii) Differential equation representing the family of curve $y = e^x(A\cos x + B\sin x)$ is $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$

.

(ix) The solution of the differential equation $\frac{dy}{dx} = \frac{x+2y}{x}$ is $x + y = kx^2$.

(x) Solution of $\frac{xdy}{dx} = y + x\tan\frac{y}{x}$ is $\sin\left(\frac{y}{x}\right) = cx$

(xi) The differential equation of all non horizontal lines in a plane is $\frac{d^2x}{dy^2} = 0$.

View Text Solution