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MATHS

BOOKS - ACCURATE PUBLICATION

DIFFERENTAL QUATIONS

Example

1. Solve the differential equation $\frac{dy}{dx} = \frac{1}{1+x^2}, y(0) = 3.$

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2. Solve the following differential equations:

$$\frac{dy}{dx} + \frac{1+y^2}{y} = 0$$

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3. Solve the following differential equations:

$$\frac{dy}{dx} - \frac{1+y^2}{y} = 0$$

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4. Find a one parameter family of slolutions of each of the followign differential equations indicating carefully the interval in which the solutions are valid:

$$y' = \left(1+x^2\right)\left(1+y^2\right)$$

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5. For the differential equation, find the general solution:

$$\left(e^{x}+e^{-x}\right)dy-\left(e^{x}-e^{-x}\right)dx=0$$

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6. Solve the differential equation $\left(\frac{dy}{dx}\right)=\frac{\sqrt{1+y^2}}{\sqrt{1+x^2}}$

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7. Solve the differential equation $\left(\frac{dy}{dx}\right)=\frac{\sqrt{1-y^2}}{\sqrt{1-x^2}}$

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8. Find particular solution of differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$,given that y=1 when x=0.

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9. Solve the differential equation $\left(\frac{dy}{dx}\right) = \frac{1+y^2}{1-x^2}$

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10. Solve the following differential equation : $x \sin y dy + (xe^x \log x + e^x)dx = 0.$

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11. Solve the following differential equations:

$x \tan y dy = (xe^x \log x + e^x)dx$

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12. Solve the following differential equations:

$x \cot y dy = (xe^x \log x + e^x)dx$

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13. Solve the differential equation :

$(\tan^2 x + 2\tan x + 5)\left(\frac{dy}{dx}\right) = 2(\tan x + 1)\sec^2 x.$

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14. Solve the differential equation :

$$(\sin^2 x + 2\sin x + 3)\left(\frac{dy}{dx}\right) = 2(\sin x + 1)\cos x.$$

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15. Solve the differential equation :

$$(\cos^2 x + 2\cos x + 3)\left(\frac{dy}{dx}\right) = -2(\cos x + 1)\sin x.$$

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16. Solve the differential equation :

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

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17. Solve the Differential Equation :

$$y\sqrt{4-x^2}dy-\sqrt{2+y^2}dx=0$$

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18. Solve the following differential equations:

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

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19. Solve the following differential equations:

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

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20. Solve the following differential equations

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

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21. Solve :

$$\frac{dy}{dx} = e^{x-y} + x^2 e^{-y} \text{ given that } x = 1, y = 1$$

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22. Solve :

$$\frac{dy}{dx} = e^{x-y} + x^3 e^{-y} \text{ given that } x = 1, y = 1$$

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23. Find the particular solution of : $\frac{dy}{dx} = e^{x-y} + xe^{-y}$, given that x=1, y=1.

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24. For the differential equation, find the general solution: $\frac{dy}{dx} = \frac{1-\cos x}{1+\cos x}$

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25. Solve the differential equation : $\sec^2 x \tan y dx - \sec^2 y \tan x dy = 0$ given that $y = \frac{\pi}{3} atx = \frac{\pi}{4}$.

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26. Solve

$\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0.$

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27. Find the particular solution of the differential equation :

$\sec^2 x \tan y dx - \sec^2 y \tan x dy = 0,$ given that $y = \frac{\pi}{6}, x = \frac{\pi}{3}.$

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28. Find the particular solution of the differential equation :

$\sec^2 x \tan y dx - \sec^2 y \tan x dy = 0,$ given that $y = \frac{\pi}{3}, x = \frac{\pi}{6}.$

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29. Find the particular solution of the differential equation :

$\sec^2 x \tan y dx - \sec^2 y \tan x dy = 0$, given that $y = \frac{\pi}{4}, x = \frac{\pi}{4}$.

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30. Find the particular solution of the differential equation :

$\sec^2 x \tan y dx - \sec^2 y \tan x dy = 0$, given that $y = \frac{\pi}{4}, x = \frac{\pi}{4}$.

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31. Solve the differential equation : $(1+y^2)(1+\log x)dx + xdy = 0$ given that $y = 1 when x = 1$

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32. Solve the differential equation : $(1+e^{2x})dy + (1+y^2)e^{2x}dx = 0$ given that $y = 1 when x = 0$

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33. Find the general solution of the Differential Equation : $\frac{dy}{dx} = \cos^3 x \sin^4 x + x\sqrt{2x+1}$

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34. Solve the following differential equations

$$\frac{dy}{dx} - x^2 \sin^2 x = \frac{1}{x \log x}$$

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

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36. Solve the differential equation : $x(1 + y^2)dx - y(1 + x^2)dy = 0$ given that

$y = 0 when x = 1$

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37. Find the particular solution of the differential equation $x^2 dy - y dx = x dy$ given that $x = 2, y = 1$

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38. Find the particular solution of the differential equation :

$x^2 dy - y dx = 2x dy$ given that $x = 3, y = 1$

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39. Find particular solution satisfying the given condition $\frac{dy}{dx} = y\tan x, y = 1$ when $x = 0$.

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40. Find the particular solution of differential equation : $\cos\left(\frac{dy}{dx}\right) = \frac{1}{3}, y(0) = 2.$

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41. Find the particular solution of differential equation : $\cos\left(\frac{dy}{dx}\right) = \frac{1}{5}, y(0) = 2.$

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42. Find the particular solution of differential equation : $\cos\left(\frac{dy}{dx}\right) = \frac{1}{7}, y(0) = 2.$

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43. Solve the different equation $\frac{dy}{dx} - \sin(x+y)$ or $\sin^{-1}\left(\frac{dy}{dx}\right) = x + y$

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44. Solve the differential equation $\sin^{-1}\left(\frac{dy}{dx}\right) = x - y.$

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45. Solve $\frac{dy}{dx} = \cos(x+y)$ or $\cos^{-1}\left(\frac{dy}{dx}\right) = x+y$

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46. Find the particular solution of $\frac{dy}{dx} = \cos(x+y+1)$, given that $x = 0, y = -1$.

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47. Find the particular solution of : $\frac{dy}{dx} = \cos(x+y-1)$, given that $x = 0, y = 1$

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48. Find the particular solution of : $\frac{dy}{dx} = \cos(x + y + 2)$, given that $x = 0, y = -2$

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49. Solve the differential equation : $x \sec^2\left(\frac{y}{x}\right)dy = \left\{y \sec^2\left(\frac{y}{x}\right) + x\right\}dx.$

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50. Solve the differential equation : $x \cos ec^2\left(\frac{y}{x}\right)dy = \left\{y \cos ec^2\left(\frac{y}{x}\right) + x\right\}dx.$

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51. Solve the differential equation :

$$x\sec\left(\frac{y}{x}\right)\tan\left(\frac{y}{x}\right)dy=\left\{y\sec\left(\frac{y}{x}\right)\tan\left(\frac{y}{x}\right)+x\right\}dx.$$

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52. Solve : $\left(3xy+y^2\right)dx+\left(x^2+xy\right)dy=0.$

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53. Find the general solution of the following

$$\left(x^2+xy\right)dy+\left(3xy+y^2\right)dx=0$$

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54. Find the general solution of the Differential Equation : $2xydx + \left(x^2 + 2y^2\right)dy = 0$

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55. Show that the given differential equation is homogeneous and solve it: $\left(x^2 + xy\right)dy = \left(x^2 + y^2\right)dx$

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56. Solve the differential equation : $(x - y)dy - (x + y)dx = 0.$

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57. Solve: $y + x\frac{dy}{dx} = x - y\frac{dy}{dx}$

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58. Solve the differential equation $\left(x^2 + y^2\right)dx = 2xydy$

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59. Solve: $\left(x^2 - y^2\right)dx - xydy = 0$

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60. Solve the differential equation $2xydy - \left(x^2 + 3y^2\right)dx = 0$

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61. Solve: $(2x - y)dy = (x - 2y)dx$

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62. Solve the following differential equation:

$(3xy + y^2)dx - 3x^2dy = 0$

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63. Solve the following differential equation:

$(5xy + y^2)dx - 5x^2dy = 0$

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64. Find the particular solution of differential equation : $x^2dy - \left(x^2 + xy + y^2\right)dx = 0, y(1) = 1.$

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65. Find the particular solution of differential equation : $x^2dy - \left(3x^2 + xy + y^2\right)dx = 0, y(1) = 1.$

Watch Video Solution

66. Find the particular solution of differential equation : $x^2dy - \left(x^2 + xy + 3y^2\right)dx = 0, y(1) = 1.$

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67. Solve the following differential equations

$$(y^2 - 2xy)\,dx = (x^2 - 2xy)\,dy$$

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68. Solve the differential equation:

$$x\frac{dy}{dx} - y + x\tan\frac{y}{x} = 0$$

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69. Find the particular solution of the differential equation

$$\frac{dy}{dx} - \frac{y}{x} + \sec\left(\frac{y}{x}\right) = 0,\ (x \neq 0),\ \text{given that } y = 0,\ x = 1.$$

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70. Find the particular solution satisfying the given condition:

$\frac{dy}{dx} - \frac{y}{x} + \cos ec\left(\frac{y}{x}\right) = 0, y = 0$ when $x = 1$

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71. Find the particular solution of differential equations :

$\left[x \sin^2\left(\frac{y}{x}\right) - y\right] dx + x dy = 0, y(1) = \frac{\pi}{4}.$

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72. Solve the following differential equation

$\left(x^2 - y^2\right) dx + 2xy dy = 0$ given that y=1 when x=1

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73. Solve the differential equation : $x\frac{dy}{dx} - y = 2x^3$.

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74. Solve the differential equation given that $y = 1$ where x=2

$x\frac{dy}{dx} + y = x^3$

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75. Solve the differential equation:

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

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

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77. Solve:

$$\frac{dy}{dx} + 3y = 2x$$

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78. Solve:

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

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79. Solve:

$$\frac{dy}{dx} + 2y = 3$$

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80. Solve:

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

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81. Solve:

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

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82. Solve:

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

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83. Solve : $x \log x \frac{dy}{dx} + y = \frac{2}{x} \log x.$

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84. Solve:

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

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85. Solve the differential equation : $x \frac{dy}{dx} + 3y = \frac{\log x}{x^3}.$

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86. Solve:

$$x\frac{dy}{dx} + 4y = \frac{\log x}{x^4}$$

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87. Solve the differential equation :

$$\frac{dy}{dx} - \frac{1}{x+1}y = \left(\frac{x}{x+1}\right)e^x$$

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88. Solve the differential equation :

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

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89. Solve $\frac{dy}{dx} + 2y = \sin x$

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90. Solve : $\frac{dy}{dx} + 3y = \cos x$

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91. Solve : $\frac{dy}{dx} + 2y = \sin 2x$

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92. Solve the following differential equation :

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

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

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

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94. Find the particular solution of the differential equation $\cos x\left(\frac{dy}{dx}\right)+y\sin x=4x\cos^2 x,\left(x\neq\frac{\pi}{2}\right)$ given that $y=3,x=0$

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95. Find the particular solution of the differential equation $\left(\frac{dy}{dx}\right) + y\tan x = \sin 2x$ given that $y = 1, x = \pi$.

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96. For the differential equation, find a particular solution satisfying the given condition:

$\frac{dy}{dx} - 3y\cot x = \sin 2x, y = 2$ when $x = \frac{\pi}{2}$

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97. Find the particular solution of the differential equation $\frac{dy}{dx} + y\cot x = 4x\,\mathrm{cosec}\,x, (x \# 0)$, given that $y = 0$ when

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

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98. Find the particular solution of the differential equation : $\cos x \frac{dy}{dx} + y = \frac{4x \cos x}{\sec x + \tan x}, \left(x \neq \frac{\pi}{2}\right)$, given that $y = 0, x = 2$.

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99. Find the particular solution of differential equation : $\tan x \frac{dy}{dx} + y = 2x \tan x + x^2, x \neq 0$, given that y=0 when $x = \frac{\pi}{2}$.

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100. Find the integrating factor for the differential equation :

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

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101. Find the integrating factor for the differential equation :

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

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102. Find the integrating factor for the differential equation :

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

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103. Solve the differential equation $x\frac{dy}{dx} + y = x\cos x + \sin x$, given $y\left(\frac{\pi}{2}\right) = 1$.

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104. Find the particular solution of $\frac{dy}{dx} = 2x + y$, given that $x = 0, y = 0$.

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105. Find the particular solution of : $\frac{dy}{dx} = 3x + y$, given that $x = 0, y = 0$.

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106. Find the particular solution of : $\frac{dy}{dx} = 4x + y$, given that $x = 0, y = 0$.

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Type I Multiple Choice Questions

1. The order of the differential equation:

$2x^2 \frac{d^2y}{dx^2} - 3\frac{dy}{dx} + y = 0$ is:

A. 2

B. 1

C. 0

D. 4

Answer: A

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2. Order of differential equation $\left(\frac{dy}{dx}\right)^3 + 3x\left(\frac{d^2y}{dx^2}\right)^2 = 0$ equals :

A. 3

B. 2

C. 1

D. 4

Answer: B

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3. Order of differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3=\left(\frac{d^2y}{dx^2}\right)^2$ equals :

A. 1

B. 3

C. 2

D. 4

Answer: C

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4. Order of differential equation $x\left(\frac{dy}{dx}\right)^2+\left(\frac{d^2y}{dx^2}\right)^3=0$ equals :

A. 2

B. 3

C. 4

D. 1

Answer: A

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

A. 3

B. 2

C. 0

D. 1

Answer: B

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

A. 3

B. 2

C. 1

D. 1

Answer: C

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7. Order of differential equation $\left(\frac{d^2y}{dx^2}\right) - \left(\frac{dy}{dx}\right)^3 + 3y = 0$ is:

A. 3

B. 2

C. 0

D. 1

Answer: B

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8. Degree of the equation : $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 = x\left(\frac{d^3y}{dx^3}\right)^2$ is :

A. 3

B. 1

C. 2

D. None of these

Answer: C

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9. Degree of the equation : $5x\left(\frac{dy}{dx}\right)^2 - \frac{d^2y}{dx^2} - 6y = \log x$ is :

A. 3

B. 2

C. 1

D. 0

Answer: C

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10. Degree of the equation : $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 0$ is :

A. 3

B. 2

C. 1

D. 0

Answer: C

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11. The degree of differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + \sin\left(\frac{dy}{dx}\right) = 0$ is equal to

A. 1

B. 2

C. 3

D. None of these

Answer: D

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12. The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^2 + \sin\left(\frac{dy}{dx}\right) + 1 = 0$ is:

A. 3

B. 2

C. 1

D. Not defined

Answer: D

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13. The degree of the differential equation ((d^2y)/(dx^2))^3 + cos(dy/dx) = 0` is equal to :

A. 1

B. 2

C. 3

D. None of these

Answer: D

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14. Degree of the differential equation : $\log\left(\frac{dy}{dx}\right)^{\frac{1}{2}} = 3x + 4y$ is :

A. 2

B. 1

C. 0

D. 3

Answer: B

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15. Degree of the differential equation $\frac{\log\left(\frac{dy}{dx}\right)^1}{2} = 5x + 4y$ is :

A. 2

B. 1

C. 0

D. 3

Answer: B

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16. Degree of the differential equation : $\log\left(\frac{dy}{dx}\right)^{\frac{1}{2}} = 4x + 3y$ is :

A. 2

B. 1

C. 0

D. 3

Answer: B

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17. Degree of differential equation $x^2\left(\frac{dy}{dx}\right)^3 - y\frac{d^2y}{dx^2} = 0$ is :

A. 1

B. 2

C. 3

D. 4

Answer: A

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18. The number of arbitrary constants in the particular solution of a differential equation of Third order is :

A. 3

B. 2

C. 1

D. 0

Answer: D

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19. The number of arbitrary constants in the particular solution of a differential equation of Second order is :

A. 2

B. 1

C. 3

D. 0

Answer: D

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20. The number of arbitrary constants in the particular solution of a differential equation of Fourth order is :

A. 4

B. 2

C. 1

D. 0

Answer: D

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21. The general solution of differential equation : $ydy + xdx = 0$ is :

A. $x^2 + y^2 = c$

B. $y^2 = x^2 + c$

C. $y^2 = cx^2$

D. $x^2 + y^2 = c$

Answer: A

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22. The general solution of differential equation : $\frac{dy}{dx} = e^{x+y}$ is equal to :

A. $e^x - e^y = c$

B. $e^y - e^x = c$

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

D. $e^{-x} + e^{-y} = c$

Answer: C

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23. The general solution of differential equation : $\frac{dy}{dx} = e^{x-y}$ is equal to :

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

B. $e^{y} - e^{x} = c$

C. $e^{x} + e^{y} = c$

D. $e^{-x} + e^{-y} = c$

Answer: B

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24. The general solution of differential equation : $\frac{dy}{dx} = e^{y-x}$ is equal to :

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

B. $e^y - e^x = c$

C. $e^x + e^y = c$

D. $e^{-x} + e^{-y} = c$

Answer: B

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25. The Integrating Factor of the differentiate equation $\frac{dy}{dx} - 2y = 3x$ is :

A. e^{2x}

B. e^{-2x}

C. e^{x}

D. $2x$

Answer: B

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

A. e^{-x}

B. e^{-y}

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

D. x

Answer: C

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27. Solve the differential equation : $x\left(\frac{dy}{dx}\right) + y = x\log x$

A. $|x|$

B. x^2

C. $\sin x$

D. $\cos x$

Answer: A

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28. I.F. of the differential equation $\frac{dy}{dx} + 2y = e^{-x}$ is

A. e^{2x}

B. e^2

C. 2

D. $\log 2$

Answer: A

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29. I.F. Of the differential equation $\frac{dy}{dx} + 2y = e^{4x}$ is :

A. e^{2x}

B. e^2

C. 2

D. $\log 2$

Answer: A

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30. I.F. Of the differential equation $\frac{dy}{dx} + 2y = e^{3x}$ is :

A. e^{2x}

B. e^2

C. 2

D. $\log 2$

Answer: A

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31. I.F. (Integrating Factor) of the differential equation $\frac{dy}{dx} - y = xe^x$ is :

A. e^x

B. e^{-x}

C. x

D. $\log x$

Answer: B

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32. Integrating factor (I.F.) of the D.E. $\frac{dy}{dx} + y = 1$is

A. e^{-x}

B. e^{x}

C. x

D. x^{2}

Answer: B

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33. Integrating factor of differential equation : $\frac{dy}{dx} + y = 3$ is :

A. x

B. e

C. e^x

D. $\log x$

Answer: C

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34. The Integrating. factor of the differential equation $x\left(\frac{dy}{dx}\right) - 3y = e^{-2x}$ is :

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

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

C. $\frac{1}{x^3}$

D. x^3

Answer: C

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35. The integrating factor of the differential equation $x\frac{dy}{dx} - y = e^{-3x}$ is

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

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

C. x^2

D. x

Answer: B

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36. The general solution of the differential equation $\frac{ydx - xdy}{y} = 0$ is:

A. $xy = C$

B. $x = Cy^2$

C. $y = Cx$

D. $y = Cx^2$

Answer: C

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37. A homogeneous differential equation of the form $\frac{dx}{dy} = h\left(\frac{x}{y}\right)$ can be solved by making the substitution.

A. $y = vx$

B. $v = yx$

C. $x = vy$

D. $x = v$

Answer: C

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38. Which of the following is a homogeneous differential equation?

A. $(4x + 5y + 5)dy - (3y + 2x + 4)dx = 0$

B. $(xy)dx - \left(x^2 + y^3\right)dy = 0$

C. $\left(x^3 + 2y^2\right)dx + 2xydy = 0$

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

Answer: D

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39. The degree of the differential equation $\frac{d^2y}{dx^2} + \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}} = 0$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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40. The degree of the differential equation

$$\frac{d^2y}{dx^2} + 3\left(\frac{dy}{dx}\right)^3 = x^2 \log\left(\frac{d^2y}{dx^2}\right), \text{ is}$$

A. 1

B. 2

C. 3

D. Not defined

Answer: D

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41. The order and degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^2=\frac{d^2y}{dx^2}$ respectively are

A. 1,2

B. 2,2

C. 2,1

D. 4,2

Answer: C

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42. The order of the differential equation of all circles of given radius a is:

A. 1

B. 2

C. 3

D. 4

Answer: B

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43. The solution of the differential equation $2x.\frac{dy}{dx} - y = 3$ represents a family are

A. straight lines

B. circles

C. parabolas

D. ellipses

Answer: C

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

A. e^x

B. $\log x$

C. $\log(\log x)$

D. x

Answer: B

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45. A solution of the differential equation $\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = 0$ is

A. $y = 2$

B. $y = x$

C. $y = 2x - 4$

D. $y = 2x^2 - 4$

Answer: C

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46. Which of the following is not a homogenous function of x and y

A. $x^2 + 2xy$

B. $2x - y$

C. $\cos^2\left(\frac{y}{x}\right) + \frac{y}{x}$

D. $\sin x - \cos y$

Answer: D

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47. Solution of the differential equation $\frac{dy}{x} + y\frac{dy}{y} = 0$ is

A. $\frac{1}{x} + \frac{1}{y} = c$

B. $\log x . \log y = c$

C. $xy = c$

D. $x + y = c$

Answer: C

Watch Video Solution

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

A. $y = \frac{x^2 + c}{4x^2}$

B. $y = \frac{x^2}{4} + c$

C. $y = \frac{x^4 + c}{x^2}$

D. $y = \frac{x^4 + c}{4x^2}$

Answer: D

Watch Video Solution

49. The degree of the differential 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

50. The degree of the differential equation $\frac{d^2y}{dx^2} + \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}} = 0$ is

A. 4

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

C. not defined

D. 2

Answer: C

Watch Video Solution

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

A. 2 and not defined

B. 2 and 2

C. 2 and 3

D. 3 and 3

Answer: A

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52. Solution of differential equation $xdy - ydx = 0$ represents

A. a rectangular hyperbola

B. parabola whose vertex is at origin

C. straight line passing through origin

D. a circle whose centre is at origin

Answer: C

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53. Integrating factor of the differential equation $\cos x \frac{dy}{dx} + y \sin x = 1$ is

A. cos x

B. tanx

C. secx

D. sinx

Answer: C

Watch Video Solution

54. Solution of the differential equation $\tan y \sec^2 x dx + \tan x \sec^2 y dy = 0$ is

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

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

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

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

Answer: D

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55. Family $Y = Ax + A^3$ of curves is represented by the differential equation of degree

A. 1

B. 2

C. 3

D. 4

Answer: A

Watch Video Solution

56. Integrating factor of $x\frac{dy}{dx} - y = x^4 - 3$ is

A. x

B. logx

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

D. $-x$

Answer: C

Watch Video Solution

57. Solve the following differential equations

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

A. $xy = -e^x$

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

C. $xy = -1$

D. $y = e^x - 1$

Answer: D

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

A. none

B. one

C. two

D. infinite

Answer: B

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59. Which of the following is a second order differential equation:

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

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

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

D. $y' = y^2$

Answer: B

Watch Video Solution

60. Integrating factor of the differential equation $(1-x^2)\frac{dy}{dx} - xy = 1d$ is

A. $-x$

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

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

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

Answer: C

Watch Video Solution

61. $\tan^{-1}x + \tan^{-1}y = c$ is the 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. $\left(1+x^2\right)dy + \left(1+y^2\right)dx = 0$

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

Answer: C

Watch Video Solution

62. 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

63. The general solution of $e^x \cos y dx - e^x \sin y dy = 0$ 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: A

Watch Video Solution

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

A. 1

B. 2

C. 3

D. 5

Answer: A

Watch Video Solution

65. 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

66. Integrating factor of the 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: B

Watch Video Solution

67. Find the general solution of the differential equation $\left(\frac{dy}{dx}\right) = \frac{1+y^2}{1+x^2}$

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

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

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

D. $\tan(xy) = k$

Answer: B

Watch Video Solution

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

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

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

C. $xe^x d$

D. e^x

Answer: B

Watch Video Solution

69. The solution of 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. $six + \sin y = c$

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

Answer: B

Watch Video Solution

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

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

B. $y = xe^x + cx$

C. $y = xe^x + k$

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

Answer: A

Watch Video Solution

71. Family $y = Ax + A^3$ of curves will correspond to a differential equation of order

A. 3

B. 2

C. 1

D. Not defined

Answer: C

Watch Video Solution

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

A. $e^{x^2y} - c$

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

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

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

Answer: C

Watch Video Solution

73. The curve for which the slope of the tangent at any point is equal to the ratio of the abscissa to the ordinate of the point is

A. an ellipse

B. parabola whose vertex is at origin

C. circle

D. rectangular hyperbola

Answer: D

Watch Video Solution

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

A. $y = ce^{-\frac{x^2}{2}}$

B. $y = ce^{\frac{x^2}{2}}$

C. $y = (x + c)e^{\frac{x^2}{2}}$

D. $y = (c - x)e^{\frac{x^2}{2}}$

Answer: C

Watch Video Solution

75. The solution of the 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

76. 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

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77. The order and degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^2 - 3\frac{d^2y}{dx^2} + 2\left(\frac{dy}{dx}\right)^4 = y^4$ are

A. 1,4

B. 3,4

C. 2,4

D. 3,2

Answer: D

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78. The order and degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^2=\frac{d^2y}{dx^2}$ respectively are

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

B. $2, 3$

C. $2, 1$

D. $3, 4$

Answer: C

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79. Which of the following is the 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. $Y = Ae^x + Be^{-x}$

D. $Y = a\cos x + B\sin x$

Answer: A

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80. 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

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81. Solution of the 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. $x(y + \cos x) = \cos x + c$

Answer: A

Watch Video Solution

82. The general solution of the differential equation $(e^x + 1)ydy = (y + 1)e^x dx$ is

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

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

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

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

Answer: C

Watch Video Solution

83. The solution of the 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

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84. The solution of the 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. $y(1+x^2) = c + \sin^{-1} x$

Answer: A

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Type Ii Fill In The Blanks Questions

1. Order differential equation $\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^3 + 5y = 0$ is .....

Watch Video Solution

2. The order of the differential equation:

$2x^2\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + y = 0$ is:

Watch Video Solution

3. Degree of differential equation $x\left(\frac{d^2y}{dx^2}\right)^2 + y\left(\frac{dy}{dx}\right)^3 = 0$ is :

Watch Video Solution

4. Degree of differential equation $x\frac{d^2y}{dx^2}+y\left(\frac{dy}{dx}\right)^4=0$ is

.....

Watch Video Solution

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

.....

Watch Video Solution

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

.....

Watch Video Solution

7. Degree of differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 0$ is .....

Watch Video Solution

8. The number of arbitrary constants in the general solution of a differential equation of fourth order are:

Watch Video Solution

9. The number of arbitrary constants in the particular solution of a differential equation of 'third order are-:

Watch Video Solution

10. The general solution of the differential equation `dy/dx = 2e^2x + sin x is equal to :

Watch Video Solution

11. The general solution of the differential equation `dy/dx = 3e^3x + sin x is equal to :

Watch Video Solution

12. The general solution of differential equation : $ydx - xdy = 0$ is :

Watch Video Solution

13. The general solution of differential equation : $ydx + xdy = 0$ is :

Watch Video Solution

14. The Integrating Factor of the differential equation $x\frac{dy}{dx} - y = 2x^2$ is:

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

18. The integrating factor of differential equation $\frac{dy}{dx} + \frac{2y}{x} = 3x$ is .....

Watch Video Solution

19. Order of the differential equation representing the family of parabolas $y^2 = 4ax$ is ....

Watch Video Solution

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

Watch Video Solution

21. The number of arbitrary constants in a particular solution of the differential equation $\tan x dx + \tan y dy = 0$ is .....

Watch Video Solution

22. $F(x, y) = \dfrac{\sqrt{x^2 + y^2} + y}{x}$ is a homogeneous function of degree.....

Watch Video Solution

23. Integrating factor of the differential equation $x\dfrac{dy}{dx} - y = \sin x$ is .....

Watch Video Solution

24. The general solution of the differential equation $\dfrac{dy}{dx} = e^{x-y}$ is .

Watch Video Solution

25. The general solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = 1$ is.....

Watch Video Solution

26. Solve the differential equation:

$$\left[\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right]\frac{dx}{dy} = 1, (x \neq 0)$$

Watch Video Solution

27. The degree of the differential equation $\frac{d^2y}{dx^2} + e^{\frac{dy}{dx}} = 0$ is .....

Watch Video Solution

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

Watch Video Solution

29. The number of arbitrary constant in the general solution of a differential equation of order three is .....

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

34. General solution of $\frac{dy}{dx} + y = \sin x$ is .....

Watch Video Solution

35. The solution of differential equation $\cot y dx = x dy$ is .....

Watch Video Solution

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

Watch Video Solution

Type Iii True Or False Questions

1. Order of the differential equation representing the family of ellipse having centre of origin and foci on x-axis is two.

Watch Video Solution

2. Degree of the differential equation $\sqrt{1+\frac{d^2y}{dx^2}}=x+\frac{dy}{dx}$ is not defined.

Watch Video Solution

3. $\frac{dy}{dx}+y=5$ is a differential equation of the type $\frac{dy}{dx}+Py=Q$ but it can be solved using variable separble method also.

Watch Video Solution

4. $F(x, y) = \dfrac{y\cos\left(\frac{y}{x}\right) + x}{x\cos\left(\frac{y}{x}\right)}$ is not a homiogeneous function.

Watch Video Solution

5. $F(x, y) = \dfrac{x^2 + y^2}{x - y}$ is a homogeneous function of degree 1.

Watch Video Solution

6. Integrating factor of the differential equation $\dfrac{dy}{dx} - y = \cos x$ is .....

Watch Video Solution

7. The general solution of the differential equation $x(1+y^2)dx + y(1+x^2)dy = 0$ is $(1+x^2)(1+y^2) = k$.

Watch Video Solution

8. The general solution of the differential equation $\frac{dy}{dx} + y\sec x = \tan x$ is

$y(\sec x - \tan x) = \sec x - \tan x + x + k$.

Watch Video Solution

9. Verify that the function $x + y = \tan^{-1} y$ satisfies the differential equation $y^2 y' + y^2 + 1 = 0$

Watch Video Solution

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

Watch Video Solution

11. 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 dgree is $y = vx$.

Watch Video Solution

12. Number of arbitrary constants in the particular solution of a differential equation of order two is :

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

15. show: The solution of the differential equation $\frac{dy}{dx} = \frac{x + 2y}{x}$ is $x + y = kx^2.$

Watch Video Solution

16. prove that : Solution of $x\frac{dy}{dx} = y + x\tan\frac{y}{x}$ is $\sin\left(\frac{y}{x}\right) = cx.$

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

Watch Video Solution

18. The degree of the differential equation

$$\left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^2 + \sin\left(\frac{dy}{dx}\right) + 1 = 0 \text{ is:}$$

Watch Video Solution

19. The order of the differential equation $2x^2\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + y = 0$ is 2.

Watch Video Solution

20. The number of arbitraruy constants in the particular solution of as differential equation of third order is 0.

Watch Video Solution

21. The general solution of differential equation $ydx - xdy = 0$ is y=cx.

Watch Video Solution

22. 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 dgree is $y = vx$.

Watch Video Solution

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

Watch Video Solution

24. The integrating factor of the differential equation $\left(1 + y^2\right) + (2xy - \cot y)\frac{dy}{dx} = 0$ is.....

Watch Video Solution

25. The integrating factor of the differential equation

$(1-y^2)\frac{dx}{dy}+yx=ay, (-1<y<1)$ is:

Watch Video Solution

26. The integrating factor of the differential equation

$x\frac{dy}{dx}-y=e^{-3x}$

Watch Video Solution

Questions Carrying 4 Marks

1. Write the sum of the order and the degree of the following differential equation

$$\frac{d}{dx}\left\{\left(\frac{dy}{dx}\right)^3\right\} = 0$$

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2. Find the sum of the degree and the order for the following differential equation:

$$\frac{d}{dx}\left[\left(\frac{d^2y}{dx^2}\right)^4\right] = 0$$

Watch Video Solution

3. Find the differential equations representing the family of curves $v = \frac{A}{r} + B$ where Aand B are arbitrary constants.

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4. Solve : $x\sqrt{(1+y^2)}dx + y\sqrt{(1+x^2)}dy = 0$

Watch Video Solution

5. Solve $\sqrt{1+x^2+y^2+x^2y^2} + xy\frac{dy}{dx} = 0$

Watch Video Solution

6. Solve the following differential equation

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

Watch Video Solution

7. Find the particular solution of the following differential equation : $\frac{dy}{dx} = 1 + x^2 + y^2 + x^2y^2$, given that $y = 1$

when $x = 0$.

Watch Video Solution

8. Find the particular solution of the following differential equation:

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

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9. Find the particular solution of the following differential equation:

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

Watch Video Solution

10. 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 $y\left(\frac{\pi}{2}\right)$

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

Watch Video Solution

12. 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

Watch Video Solution

13. Solve the differential equation $(x^2 - yx^2)dx + (y^2 + x^2y^2)dy = 0$ given that y=1, when x=1.

Watch Video Solution

14. 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 $x = 2, y = \pi$

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15. Show that each of the following differential equations is homogeneous and find the primitive of each of them. Derive

the solution whenever possible.

$(x - y)y' = x + 2y$

Watch Video Solution

16. Show that each of the following differential equations is homogeneous and find the primitive of each of them. Derive the solution whenever possible.

$2ye^{\frac{x}{y}}dx + \left(y - 2xe^{\frac{x}{y}}\right)dy = 0$

Watch Video Solution

17. Show that each of the following differential equations is homogeneous and find the primitive of each of them. Derive

the solution whenever possible.

$$ydx + x\left(\log\frac{y}{x}\right)dy - 2xdy = 0$$

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18. Show that the given differential equations are homogeneous and solve them:

$$x^2\frac{dy}{dx} = x^2 - 2y^2 + xy$$

Watch Video Solution

19. Show that the given differential equation is homogeneous and solve it:

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

Watch Video Solution

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

Watch Video Solution

21. Solve the following differential equations

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

Watch Video Solution

22. Show that the differential equation $x - \cos\left(\frac{y}{x}\right)\left(\frac{dy}{dx}\right) = y\cos\left(\frac{y}{x}\right) + x$ is homogeneous and solve it.

Watch Video Solution

23. Solve the following differential equation:

$$\left[y - x\cos\left(\frac{y}{x}\right)\right]dy + \left[y\cos\left(\frac{y}{x}\right) - 2x\sin\left(\frac{y}{x}\right)\right]dx = 0$$

Watch Video Solution

24. For the differential equation, find the particular solution satisfying the given condition:

$$\left[x\sin^2\left(\frac{y}{x}\right) - y\right]dx + xdy = 0, y = \frac{\pi}{4} \text{ when } x = 1$$

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25. For each of the differential equations, find the particular solution satisfying the given condition:

$x^2dy = \left(2xy + y^2\right)dx$, given that $y = 1$ when x=1

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Watch Video Solution

26. For each of the differential equations, find the particular solution satisfying the given condition:

$\frac{dy}{dx} = \frac{xy}{x^2 + y^2}$ given that $y = 1$ when x=0

Watch Video Solution

27. Solve : $x \log x \frac{dy}{dx} + y = \frac{2}{x} \log x.$

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28. Find one parameter families of solution curves of the following differential equation:

$\left(1 + x^2\right) dy + 2xydx = \cot x dx (x \neq 0)$

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29. Solve the differential equation:

$$\left[\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right]\frac{dx}{dy} = 1, (x \neq 0)$$

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30. Solve the following differential equations

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

Watch Video Solution

31. Find a one parameter family of solutions of each of the following differential equations

$y' \cos^2 x = \tan x - y$

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32. Solve: $\frac{dy}{dx} + y \sec x = \tan x$

Watch Video Solution

33. Solve the following differential equations

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

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34. The solution of $\left(1 + x^2\right)\frac{dy}{dx} + y = e^{\tan^{-1} x}$, is given by

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35. Solve the following differential equation

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

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36. Find the particular solution of the differential equation $(y - \sin x)dx + (\tan x)dy) = 0$ satisfying the condition that $y = 0$ when x=0

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37. Find the particular solution of the differential equation $\frac{dx}{dy} + y\cot x = 2x + x^2 \cot x (x \neq 0)$ given that y = 0 when $x = \frac{\pi}{2}$

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38. Solve: $\frac{dy}{dx} + 2y \tan x = \sin x, y = 0$ when $x = \frac{\pi}{3}$

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

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40. Solve the differential equation:

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

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41. Solve the differential equation:

$$x\frac{dy}{dx} + y = x\cos x + \sin x, \text{ given } y\left(\frac{\pi}{2}\right) = 2$$

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