

MATHS

BOOKS - MBD MATHS (ODIA ENGLISH)

DIFFERENTIAL EQUATIONS

Question Bank

1. Determine the order and degree of each of the following differential equations.

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



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2. Determine the order and degree of each of the following differential equations.

$$\left(\frac{dy}{dx}\right)^4 + y^5 = \frac{d^3y}{dx^2}$$



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3. Determine the order and degree of each of the following differential equations.

$$a \frac{d^2}{dx^2} = \left\{ 1 + \left(\frac{dy}{dx}\right)^2 \right\}^{\frac{3}{2}}$$



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4. Determine the order and degree of each of the following differential equations.

$$\tan^{-1} \sqrt{\frac{dy}{dx}} = x$$



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5. Determine the order and degree of each of the following differential equations.

$$\ln \left(\frac{d^2y}{dx^2} \right) = y$$



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6. Determine the order and degree of each of the following differential equations.

$$\frac{\frac{dy}{dt}}{y + \frac{dy}{dt}} = \frac{yt}{\frac{dy}{dt}}$$



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7. Determine the order and degree of each of the following differential equations.

$$\frac{d^2y}{du^2} = \frac{3y + \frac{dy}{du}}{\sqrt{\frac{d^2y}{du^2}}}$$



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8. Determine the order and degree of each of the following differential equations.

$$e^{\frac{dy}{dx}} = x^2$$



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9. Form the differential equation by eliminating the arbitrary constants in each of the following cases.

$$y = A \sec x$$



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10. Form the differential equation by eliminating the arbitrary constants in each of the following cases.

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





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11. Form the differential equation by eliminating the arbitrary constants in each of the following cases.

$$y = Ae^t + Be^{2t}$$



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12. Form the differential equation by eliminating the arbitrary constants in each of

the following cases.

$$y = Ax^2 + Bx$$



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13. Form the defferentialequation by eliminating the arbitrary constants in each of the following cases.

$$y = a \cos x + b \sin x$$



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14. Form the differential equation by eliminating the arbitrary constants in each of the following cases.

$$y = a \sin^{-1} x + b \cos^{-1} x$$



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15. Form the differential equation by eliminating the arbitrary constants in each of the following cases.

$$y = at + be^t$$





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16. Form the differential equation by eliminating the arbitrary constants in each of the following cases.

$$y = a \sin t + be^t$$



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17. Form the differential equation by eliminating the arbitrary constants in each of

the following cases.

$$ax^2 + by = 1$$



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18. Find the general solution of the following differential equation.

$$\frac{dy}{dx} = \frac{e^{2x+1}}{e^x}$$



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19. Find the general solution of the following differential equation.

$$\frac{dy}{dx} = x \cos x$$



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20. Find the general solution of the following differential equation.

$$\frac{dy}{dt} = t^5 \log t$$



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21. Find the general solution of the following differential equation.

$$\frac{dy}{dt} = 3t^2 + 4t + \sec^2 t$$



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22. Find the general solution of the following differential equation.

$$\frac{dy}{dx} = \frac{1}{x^2 - 7x + 12}$$



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23. Find the general solution of the following differential equation.

$$\frac{dy}{du} = \frac{u + 1}{\sqrt{3u^2 + 6u + 5}}$$



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24. Find the general solution of the following differential equation.

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



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25. Find the general solution of the following differential equation.

$$\frac{dy}{dt} = \frac{\sin^{-1} t e^{\sin^{-1} t}}{\sqrt{1-t^2}}$$



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26. Solve the following differential equations.

$$dy/dx=y+2$$



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27. Solve the following differential equations.

$$\frac{dy}{dt} = \sqrt{1 - y^2}$$



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28. Solve the following differential equations.

$$\frac{dy}{dz} = \sec y$$



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29. Solve the following differential equations.

$$\frac{dy}{dx} = e^y$$



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30. Solve the following differential equations.

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



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31. Solve the following differential equations.

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



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32. Solve the following differential equations.

$$\frac{dy}{dx} + e^y/y = 0$$



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33. Solve the following differential equations.

$$dx + \cot x \, dt = 0$$



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34. Obtain the general solution of the following differential equations.

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



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35. Obtain the general solution of the following differential equations.

$$\frac{dy}{dt} = e^{2t+3y}$$



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36. Obtain the general solution of the following differential equations.

$$\frac{dy}{dz} = \frac{\sqrt{1-y^2}}{\sqrt{1-z^2}}$$



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37. Obtain the general solution of the following differential equations.

$$\frac{dy}{dx} = \frac{x \log x}{3y^2 + 4y}$$



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38. Obtain the general solution of the following differential equations.

$$x^2 \sqrt{y^2 + 3} dx + y \sqrt{x^3 + 1} dy = 0$$



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39. Obtain the general solution of the following differential equations.

$$\tan y \, dx + \cot x \, dy = 0$$



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40. Obtain the general solution of the following differential equations.

$$(x^2 + 7x + 12) \, dy + (y^2 - 6y + 5) \, dx = 0$$



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41. Obtain the general solution of the following differential equations.

$$ydy + e^{-y}x \sin x dx = 0$$



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42. Solve the following second order equation

$$\frac{d^2y}{dx^2} = 12x^2 + 2x$$



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43. Solve the following second order equation

$$\frac{d^2y}{dt^2} = e^{2t} + e^{-t}$$



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44. Solve the following second order equation

$$\frac{d^2y}{d\vartheta^2} = -\sin \vartheta + \cos \vartheta + \sec^2 \vartheta$$



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45. Solve the following second order equation

$$\cos ecx \frac{d^2 y}{dx^2} = x$$



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46. Solve the following second order equation

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



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47. Solve the following second order equation

$$\sec x \frac{d^2 y}{dx^2} = \sin 3x$$



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48. Solve the following second order equation

$$\frac{d^2 y}{dx^2} = \sec^2 x + \cos^2 x$$



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49. Solve the following second order equation

$$e^{-x} \frac{d^2 y}{dx^2} = x$$



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50. Find the particular solution of the following equation subject to the given conditions.

$$dy/dx = \cos x, \text{ given that } y=2 \text{ when } x=0$$



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51. Find the particular solution of the following equation subject to the given conditions.

$$\frac{dy}{dt} = \cos^2 y \text{ subject to } y = \frac{\pi}{4} \text{ when } t=0.$$



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52. Find the particular solution of the following equation subject to the given conditions.

$$\frac{dy}{dx} = \frac{1 + y^2}{1 + x^2} \text{ given that } y = \sqrt{3} \text{ when } x=1$$



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53. Find the particular solution of the following equation subject to the given conditions.

$$\frac{d^2y}{dx^2} = 6x, \text{ given that } y=1 \text{ and } dy/dx=2 \text{ when } x=0.$$



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54. Solve:

$$\frac{dy}{dx} = \sec(x + y)$$



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55. Solve:

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



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56. Solve:

$$\frac{dy}{dx} = \cos(x + y)$$



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57. Solve:

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



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58. Solve the following differential equations.

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



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59. Solve the following differential equations.

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



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60. Solve the following differential equations.

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



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61. Solve the following differential equations.

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



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62. Solve the following differential equations.

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



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63. Solve the following differential equations.

$$dy/dx + y = \sec x = \tan x$$



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64. Solve the following differential equations.

$$(x + \tan y)dy = \sin 2y dx$$



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65. Solve the following differential equations.

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



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66. Solve the following differential equations.

$$\sin x \, dy/dx + 3y = \cos x$$



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67. Solve the following differential equations.

$$(x+y+1)dy/dx=1$$



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68. Solve the following differential equations.

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



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69. Solve the following differential equations.

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



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70. Solve the following differential equations.

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



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71. Solve the following differential equations.

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



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72. Solve the following differential equations.

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



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73. Solve the following differential equations.

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



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74. Solve the following differential equations.

$$\frac{dy}{dx} + 2y \tan x = \sin x, y\left(\frac{\pi}{3}\right) = 0$$



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75. Find the solution of the following differential equations:

$$(x+y)dy+(x-y)dx=0$$



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76. Find the solution of the following differential equations:

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



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77. Find the solution of the following differential equations:

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



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78. Find the solution of the following differential equations:

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



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79. Find the solution of the following differential equations:

$$x(x + y)dy = (x^2 + y^2)dx$$



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80. Find the solution of the following differential equations:

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



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81. Find the solution of the following differential equations:

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



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82. Find the solution of the following differential equations:

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



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83. Solve the differential equation

$$\frac{dy}{dx} = \frac{y - x + 1}{y + x + 5}$$



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84. Find the solution of the following differential equations:

$$x(x + y)dy = (x^2 + y^2)dx$$



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85. Find the solution of the following differential equations:

$$(2x+y+1)dx+(4x+2y-1)dy=0$$



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86. Find the solution of the following differential equations:

$$(2x+3y-5)dy/dx+3x+2y-5=0$$



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87. Find the solution of the following differential equations:

$$(4x+6y+5)dx-(2x+3y+4)dy=0$$



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