MATHS

BOOKS - ARIHANT PUBLICATION

DIFFERENTIAL EQUATION

Examples

1. Find the order and degree, if defined of each of the following differential equation.

$$\frac{dy}{dx} - \sec x = 0$$

Watch Video Solution

2. Find the order and degree, if defined of each of the following differential equation.

$y''' + y^2 + e^{y'} = 0$

Watch Video Solution

3. Find the order and degree, if defined of each of the following differential equation.

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

Watch Video Solution

4. Verify that the function $y = e^{-3x}$ is a solution of the differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 6y = 0$

Watch Video Solution

5. Verify that $y = A\cos x + B\sin x$ is a solution of the differential equation $\frac{d^2y}{dx^2} + y = 0$

Watch Video Solution

6. Verify that the function $x + y = \tan^{-1} y$ is a solution of the differential equation $y^2y' + y^2 + 1 = 0$

Watch Video Solution

7. Find the differential equation of the family of curves $y = Ax + \frac{B}{x}$, where A and B are arbitary constants.

Watch Video Solution

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

Watch Video Solution

9. Solve the differential equation $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$

Watch Video Solution

10. Find the particular solution of the differential equation $\frac{dy}{dx} = -4xy^2$, given that y= 1, when x= 0.

Watch Video Solution

11. Find the particular solution of the following differential equation: $\left(\frac{dy}{dx}\right) = \frac{1+y^2}{1+x^2}$ given that $y = \sqrt{3}$ when $x = 1$

Watch Video Solution

12. Solve $\frac{d^2y}{dx^2} = 6x + 2.$

Watch Video Solution

13. Solve the differential equation $\frac{dy}{dx} + 1 = e^{x+y}$

Watch Video Solution

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

Watch Video Solution

15. Show that the differential equation $\left(x^2 - y^2\right)dx + 2xydy = 0$ is homogeneous and solve it.

Watch Video Solution

16. Find the general solution of $y^2dx + \left(x^2 - xy + y^2\right)dy = 0.$

Watch Video Solution

17. Solve the differential equation $\frac{dy}{dx} = \frac{y - x + 1}{y + x + 5}$.

Watch Video Solution

18. Solve the differential equation $\frac{dy}{dx} = e^y \cos x$.

Watch Video Solution

19. Solve the following differential equations.

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

Watch Video Solution

20. Find the general solution of the following differential equation $e^{2x}\frac{dy}{dx} + 3e^{2x}y = 1$

Watch Video Solution

21. Find the general solution of the differential equation $(3y^2 - x)dy = ydx.$

Watch Video Solution

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

Watch Video Solution

Questions For Practice Of Part I Very Short Answer Type

1. Find the order and degree of each of the following differential equations, if defined.

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

Watch Video Solution

2. Find the order and degree of each of the following differential equations, if defined.

$$\left(\frac{d^2y}{dx^2}\right)^2+5x\left(\frac{dy}{dx}\right)^4-6y=\log x$$

Watch Video Solution

3. Find the order and degree of each of the following differential equations, if defined.

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

Watch Video Solution

4. Find the order and degree of each of the following differential equations, if defined.

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

Watch Video Solution

5. Find the order and degree of each of the following differential equations, if defined.

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

Watch Video Solution

6. Find the order and degree of each of the following differential equations, if defined.

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

Watch Video Solution

7. Find the order and degree of each of the following differential equations, if defined.

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

Watch Video Solution

8. Find the order and degree of each of the following differential equations, if defined.

$$\left[1+\left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}}=\frac{d^2y}{dx^2}.$$

Watch Video Solution

9. Write the order of the differential equation of the family of circles $ax^2+ay^2+2gx+2fy+c=0.$

Watch Video Solution

10. Write the order of the differential equation of the system of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1.$

Watch Video Solution

11. Write the degree of the differential equation

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

Watch Video Solution

12. Write the order of the differential equation whose general solution is $y = ax^2 + b$, where a and b are arbitrary constants.

Watch Video Solution

13. Write the order and the degree of the following differential equation.

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

Watch Video Solution

14. Write the order and degree of the differential equation

$$\left(\frac{dy}{dx}\right)^5 = \frac{\left(\frac{d^2y}{dx^2}\right)^3}{1+\frac{dy}{dx}}$$

Watch Video Solution

15. Determine the order and degree of the differential equation $\frac{d^2y}{dx^2} = \frac{2y^3 + \left(\frac{dy}{dx}\right)^3}{\sqrt{\frac{d^2y}{dx^2}}}$

Watch Video Solution

16. Write the order and degree of the differential equation

$$\left(\frac{d^2y}{dx^2}+\frac{dy}{dx}\right)^5+\left(\frac{d^3y}{dx^3}\right)^2=x^4\sqrt{3\frac{d^3y}{dx^3}+1}$$

Watch Video Solution

17. If p and q are the order and degree of the differential equation $y\left(\frac{dy}{dx}\right)^2+x^2\frac{d^2y}{dx^2}+xy=\sin x$, then choose the correct statement out of

$p>q$

Watch Video Solution

18. If p and q are the order and degree of the differential equation $y\left(\frac{dy}{dx}\right)^2+x^2\frac{d^2y}{dx^2}+xy=\sin x$, then choose the

correct statement out of

$p = q$

Watch Video Solution

19. If p and q are the order and degree of the differential equation $y\left(\frac{dy}{dx}\right)^2 + x^2\frac{d^2y}{dx^2} + xy = \sin x$, then choose the correct statement out of

$p < q$

Watch Video Solution

20. Verify that the function $y = \sqrt{a^2 - x^2}, x \in (-a, a)$ is a solution of differential equation $x + y\frac{dy}{dx} = 0 (y \neq 0)$.

Watch Video Solution

21. Verify that $y = e^{-x} + Ax + B$ is a solution of the differential equation $e^{x}\left(\frac{d^2y}{dx^2}\right) = 1$.

Watch Video Solution

22. Write the differential equation obtained by elimenating the arbitrary constant C in the equation representing the family of curves $xy = C\cos x$.

Watch Video Solution

23. Write the differential equation of the family of straight lines parallel to the Y-axis.

Watch Video Solution

Watch Video Solution

24. Form the differential equation whose primitive is $y = Ae^{3x} + Be^{-3x}$.

Watch Video Solution

25. Obtain the differential equation whose primitive is $y = Ae^{2x} + Be^{-2x}$.

Watch Video Solution

Questions For Practice Of Part I Short Answer Type

1. If $f'(x) = e^x + \frac{1}{1+x^2}$ and $f(0) = 1$, then f(x).

Watch Video Solution

2. Find the particular solution of the differential equation $\frac{d^2y}{dx^2} = 6x$, given that $y = 1$ and $\frac{dy}{dx} = 2$, when x= 0 at Y-axis.

Watch Video Solution

3. Find the differential equation whose general solution is $ax^2 + by = 1$, where a and b are arbitrary constants.

Watch Video Solution

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

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

Watch Video Solution

5. Find the differential equation whose general solution is $y = a\cos x + b\sin x$.

Watch Video Solution

6. Find the differential equation whose general solution is $C_1x^2 + C_2y^2 = 1$, where C_1 and C_2 are arbitrary constants.

Watch Video Solution

7. Show that $y = Ae^{mx} + Be^{nx}$ is a solution of the differential equation $\frac{d^2y}{dx^2} - (m+n)\frac{dy}{dx} + mny = 0$.

Watch Video Solution

8. Form the differential equation for the family of curves $ay^2 = (x-c)^3$, where c is a parameter.

Watch Video Solution

9. Form the differential equation for the family of the curves $y^2 = a(b-x)(b+x)$, where a and b are arbitrary constants.

Watch Video Solution

10. 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

Questions For Practice Of Part I Long Answer Type

1. Form the differential equation of the family of ellipse having foci on Y-axis and centre at origin.

Watch Video Solution

2. Form the differential equation of the family of all circles of radius r.

Watch Video Solution

Questions For Practice Of Part Ii Very Short Answer Type

1. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

Watch Video Solution

2. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

Watch Video Solution

3. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

$$\frac{dy}{dx} = x^3 e^{-2y}$$

Watch Video Solution

4. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

$$\frac{dy}{dx} = \sqrt{4 - y^2}(-2 < y < 2)$$

Watch Video Solution

5. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

Watch Video Solution

6. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

Watch Video Solution

7. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

Watch Video Solution

8. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

Watch Video Solution

9. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

Watch Video Solution

10. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

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

Watch Video Solution

11. Solve the following differential equations (or find the general solution (or solution) of following differential equations)

$\cos x(1 + \cos y)dx - \sin y(1 + \sin x)dy = 0.$

Watch Video Solution

12. Solve $\frac{dy}{dx} = y \tan x$, when x= 0 and y= 1.

Watch Video Solution

13. Write the particular solution of the equation $\frac{dy}{dx} = \sin x$ given that $y(\pi) = 2$.

Watch Video Solution

14. Write the particular solution of $\frac{dy}{dx} = (1+x)^4$, y= 0 when x= -1.

Watch Video Solution

15. Form the differential equation , whose solution is $y = e^{x+a}$

Watch Video Solution

16. Write the particular solution of $\frac{dy}{dx} = \frac{1}{1+x^2}$,given that when x=0,y=1.

Watch Video Solution

17. Given the general solution as $y = \left(x^2 + c\right)e^{-x}$ of a differential equation, if y=0 when x= 1?

View Text Solution

Questions For Practice Of Part Ii Short Answer Type

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

Watch Video Solution

2. Solve $(x-1)\frac{dy}{dx} = 2x^3y.$

Watch Video Solution

3. 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.

View Text Solution

4. Solve the initial value problem $e^{\frac{dy}{dx}} = x+1, y(0) = 5.$

View Text Solution

5. solve $\frac{dy}{dx} = (4x + y + 1)^2$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

9. Find the equation of the curve passing through the point $\left(0, \frac{\pi}{4}\right)$, whose differential equation is $\sin x \cos y dx + \cos x \sin y dy = 0$.

Watch Video Solution

10. Find the particular solution of the differential equation $\frac{dy}{dx} - \frac{y}{x} + \cos ec\left(\frac{y}{x}\right) = 0$, y= 0 when x=1.

Watch Video Solution

11. Solve the following differential equation

$$xy\log\left(\frac{y}{x}\right)dx+\left[y^2-x^2\log\left(\frac{y}{x}\right)\right]dy=0.$$

View Text Solution

12. Solve the following differential equation

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

Watch Video Solution

13. Solve the differential equation

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

Watch Video Solution

14. Solve $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$.

Watch Video Solution

Questions For Practice Of Part Ii Long Answer Type

1. Solve $\frac{d^2y}{dx^2} = \cos ec^2 x$.

Watch Video Solution

2. Solve $\frac{d^2y}{dx^2} = 9e^{-3x}$.

Watch Video Solution

3. Solve $\frac{dy}{dx} = 4e^{2x} + \cos x + \sec^2 x$, given that $y(0) = 2,$.

Watch Video Solution

4. Solve $\frac{dy}{dt} = \cos^2(y).$

Watch Video Solution

5. Solve $(x-1)dx - (y+5)dy = 0.$

Watch Video Solution

6. Find the particular solution of the differential equation $\frac{dy}{dx} = \frac{x+1}{\sin y + \cos y}$ given that $y = \frac{\pi}{2}$, when x= 1.

Watch Video Solution

7. Solve the differential equation $\left[x \sin^2\left(\frac{y}{x}\right) - y\right] dx + x dy = 0$, given $y = \frac{\pi}{4}$, when x= 1.

Watch Video Solution

8. Find the solution of the differential equation $\left\{x \cos\left(\frac{y}{x}\right) + y \sin\left(\frac{y}{x}\right)\right\} y dx = \left\{y \sin\left(\frac{y}{x}\right) - x \cos\left(\frac{y}{x}\right)\right\} x dy$

.

Watch Video Solution

9. Show that the differential equation $2y \cdot e^{\frac{x}{y}} dx + \left(y - 2x e^{\frac{x}{y}}\right) dy = 0$. Is homogeneous and find

its particular solution, given that x=0, when y= 1.

Watch Video Solution

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

Watch Video Solution

11. Solve the differential equation $x^2 dy + \left(xy + y^2\right) dx = 0$ given y=1, when x=1.

Watch Video Solution

12. Find the general solution of differential equation $\tan y dx + \cot x dy = 0.$

Watch Video Solution

13. For the differential equation $xy\frac{dy}{dx} = (x+2)(y+2)$, find the solution curve passing through the point $(1, -1)$.

Watch Video Solution

14. Show that the general solution of the differential equation $\frac{dy}{dx} + \frac{y^2+y+1}{x^2+x+1} = 0$ is given by $(x+y+1) = A(1-x-y-2xy)$, where A is a parameter.

Watch Video Solution

15. A population grows at the rate of 5% per year. How long does it take for the population to double?

Watch Video Solution

16. In a bank, principal increases continuously at the rate of 5% per year. An amount of Rs 1000 is deposited with this bank, how much will it be worth after 10 yr? $\left(e^{0.5} = 1.648\right)$.

Watch Video Solution

Questions For Practice Of Part Iii Very Short Answer Type

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

Watch Video Solution

2. Find the integrating factor of $x\frac{dy}{dx} + 2y = x\cos x.$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

5. Solve $\frac{dy}{dx} + y = \cos x - \sin x$

Watch Video Solution

6. Solve $\frac{dy}{dx} + 2xy = y$

Watch Video Solution

7. Solve $\frac{dy}{dx} - 2y = \cos 3x$

Watch Video Solution

8. Solve the differential equation $x\frac{dy}{dx} + y = x^3$, given that y=1, when x= 2.

Watch Video Solution

9. Solve $ydx + \left(x - y^3\right)dy = 0.$

Watch Video Solution

10. Write an integrating factor of the differential equation $\frac{dy}{dx} + y = e^{-x}.$

Watch Video Solution

11. Find an integrating factor of the differential equation (x + tan y) dy = tan ydx.

Watch Video Solution

12. Write an integrating factor of the differential equation $(1+y^2)dx = (\tan^{-1} y - x)dy.$

Watch Video Solution

13. Write an integrating factor of the equation $\frac{dy}{dx} - \frac{y}{x} = x^2 + 1$

Watch Video Solution

14. Find the factor that should be multiplied with the differential equation cos x $\frac{dy}{dx} + y \sin x = 3$ to make it integrable.

Watch Video Solution

Questions For Practice Of Part Iii Short Answer Type

1. Find the integrating factor of the solution of the differential equation $Iny\frac{dy}{dx} = -yIny.$

Watch Video Solution

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

Watch Video Solution

3. Solve the differential equation $\frac{d^2y}{dx^2} = 12x^2 + 2x.$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

6. Solve $\left(1+x^2\right)\frac{dy}{dx}+2xy=\frac{1}{1+x^2}$ where y= 0 and x= 1.

Watch Video Solution

7. Solve $\left(x^2+1\right)\frac{dy}{dx}-2xy=\left(x^2+2\right)\left(x^2+1\right).$

Watch Video Solution

8. Solve the differential equation $\left(1+x^2\right)dy+2xydx=\sec^2 xdx.$

Watch Video Solution

9. Find the general solution of the differential equation $(x\log x)\frac{dy}{dx}+y=\frac{2}{x}\log x.$

Watch Video Solution

10. 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

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

Watch Video Solution

Questions For Practice Of Part Iii Long Answer Type

1. Solve $\frac{dy}{dx} = xy^2$

Watch Video Solution

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

Watch Video Solution

3. Find the particular solution of the differential equation $x\frac{dy}{dx} + y - x + xy\cot x = 0, x \neq 0,$ given that when $x = \frac{\pi}{2}, y = 0.$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

6. Find the general solution of the differential equation $(1+y^2)\frac{dx}{dy}+\left(x-e^{\tan^{-1}y}\right)=0.$

Watch Video Solution

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

Watch Video Solution

8. solve:$(x - \sin y)dy + (\tan y)dx = 0$

Watch Video Solution

9. Solve the initial value problem $ye^y dx = \left(y^3 + 2xe^y\right)dy, y(0) = 1.$

Watch Video Solution

Odisha Bureau S Textbook Solutions Exercise 11 A

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

y = A sec x

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

$y = Ax^2 + Bx$

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

$y = at + be^t$

Watch Video Solution

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

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

Watch Video Solution

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

$ax^2 + by = 1$

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

26. Solve the following differential equations.

dy/dx=y+2

Watch Video Solution

27. Solve the following differential equations.

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

Watch Video Solution

28. Solve the following differential equations.

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

Watch Video Solution

29. Solve the following differential equations.

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

Watch Video Solution

30. Solve the following differential equations.

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

Watch Video Solution

31. Solve the following differential equations.

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

Watch Video Solution

32. Solve the following differential equations.

`dy/dx+e^y/y=0

Watch Video Solution

33. Solve the following differential equations.

dx+cot x dt=0

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

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

`tan y dx+cot x dy=0

Watch Video Solution

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

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

Watch Video Solution

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

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

Watch Video Solution

42. Solve the following second order equation

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

Watch Video Solution

43. Solve the following second order equations

$$\frac{d^2y}{dt^2} = e^{2t} + e^{-1}$$

Watch Video Solution

44. Solve the following second order equation

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

Watch Video Solution

45. Solve the following second order equations

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

Watch Video Solution

46. Solve the following second order equation

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

Watch Video Solution

47. Solve the following second order equation

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

Watch Video Solution

48. Solve the following second order equations

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

Watch Video Solution

49. solve: $e^{-x}\frac{d^2y}{dx^2} = x$

Watch Video Solution

50. Find the particular solutions of the following equations subject to the conditions

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

Watch Video Solution

51. Find the particular solutions of the following equations subject to the conditions

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

Watch Video Solution

52. Find the particular solutions of the following equations subject to the conditions

$\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$, given that $y = \sqrt{3}$ when x=0

Watch Video Solution

53. Find the particular solutions of the following equations subject to the conditions

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

Watch Video Solution

54. Solve : $\frac{dy}{dx} = \sec(x+y)$

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

57. Solve the differential equation $\frac{dy}{dx} + 1 = e^{x+y}$

Watch Video Solution

Odisha Bureau S Textbook Solutions Exercise 11 B

1. Solve the following differential equations

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

Watch Video Solution

2. Solve the following differential equations

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

Watch Video Solution

3. Solve the following differential equations

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

Watch Video Solution

4. Solve the following differential equations

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

Watch Video Solution

5. Solve the following differential equations

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

Watch Video Solution

6. Solve the following differential equations.

dy/dx +y=sec x=tan x

Watch Video Solution

7. Solve the following differential equations

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

Watch Video Solution

8. Solve the following differential equations

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

Watch Video Solution

9. Solve the following differential equations.

sin x dy/dx +3y=cos x

Watch Video Solution

10. Solve the following differential equations

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

Watch Video Solution

11. Solve the following differential equations

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

Watch Video Solution

12. Solve the following differential equations

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

Watch Video Solution

13. Solve the following differential equations

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

Watch Video Solution

14. Solve the following differential equations.

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

Watch Video Solution

15. Solve the following differential equations.

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

Watch Video Solution

16. Solve the following differential equations

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

Watch Video Solution

17. Solve the following differential equations

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

Watch Video Solution

Odisha Bureau S Textbook Solutions Exercise 11 C

1. Find the solutions of the following differential equations :

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

Watch Video Solution

2. Find the solution of the following differential equations:

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

Watch Video Solution

3. Find the solutions of the following differential equations :

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

Watch Video Solution

4. Find the solution of the following differential equations:

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

Watch Video Solution

5. Find the solution of the following differential equations:

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

Watch Video Solution

6. Find the solutions of the following differential equations :

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

Watch Video Solution

7. Find the solutions of the following differential equations :

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

Watch Video Solution

8. Find the solution of the following differential equations:

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

Watch Video Solution

9. Solve the differential equation $\frac{dy}{dx} = \frac{y - x + 1}{y + x + 5}$.

Watch Video Solution

10. Find the solutions of the following differential equations :

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

Watch Video Solution

11. Find the solutions of the following differential equations :

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

Watch Video Solution

12. Find the solutions of the following differential equations :

$\frac{dx}{dy}=\frac{7y+7}{7x-3}$

Watch Video Solution

13. Find the solution of the following differential equations:

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

Watch Video Solution

14. Find the solution of the following differential equations:

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

Watch Video Solution

15. Find the solution of the following differential equations:

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

Watch Video Solution

Chapter Practice Very Short Answer Type Questions

1. Find the order and degree of the following differential equations :

$$\left(\frac{d^2y}{dx^2}\right)^3 + 2\left(\frac{dy}{dx}\right)^4 + 6 = \cos x$$

Watch Video Solution

2. Find the order and degree of the following differential equations :

$$\frac{d^4y}{dx^4} + \sin\left(\frac{d^3y}{dx^3}\right) = 0$$

Watch Video Solution

3. Find the order and degree of the following differential equations :

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

Watch Video Solution

4. Find the order and degree of the following differential equations :

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

Watch Video Solution

5. Find the order and degree of the following differential equations :

$$x^3\left(\frac{d^2y}{dx^2}\right)^2 + x\left(\frac{dy}{dx}\right)^4 = 0$$

Watch Video Solution

6. Find the order and degree of the following differential equations :

$$\frac{d^2y}{dx^2} + \left[1 + \left(\frac{dy}{dx}\right)^3\right]^{\frac{5}{2}} = 0$$

Watch Video Solution

7. State whether $y = e^{-x}(x + a)$ is a solution of differential equation $\frac{dy}{dx} + y = e^{-x}$

Watch Video Solution

8. Verify that the function $y = a\cos x + b\sin x$, where $a, b \in R$ is a solution of the differential equation $\frac{d^2y}{dx^2} + y = 0$

Watch Video Solution

9. Show that the function $y = (A + Bx)e^{3x}$ is a solution of the equation $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = 0$

Watch Video Solution

10. Show that $y = Cx + \frac{a}{C}$ is a solution of differential equation $y = x\frac{dy}{dx} + \frac{a}{\frac{dy}{dx}}$, where C is a parameter.

Watch Video Solution

11. Prove that $xy = ae^x + be^{-x} + x^2$ is the general solution of the differential equation $x\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - xy + x^2 - 2 = 0$

Watch Video Solution

12. Show that the function ϕ, defined by $\phi(x) = \cos x (x \in R)$, satisfies the initial value problem $\frac{d^2y}{dx^2} + y = 0, y(0) = 1, y'(0) = 0.$

Watch Video Solution

13. Find the differential equation of the family of all straight lines.

Watch Video Solution

14. Write the differential equation of all non-horizontal lines in a plane.

Watch Video Solution

15. Write the differential equation representing the family of curves $y = mx$, where m is an arbitrary constant.

Watch Video Solution

16. Find the differential equation of the family of concentric circles having centre (0, 0).

Watch Video Solution

17. Find the differential equation of the family of curves $y = Ae^{x} + Be^{-x}$, where A and B are constants.

Watch Video Solution

18. Form the differential equation by aliminating A and B in $Ax^2 + By^2 = 1$

Watch Video Solution

19. Find the differential equation corresponding to curve $y = a\cos(x + b)$, where a and b are constants.

Watch Video Solution

20. Solve the following differential equations :

$$\frac{dy}{dx} = \sqrt{1 - y^2}, \ -1 < y < 1$$

Watch Video Solution

21. Solve the following differential equations :

$$\frac{dy}{dx} + y = 1, y \neq 1.$$

Watch Video Solution

22. Solve the following differential equations :

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

Watch Video Solution

23. Solve the following differential equations :

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

Watch Video Solution

24. Write the solution of differential equation $\left(e^{x}+e^{-x}\right)dy=\left(e^{x}-e^{-x}\right)dx.$

Watch Video Solution

25. If $\frac{dy}{dx}=ye^{x}$ and $x=0, y=e$, then find the value of y, when x= 1.

Watch Video Solution

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

Watch Video Solution

27. Solve the differential equation $\frac{dy}{dx} = y \sin 2x$, given that y(0)= 1.

Watch Video Solution

28. Solve the initial value problem $dy = e^{2x+y}dx, y(0) = 0.$

Watch Video Solution

29. Find the equation of a curve passing through the point $(-2, 3)$, given that slope of the tangent to the curve at any point (x, y) is $\frac{2x}{y^2}$.

Watch Video Solution

30. Show that the given differential equation is homogeneous ans solve it $y' = \frac{x+y}{x}$.

Watch Video Solution

31. Find the integrating factor of the differential equation $x\frac{dy}{dx} - y = 2x^2$.

Watch Video Solution

32. Find the integrating factor of the differential equation $(1-y^2)\frac{dx}{dy} + yx = ay, \ -1 < y < 1.$

Watch Video Solution

33. Write the integrating factor of $\frac{dy}{dx} - \frac{1}{(1+x)}y = (1+x)e^x$.

Watch Video Solution

34. Write the integrating factor of the differential equation $\sqrt{x}\frac{dy}{dx} + y = e^{-2\sqrt{x}}$.

Watch Video Solution

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

Watch Video Solution

Chapter Practice Short Answer Type Questions

1. Solve each of the following differential equations :

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

Watch Video Solution

2. Solve each of the following differential equations :

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

Watch Video Solution

3. Solve each of the following differential equations :

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

Watch Video Solution

4. Solve each of the following differential equations :

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

Watch Video Solution

5. Solve each of the following differential equations :

$2xydx + \left(x^2 + 2y^2\right)dy = 0.$

Watch Video Solution

6. Solve each of the following differential equations :

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

Watch Video Solution

7. Solve each of the following differential equations :

$$\frac{dy}{dx} + 2y = 6e^x.$$

Watch Video Solution

8. Solve each of the following differential equations :

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

Watch Video Solution

9. Solve each of the following differential equations :

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

Watch Video Solution

10. Solve each of the following differential equations :

$$\left(x+3y^2\right)\frac{dy}{dx}=y(y>0)$$

Watch Video Solution

11. Solve each of the following differential equations :

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

Watch Video Solution

Chapter Practice Long Answer Type Questions

1. Form the differential equation representing the family of curves $y^2-2ay+x^2=a^2$, where a is an arbitrary constant.

Watch Video Solution

2. Form the differential equation of the family of circles in the second quadrant, which touch the coordinate axes.

Watch Video Solution

3. Show that the differential equation represents the family of all parabolas having their axis of symmetry coincident with the axis of x is $yy_2 + y_1^2 = 0$.

Watch Video Solution

4. Solve the differential equation $\frac{dy}{dx} = \frac{e^x\left(\sin^2 x + \sin 2x\right)}{y(2\log y + 1)}$.

Watch Video Solution

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

Watch Video Solution

6. Solve $(x + y)^2 \frac{dy}{dx} = a^2$.

Watch Video Solution

7. Show that the differential equation $(x^2 + xy)dy = (x^2 + y^2)dx$ is homogeneous and solve it.

Watch Video Solution

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

Watch Video Solution

9. Show that the differential equation $\left(x^2 - y^2\right)dx + 2xydy = 0$ is homogeneous and solve it.

Watch Video Solution

10. Solve the differential equation $(1 + e^x)dx + (1 + e^y)dy = 0$.

Watch Video Solution

11. Find the particular solution of the differential equation $2xy + y^2 - 2x^2 \frac{dy}{dx} = 0, y = 2$ when x=1.

Watch Video Solution

12. Solve $x^2 \frac{dy}{dx} - xy = x, x = 1, y = \frac{\pi}{2}$.

Watch Video Solution

13. Solve the initial value problem $\left(xe^{\frac{y}{x}} + y\right)dx = xdy, y(1) = 1.$

Watch Video Solution

14. Show that the family of curves for which the slope of the tangent at any point (x, y) on it is $\frac{x^2+y^2}{2xy}$, is given by $x^2 - y^2 = Cx$.

Watch Video Solution

15. Find the general solution of $\frac{dy}{dx} + 3y = \frac{1}{e^{3x}}$.

Watch Video Solution

16. Solve the differential equation $x\frac{dy}{dx} - ay = x + 1$.

Watch Video Solution

17. Solve $y + \frac{d}{dx}(xy) = x(\sin x + \log x)$.

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution