BHARATIYA VIDYA BHAVAN'S V M PUBLIC SCHOOL, VADODARA

QUESTION BANK

CHAPTER -9 DIFFERENTIAL EQUATIONS

Find the particular solution of the following differential equations :

1. $\frac{dy}{dx}$ + y cot x = 2x + x^2 cot x, x$\neq$ 0, given that y =0. When x = $\frac{\pi}{2}$.
2. (x dy- ydx) y sin $\left(\frac{y}{x}\right)$ = (ydx + x dy) x cos $\left(\frac{y}{x}\right)$, given that y = π when x = 3.
3. $\frac{dy}{dx} - \frac{y}{x} + \operatorname{cosec}\left(\frac{y}{x}\right) = 0$, given that y(1) = 0.
4. ($x^2 - y^2$) dx + 2xy dy = 0 ,given that y = 1 when x = 1.
5. Find the particular solution of the following differential equation satisfying the given condition: x $(x^2 - 1)$ $\frac{dy}{dx}$ = 1 ; y = 0 when x = 2.
6. Solve the given differential equation : $\frac{dx}{dy} + x \cot y = y^2 \cot y + 2y$, y$\neq$0.
7. Show that the given differential equation is homogeneous and solve it.
   $x^2 \frac{dy}{dx}$ = x^2- 2y^2 + xy.
8. Find the particular solution of the differential equation:
   X $\frac{dy}{dx}$ - y + x cosec $\left(\frac{y}{x}\right)$ =0, given that y =0 when x =0.
9. Solve the differential equation: (1 + x^2) $\frac{dy}{dx}$ + y = $e^{\tan^{-1} x}$.

10. Solve : $\frac{dy}{dx} + \frac{y}{x} = e^x$

11.Solve : $(x^2 + xy)\ dy = (x^2 + y^2)\ dx$

12. Find the differential equation representing the family of curves $y = e^{c.x}$

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

14. Solve the differential equation: $(3xy + y^2)dx + (x^2 + xy)dy = 0$.

15. Form the differential equation of the family of circles touching the y-axis at origin.

16. Find the particular solution of the differential equation $\frac{dy}{dx}$+ ycotx = 4x cosecx $(x \neq 0)$ given that y = 0 when x = $\frac{\pi}{2}$.

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

18. Write the general solution of the differential equation $x\frac{dy}{dx} = y$.

19. Form the differential equation representing the given family of curves by eliminating arbitrary constants a and b: $\frac{x}{a} + \frac{y}{b} = 1$

20 . Form the differential equation of the family of curves y = a sin (bx + c) , a, b, c are arbitrary constants.

21. If y(t) is a solution of $(1 + t)\frac{dy}{dx} - ty = 1$ and y(0)= - 1 ,then show that y(1)= - ½

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

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