Worksheet – Basic

Class XII

Chapter IX- Differential Equations

ONE MARK QUESTIONS

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

(a) 6   (b) 2   (c)   3   (d) not defined

2. A solution of the differential equation $\left(\frac{dy}{dx}\right)^2 - x\frac{dy}{dx} + y = 0$ is

(a) y=2   (b) y=2x   (c) y= 2x-4   (d) $y = 2x^2 - 4$

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

(a) $e^x + e^{-y} = c$ (b) $e^x + e^y = c$ (c) $e^{-x} + e^y = c$ (d) $e^{-x} + e^{-y} = c$

4. The general solution of the differential equation $xdy - ydx = 0$ is

(a) x=ky   (b) x=3y   (c) x+y=0   (d) x-y=0

5. If the general solution of a differential equation is $y = c_1x^2 + (c_2\ c_3c_4)$ then the order of the differential equation is

(a) 5   (b) 2   (c)   3   (d) none of these

6. The general solution of the differential equation $\frac{ydx - xdy}{x} = 0$ is – – – –.

7. The integrating factor of the differential equation

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

8. Find the sum of order and Degree of the differential equation

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

9. Find the order and degree of the differential equation

$y = x\frac{dy}{dx} + a\sqrt{1 + \frac{d^2y}{dx^2}}$

10. Find the integrating factor of the differential equation $\frac{xdy}{dx} - y = x^4 - 3x$.

TWO MARKS QUESTIONS

1. Find the differential equation of all non-horizontal lines in a plane.
2. Form the differential equation for the family of circles touches x − axis at origin.
3. Solve : $\frac{dy}{dx} + \frac{y}{x} = x^2$
4. Find the differential equation representing the family of curves $y = ae^{bx+5}$, where a and b are arbitrary constants.
5. Solve : $\frac{dy}{dx} = \frac{1-cosx}{1+cosx}$
6. Find the general solution of $\frac{dy}{dx} = 1 - x + y - xy$
7. Find the general solution of $\log\left(\frac{dy}{dx}\right) = 3x + 4y$
8. Show that the following differential equation is homogeneous. $x \frac{dy}{dx} \sin\left(\frac{y}{x}\right) + x - y \sin\left(\frac{y}{x}\right) = 0$
9. Find the particular solution of, $x \frac{dy}{dx} + y = x^3$ given that y=1, when x=2.
10. Find the general solution of the differential equation; $\frac{dy}{dx} + \frac{2y}{x} = x$
11. Form the differential equations representing the family of curves $y = A \cos(x + B)$ where A and B are parameters.

FOUR MARKS QUESTIONS

1. Solve the differential equation: $(x^2 - y^2)dx + 2xy\, dy = 0$

2. Solve the differential equation: $x \log x \frac{dy}{dx} + y = \frac{2}{x} \log x$.
3. Solve the differential equation : $x\frac{dy}{dx} = y - x\tan\frac{y}{x}$.
4. Solve the differential equation: $x\, dy - y dx = \sqrt{x^2 + y^2}\, dx$, given that y=0 when x=1

5. Solve the differential equation $(1+x^2)\frac{dy}{dx} + 2xy - 4x^2 = 0$, subject to the initial condition y(0)=0

6. Find the differential equation for the family of curves $y = a \sin^{-1} x + b \cos^{-1} x$

7. Find the general solution of the differential equation
   $y\, dx - (x + 2y^2)\, dy = 0$.

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

9. Solve the differential equation
   $(1+y^2)\, dx = (\tan^{-1} y - x)dy$ given that y(0) = 0.

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