SWOT INSTITUTE
DIFFERENTIAL EQUATIONS
XII-TEST

Time : 1 hr.

Determine order and degree (if defined) of differential equations given in Question 1 to 2.

1. $(y^m)^2 + (y^n)^3 + (y')^4 + y^5 = 0$
2. $y^m + 2y^n + y' = 0$

In the given question verify that the given functions (explicit or implicit) is solution of the corresponding differential equation.

3. $y - \cos y = x$.

In the given question, from a differential equation representing the given family of curves by eliminating arbitrary constants a and b.

4. $y^2 = a(b^2 - x^2)$
5. Show that the differential equation $x\cos\left(\frac{y}{x}\right)\frac{dy}{dx} = y\cos\left(\frac{y}{x}\right) + x$ is homogenous and solve it.
6. Show that the differential equation $2ye^{\frac{x}{y}}dx + \left(y - 2xe^{\frac{x}{y}}\right)dy = 0$ is homogenous and find its particular solution, given that x = 0, when y = 1.

In the given question, show that the given differential equation is homogenous and solve it.

7. $x\,dy - y\,dx = \sqrt{x^2 + y^2}\,dx$.
8. Find the particular solution of the differential equation

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

given that y = 0 when $x = \frac{\pi}{2}$.

For each of the differential equation given in question, find the general solution :

9. $y\,dx = (x + y^2)dy = 0$

For each of the differential equation given in question, find a particular solution satisfying the given condition :

10. $\frac{dy}{dx} - 3y\cot x = \sin 2x;\ y = 2$ when $x = \frac{\pi}{2}$
11. Solve the differential equation

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

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