National Institute of Open Schooling (NIOS)
Senior Secondary Course
Lesson – 32: Differential Equations
Worksheet -32

1. Write any three differential equations and identify its degree and order.

2. Find the differential equation of all circles which pass through the origin and whose centres are on the x-axis.

3. Distinguish between Homogeneous differential equations and linear differential equations with examples.

4. Form the differential equation of the family of straight lines $y = mx$, where m is arbitrary constant.

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

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

(b) $x^3\left(\frac{d^2y}{dx^2}\right) + x\left(\frac{dy}{dx}\right)^5 = 7$

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

6. Solve the following differential equations

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

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

7. Obtain the differential equation of the family of curves $(x-h)^2+(y-K)^2=r^2$, where h, K are arbitrary constant.

8. Show that the differential equation $(x-y)\frac{dy}{dx}=x+2y$ is homogeneous and solve the equation.

9. Find the particular solution of the following differential equation:

(a) $(x-y)\frac{dy}{dx}=(x+3y)$, given that $y=0$, when $x=1$

(b) $dy=\cos x(2-y-\cos ecx)\,dx$, given that $y=0$, when $x=\frac{\pi}{2}$

10. Verify that $xy=100y+c$ is a solution of differential equation $(xy-1)\frac{dy}{dx}+y^2=0$