# INDIAN SCHOOL MUSCAT
## DEPARTMENT OF MATHEMATICS
## CLASS XII
## DIFFERENTIAL EQUATIONS

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

1. $\frac{d^3y}{dx^3} + \cos\left(\frac{d^2y}{dx^2}\right) = 3$
2. $\frac{d^5y}{dx^5} + \cos(y''') = 3$
3. $(y'')^2 + (y')^3 + y^4 = 0$

2. Form the differential equation representing the family of ellipses having foci $x$-axis and the centre at the origin.

3. Form the differential equation of the family of circles in the quadrant which touch the coordinate axes.

4. Solve: $xy(y+1)dy = (x^2+1)dx$

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

6. Solve: $\frac{dy}{dx} = 1 - \frac{\cos x}{1+cosx}$

7. Solve: $(sinx + cosx)dy + (cosx - sinx)dx = 0$

8. Solve: $sec^2y\,(1+x^2)dy + 2x\tan y\,dx = 0\ given\ that\ y(1) = \frac{\pi}{4}$.

9. Solve: $(1+y^2)\,(1+logx)dx + xdy = 0, given\ y(1) = 1$

10.Solve: $log\left(\frac{dy}{dx}\right) = 3x + 4y\ given\ that\ y = 0\ when\ x = 0.$

11. Solve: $xcos\left(\frac{y}{x}\right)\frac{dy}{dx} = ycos\left(\frac{y}{x}\right) + x$

12. Solve: $\left\{xcos\left(\frac{y}{x}\right) + ysin\left(\frac{y}{x}\right)\right\}ydx = \left\{ysin\left(\frac{y}{x}\right) - xcos\left(\frac{y}{x}\right)\right\}xdy$

13. Solve: $x^2ydx - (x^3+y^3)dy = 0$

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

15. Solve: $xdy - ydx = \sqrt{x^2+y^2}dx$

16.Solve : $x\frac{dy}{dx} + 2y = x^2\ (x \neq 0)$

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

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

19. Solve: $ydx + (x - y^3)dy = 0$

20. Solve: $\left[\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right]\frac{dy}{dx} = 1 \ (x \neq 0)$.

21. Solve: $(1 + y^2)dx = (tan^{-1}y - x) = dy \ y = 0 \ when \ x = 0$.

22. Find the equation of a curve passing through the point(0,2) given that the sum of the coordinate of any point on the curve exceeds the magnitude of the tangent to the curve at that point by 5.

23. In a bank principal increases continuously at the rate of 5% per year. An Amount of Rs1000 is deposited with this Bank, how much will it worth after 10 years ( $e^{0.5} = 1.648$)