1) Find the Particular solution $(D^2 + a^2)y = \cos ax$

2) Find the Particular solution $y'' + y' + y = 5$

3) Solve the differential equation $y'' + y = \sin x$

4) Solve the differential equation
$$y'' + 2y' - 3y = x^2 + 3e^{2x} + 4\sin x$$

5) Find the order and degree of the differential equation?

$$\left(\frac{d^3 y}{dx^3}\right)^4 + \left(\frac{d^2 y}{dx^2} + 1\right)^2 + 11y = 6x$$

6) Find the order and degree of the differential equation?
$$\left(\left(\frac{dy}{dx}\right)^3 + 5\right)^{\frac{2}{3}} = \frac{d^3 y}{dx^3}$$

7) Form the differential equation of the family of curves
$$y = \sin(x - A) \text{ where } A \text{ is the parameter}$$

8) Determine the differential equations is exact and solve it?

$$(y^3 - 1)e^x dx + 3y^2(e^x + 1)dy = 0$$

9) Determine the differential equations is exact and solve it?
$$(2x^3 y^2 + 4x^2 y + 2xy^2 + xy^4 + 2y)dx + 2(y^3 + x^2 y + x)dy = 0$$

10) Solve the differential equation

$$y^2 + x^2 \frac{dy}{dx} = 0$$

11) Solve the differential equation

$$\frac{dy}{dx} + y\cot x = \csc x$$

12) Solve the differential equation
$$\frac{dy}{dx} = \frac{y}{x} - \frac{y^2}{x^2}$$

13) Solve the differential equation
$$2\frac{dy}{dx} = \frac{y}{x} - \frac{y^2}{x^2}$$

14) Solve the differential equation
$$\frac{dy}{dx} = \frac{xy - 2y^2}{x^2 - 3xy}$$

15) Solve the differential equation
$$x(y - x)\frac{dy}{dx} = y^2$$

16) Solve the differential equation
$$\frac{dy}{dx} = \frac{y^2 - 2xy}{x^2 - 2xy}$$

17) Solve the differential equation
$$\frac{dy}{dx} = \frac{xy}{x^2 - y^2}$$

18) $(x^2 + y^2)dx + (x^2 - xy)dy = 0$

19) $2xe^y + (x^2e^y + \cos y)\frac{dy}{dx} = 0$

20) $(x + y)^2 dx = 2x^2 dy$

21) $x\frac{dy}{dx} = y + \sqrt{x^2 + y^2}$

22) $\frac{d^2y}{d^2x} + 6\frac{dy}{dx} + 5y = 0$

23) $(1 + x)\frac{dy}{dx} = x + 6$

24) $y \ln x \frac{dx}{dy} = (\frac{y+1}{x})^2$

25) $(ye^x - x)dx + e^x dx = 0$

26) $(x^2 e^y + \cos y)\frac{dy}{dx} = -2xe^y$

27) $\frac{dy}{dx} = \frac{y \cos x}{1+2y^2}$

28) $(x^2 + y^2)dx + (x^2 - xy)dy = 0$

29) $2xe^y + (x^2 e^y + \cos y)\frac{dy}{dx} = 0$

30) $(2xy - \sec^2 x)dx + (x^2 + 2y) = 0$

31) $\frac{dy}{dx} = e^{(3x+2y)}$

32) $y(x+1)dy = xdx$

33) $(4y + y x^2)dy - (2x + xy^2)dx = 0$

34) $y \ln x \frac{dx}{dy} = (\frac{y+1}{x})^2$

35) $(e^y + 1)^2 e^{-y}dx + (e^x + 1)^3 e^{-x}dy = 0$

36) $\frac{dy}{dx} + \frac{2y}{x} = 6x^3$

37) Find particular solution $y' + \tan(x)\, y = \cos^2(x), y(0) = 2$

38) $y \cot x + \frac{dy}{dx} = cosecx$

39) $\frac{dy}{dx} - \sin 2x = y\cot x$

40) $y \cot x + \frac{dy}{dx} = \sin 2x$

41) $\frac{y}{x} + \log x \frac{dy}{dx} = \sin 2x$

42) $2l + \frac{dl}{dx} = -2$

43) $\frac{ds}{dx} + \frac{2}{x}s = -x^2\cos x . s^2$

44) $\frac{dy}{dx} = (-2x + y)^2 - 7, y(0) = 0$

45) $(x^3 + x^2 + x + 1)(\frac{dy}{dx})^2 - (x^2 + 2x + 1)y\frac{dy}{dx} + 2xy^2 = 0$

46) $xy(\frac{dy}{dx})^2 - (x^2 + y^2)\frac{dy}{dx} + xy = 0$

47) $6y^2(\frac{dy}{dx})^2 + 3x\frac{dy}{dx} - y = 0$

48) Find general solution

$$y'' + y' + y = 5$$

49) Find general solution

$$y'' - 3y' + 2y = 0$$

50) Find general solution

$$y'' + y' = cos2x$$