34 x 5 = 170

1) Find the particular solution satisfying the given condition : $x^2dy + \left(xy + y^2\right) dx = 0$; y = 1, when x = 1.

2) Show that the following differential equation is homogeneous and then solve it.
$ydx + x\log\left|\frac{y}{x}\right|dy - 2xdy = 0$

3) Find the particular solution of the differential equation
$x\frac{dy}{dx} + y - x + xy\cot x = 0, x \neq 0$,given that when $x = \frac{\pi}{2}, y = 0$.

4) Solve $\frac{dy}{dx} - 3y\cot x = \sin 2x,$ where $y = 2$ and $x = \frac{\pi}{2}$

5) Solve the following differential equation $\left(1 + x^2\right) dy + 2xydx = \cot xdx, x \neq 0$

6) Obtain the differential equation of all the circles of radius r.

7) Solve the following differential equation :
$\left(1 + y^2\right) dx = \left(\tan^{-1} y - x\right) dy$

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

9) Find the particular solution of the differential equation (x - siny) dy + (tany) dx = 0, given that y = 0 when x = 0.

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

11) Find the particular solution of the differential equation :
$xe^{\frac{y}{x}} - y\sin\left(\frac{y}{x}\right) + x\frac{dy}{dx}\sin\left(\frac{y}{x}\right) = 0$ for x = 1, y = 0.

12) Find the particular solution of the following differential equation given that : y = 0, when x = 1 (x^2 + xy) dy = (x^2 + y^2) dx.

13) Find the particular solution of the differential equation : x^2dy = y(x + y)dx = 0, when x = 1, y = 1.

14) Show that the differential equation
$x\frac{dy}{dx}\sin\left(\frac{y}{x}\right) + x - y\sin\left(\frac{y}{x}\right) = 0$is homogeneous. Find particular solution of this differential equation, given that x = 1 when y = $\frac{\pi}{2}$.

15) Find the particular solution of the differential equation :
$x^2\frac{dy}{dx} - xy = 1 + \cos\left(\frac{y}{x}\right), x \neq 0$, when x = 1, $y = \frac{\pi}{2}$

16) Find the particular solution of the differential equation $(3xy+y^2)dx+(x^2+xy)dy = 0$ for x = 1, y = 1

17) Find the particular solution of the differential equation
$xcos\left(\frac{y}{x}\right)\frac{dy}{dx} = ycos\left(\frac{y}{x}\right) + x$ given that when x = 1, y = $\frac{\pi}{4}$

18) Solve the following differential equation:
$xcos\left(\frac{y}{x}\right)(ydx + xdy) = ysin\left(\frac{y}{x}\right)(xdy - ydx)$

19) Show that the differential equation ($xe^{y/x}$+y) dx = x dy is homogeneous. Find the particular solution of this differential equation, given that x = 1 when y = 1.

20) Form the differential equation of the family of all circles of radius r.

21) Find the differential equation of all the parabolas with latusrectum '4 a' and whose axes are parallel to positive X-axis.

22) Solve the following differential equation
$x\left(x^2 - 1\right)\frac{dy}{dx} = 1, y = 0,$ when $x = 2$

23) Find the particular solution of the differential equation $\frac{dy}{dx} = \frac{x(2\log x+1)}{\sin y+y\cos y}$, given that $y = \frac{\pi}{2}$ when x = 1

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

25) Solve the differential equation
$\left[x\sin^2\left(\frac{y}{x}\right) - y\right]dx + xdy = 0,$ given $y = \frac{\pi}{4}$ when x = 1.

26) Solve the differential equation $dy = \cos x(2 - y\,\text{cosec}\,x)dx$ given that y = 2 when $x = \pi/2$.

27) Solve the following differential equation $\frac{dy}{dx} + y\cot x = 4x\,\text{cosec}\,x,$ given that $y = 0$ when $x = \pi/2$.

28) Solve the differential equation
$\left(x^2+1\right)\frac{dy}{dx} + 2xy = \sqrt{x^2+4}$

29) Solve the differential equation
$\left(x^2+1\right)\frac{dy}{dx} + 2xy = \sqrt{x^2+4}$

30) Solve the following initial value problem
$\left(x^2+1\right)y' - 2xy = \left(x^4+2x^2+1\right)\cos x, y(0) = 0$

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

32) Solve the initial value problem
$ye^y dx = \left(y^3 + 2xe^y\right)dy, y(0) = 1$

33) Solve the initial value problem
$(x - \sin y)dy + (\tan y)dx = 0, y(0) = 0$

34) An equation relating to the stability of a aeroplane is given by $\frac{dv}{dt} = g\cos\alpha - kv$.Where the velocity and g, α, k are constants. Find an expression for the velocity if v = 0 at t = 0.