PARUL UNIVERSITY

Faculty Of Engineering & Technology

Department of Applied Sciences & Humanities

1st year B.Tech Programme (All branches)

Mathematics-II (Subject Code :303191151)

Tutorial-1(B) Higher Order Differential Equation

1. Solve the following homogeneous equations with variable coefficients (Cauchy's Homogeneous linear equation)
    1. $x^2y'' - 2.5xy' - 2y = 0$.
    2. $x^2y'' - 3xy' + 4y = 0;\ y(1) = 0, y'(1) = 3;$
    3. $x^2\dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} + y = 0$.
    4. $x^2y'' - 3xy' + 4y = 0\,, y(1) = 1, y'(1) = 0;$
    5. $x^3\frac{d^3y}{dx^3} + 2x^2\frac{d^2y}{dx^2} + 2y = 0.$
2. Solve the following non-homogeneous Cauchy-Euler differential equations.
    1. $x^2y'' - 4xy' + 6y = 21x^{-4}$.
    2. $x^2y'' - xy' + y = 2\,log\,x.$
    3. $x^2y'' - 3xy' + 4y = x^2; given\ that\ y(1) = 1 and\ y'(1) = 0;$
    4. $x^2y'' - 2xy' + 2y = 2x^3e^3.$
    5. $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = x^3cosx$.
3. In an LCR circuit with equation $L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{c} = E(t)$, $R = 40ohms$,$L = 10henries$, And $C = \frac{1}{80}farad$, Applied voltage $E(t) = 10\,sint$ and $q(0) = 1, q'(0) = 0$. Then find charge on capacitor.