G.PULLAIAH COLLEGE OF ENGINEERING&TECHNOLOGY::KURNOOL
MATHEMATICS-II QUESTION BANK

UNIT-II

I .EULER-CAUCHY'S LINEAR EQUATION :

1. Solve $(x^2D^2 + xD + 1)y = \log x \sin(\log x)$
2. Solve $(x^3D^3 + 3x^2D^2 + xD + 1)y = x + \log x$
3. Solve $2x^2D^2 + 3xD - y = x$
4. Solve $(x^2D^2 - 3xD + 5)y = x^2 \sin(\log x)$
5. Solve $(x^2D^2 + 3xD + 1)y = \log x$
6. Solve $(x^2D^2+xD+9)y = 0$
7. Solve $(x^2D^2- xD+1)y = 0$
8. Solve $(x^2D^2-3xD+4)y = 0$

II.LEGENDRE'S LINEAR EQUATION :

1. Solve $(1+2x)^2\frac{d^2y}{dx^2} - 6(1+2x)\frac{dy}{dx} + 16y = 8(1+2x)^2$
2. Solve $((1+x)^2D^2 + (1+x)D + 1)y = 4\cos[\log(1+x)]$
3. Solve $((3x+2)^2D^2 + 3(3x+2)D - 36)y = 3x^2 + 4x$
4. Solve $((x+1)^2D^2 - 3(x+1)D + 4)y = x^2 + x + 1$

III.ELECTRICAL CIRCUITS

1. A condenser of capacity C discharged through an inductance L and resistance R in series and the charge q at time t satisfies the equation $L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{c} = 0$. Given that L=0.25 henries, R=250 ohms, C=$2\text{x}10^{-6}$ farads, and that when t=0, charge q is 0.002 coulombs and the current $\frac{dq}{dt} = 0$, obtain the value of q in terms of t.
2. An uncharged condenser of capacity C is charged by applying an emf E.$\sin\left(\frac{1}{\sqrt{LC}}\right)$, through leads of self inductance L and negligible resistance. Prove that at any time t, the charge on one of the plates is $\frac{EC}{2}\left\{\sin\frac{t}{LC} - \frac{1}{\sqrt{LC}}\cos\frac{t}{\sqrt{LC}}\right\}$
3. .The charge $q(t)$ on the capacitor is given by D.E., $10\frac{d^2q}{dt^2} + 120\frac{dq}{dt} + 1000q = 17\sin 2t$. At time zero and the charge on the capacitor is $\frac{1}{2000}$ coulomb. Find the charge on the capacitor for $t > 0$.

IV.**Simultaneous Linear Equations**

1. Solve $\frac{dx}{dt} = x - 2y, \frac{dy}{dt} = 5x + 3y$
2. Solve $\frac{dx}{dt} = 3x + 2y, \frac{dy}{dt} + 5x + 3y = 0$
3. Solve $\frac{dx}{dt} = y, \frac{dy}{dt} = x$
4. Solve $\frac{dx}{dt} = -ay, \frac{dy}{dt} = ax$
5. Solve $\frac{dx}{dt} + 5x - 2y = t, \frac{dy}{dt} + 2x + y = 0$
6. Solve $D^2\text{x} + \text{y} = \sin\text{t}\,; \text{x} + \text{D}^2\text{y} = \cos\text{t}$
7. Solve $\frac{dx}{dt} + y = e^t; \frac{dy}{dt} - x = e^{-t}$
8. Solve $(D+6)y - Dx = 0\,; (3-D)x - 2Dy = 0$