Indian Institute of Technology Mandi

IC 110: B.Tech. I year

Odd Semester 2013-14

Tutorial-6 (Differential Equations)

1. Show that $\dfrac{-1}{x^2}$ is an integrating factor of the differential equation $ydx - xdy = 0$. What about $\dfrac{-1}{xy}$?

2. Solve the linear differential equation $\dfrac{dx}{dt} + \dfrac{2x}{10+2t} = 4$.

3. What constant interest rate is required if an initial deposit placed into an account that accrues interest compounded continuously is to double its value in six years?

4. Solve $y' - 5y = 3e^x - 2x + 1$.

5. Solve $y'' - 5y' + 6 = x(\sin x + e^{2x})$.

6. Solve $y''' - 6y'' + 11y' - 6y = 0$; $y(\pi) = 0$, $y'(\pi) = 0$, $y''(\pi) = 1$.

7. Solve $\ddot{x} + 4x = \sin^2 2t$; $x(0) = 0$, $\dot{x}(0) = 0$.

8. Find the general solution near $x = 0$ of $y'' - xy' + 2y = 0$.

9. Use power series method to find the general solution near $x = 0$ of $y'' + y' = 0$.

10. Solve the following using the method of variation of parameters.

    (a) $y''' + y' = \sec x$

    (b) $y'' - 2y' + y = \dfrac{e^x}{x}$

    (c) Problem No. 7.