ME 501 Analytical Methods in Engineering Homework 1
Given 29.09.2013 Due to : 13.10.2013

1- Determine whether the equation is linear or non linear, Ordinary or Particular and find degre and order of the D.E.

a – $(1-x)\,y''-4\,x\,y'+5\,y=\cos[x]$

b – $x\,\frac{d^3y}{dx^3}-\left(\frac{dy}{dx}\right)^4+y=0$

c – $t^5\,y^{(4)}-t^3\,y''+6\,y=0$

d – $\frac{d^2u}{dr^2}+\frac{du}{dr}+u=\cos[r+u]$

e – $\frac{\partial^2u}{\partial x^2}+\frac{\partial^2u}{\partial y^2}+u=\cos[x\,y]$

f – $\ddot{x}-\left(1-\frac{1}{3}\,\dot{x}^2\right)\dot{x}+x=0$

2 - Solve the given differential equation by seperation of variables

a – $\frac{dy}{dx}=\sin[2\,x]$

b – $dx+e^{3\,x}\,dy=0$

c – $\frac{dy}{dx}+2\,x\,y^2=0\quad,\ y[0]=0$

3 - Determine whether the given differential equation is exact if it is exact solve it

a – $(2\,x-1)\,dx+(3\,y+7)\,dy=0$

b – $(5\,x+4\,y)\,dx+\left(4\,x-8\,y^3\right)dy=0,\qquad y[0]=1$

c – $(\sin[y]-y\,\sin[x])\,dx+(\cos[x]+x\,\cos[y]-y)\,dy=0$

d – $\left(3\,x^2\,y+e^y\right)dx+\left(x^3+x\,e^y-2\,y\right)dy=0,\qquad y[0]=0$

4 - Solve differential equations by using Integral Multiplier Method

a – $(-xy\,\sin[x]+2\,y\,\cos[x])\,dx+2\,x\,\cos[x]\,dy=0$

b – $\left(x^2+2\,xy-y^2\right)dx+\left(y^2+2\,xy-x^2\right)dy=0$