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Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech.
Mid Semester Examination (September-October, 2019)

Branch : EEE
Title of the Course : Ordinary Differential Equations and Transforms
Semester : 3rd
Course Code : MAL 201

Time: 2 Hours

Maximum Marks: 25

Note: All questions are compulsory.

Q.1. What is the order, degree, linearity of the differential equation $(2x+y-3)dy=(x+2y-3)dx$. Find the general solution of the differential equation. **4 Marks**

Q.2. Solve the differential equation $\frac{d^2y}{dx^2}+9y=x^2e^{2x}+e^{-x}\cos 3x$ by a suitable method. **4 Marks**

Q.3. Obtain the series solution to differential equation $\frac{d^2y}{dx^2}-2x\frac{dy}{dx}+y=0$ about x=0. **4 Marks**

Q.4. Solve the differential equation $(x+1)^4D^3y+2(x+1)^3D^2y-(x+1)^2Dy+(x+1)y=\frac{1}{1+x}$. **4 Marks**

Q.5. A) Find the orthogonal trajectories of one parameter family of curves $xy=c$. **2 Marks**

B) Show that the generating function of the Bessel function $J_n(x)$ is $e^{\frac{x}{2}\left(z-\frac{1}{z}\right)}$. **3 Marks**

Q.6. The differential equation for the LRC series circuit is $L\frac{d^2q}{dt^2}+R\frac{dq}{dt}+\frac{1}{C}q=E(t)$. Find the charge on the capacitor in the LRC series circuit at $t=0.01\sec$ when $L=0.05h$, $R=2\Omega$, $C=0.01f$, $E(t)=0\,V$, $q(0)=5C$ *and* $i(0)=0\,A$. Determine the first time when the charge on the capacitor is equal to zero. **4 Marks**