RollNo. | | | | | | | |

Paper Code: TMA-201

End Semester Examination, 2019
B.Tech – I[st] year I[st] Semester
Engineering Mathematics- I

Time: Three Hours MM: 100

Note:

1. . **This question paper contains five questions with alternative choice. All questions are compulsory**
2. **Each question carries four parts a,b,c and d. Attempt either parts a and b or attempt parts c and d of each question**
3. **Each part carries ten marks .Total marks assigned to each question are twenty.**

Q1 (a) Solve $\frac{d^2y}{dx^2}+4\frac{dy}{dx}+2y=xSin3x$

(b) Use Variation of parameters method to solve $\frac{d^2y}{dx^2}+y=Sec(x)$

(c) A body executes dumped forced vibrations given by the equation $\frac{d^2x}{dt^2}+2k\frac{dx}{dt}+b^2x=e^{-kt}Sin\omega t$

Solve the difference equation for both the case when $\omega^2=b^2-k^2$ and $\omega^2\neq b^2-k^2$

Q2 (a) Find Laplace transformation of the function $f(t)=\begin{cases} t & 1<t<2 \\ t^2 & 2<t<3 \end{cases}$

(b) Find the Laplace transform of $f(t)=\frac{1}{t^2}-\frac{Cost}{t^2}$

(c) Solve the Differential equation by using Laplace transformation

$\frac{d^2y}{dx^2}+2\frac{dy}{dx}+2y=5Sin\,t, \quad y(0)=y'(0)=0.$

Q3 (a) Find the Fourier series for the function $f(x)=x,-\pi<x<\pi$

(b) Find the Fourier series of the function $f(x)=Cos(x),-\pi<x<\pi$

(c) Find the Fourier series Cosine series of the function $f(x)=\begin{cases} 1, & 0<x<\pi/2 \\ 0, & \pi/2<x<\pi \end{cases}$

Q4 (a) Prove the Orthogonality of Bessel's function.
(b) State and prove Rodrigue's formula
(c) State and prove generating function of Legendre's polynomial.

Q5 (a) Solve PDE by using separation of variable method $\frac{\partial u}{\partial x}-2\frac{\partial u}{\partial t}-u=0,\ where\ u(x,0)=6e^{-3x}$

(b)Solve PDE by using separation of variable method

$u_{xx}=u_y+2,\ where\ u(0,y)=0\ and\ \frac{\partial}{\partial x}u(0,y)=1+e^{-30y}$

(c) Find the Solution of 1D wave equation by using separation of variable method.

9.30-12.30

01/1/19