Roll No	2	2	6	1	5	1	4

End Semester Back Paper Examination 2022

Name of the Program: B.Tech. | Semester: II

Name of the Course: Engineering Mathematics | Course Code: TMA-201

Time: 3 Hour's | Maximum Marks: 100

Note:

(i) All questions are compulsory.
(ii) Answer any two sub questions among a, b, and c in each main question.
(iii) Total marks in each main question are twenty.
(iv) Each question carries 10 marks

Q1	**(10 X 2=20 marks)**	
(a)	Solve the differential equation $(x+y-10)dx+(x-y-2)dy=0$.	CO1
(b)	Solve using the Method of variation of parameters $(D^2+1)y=\sec x$	
(c)	Obtain the general solution of $\frac{d^2y}{dx^2}-y=3e^x-2e^{2x}$	
Q2	**(10 X 2=20 marks)**	
(a)	Find the Laplace transform of the function $\frac{\cos at-\cos bt}{t}$.	CO2
(b)	Obtain the inverse Laplace transform of the function $\cot^{-1}\left(\frac{s+3}{2}\right)$.	
(c)	Applying Convolution theorem, solve the following initial value problem $y''+y=\sin 3t$, given $y(0)=0$, $y'(0)=0$.	
Q3	**(10 X 2=20 marks)**	
(a)	Find the Fourier series for the function $f(x)=x$ in $(0,2\pi)$.	CO3
(b)	Obtain the Fourier series for the function $f(x)=\begin{cases}-k, & -\pi<x<0\\ k, & 0<x<\pi\end{cases}$.	
(c)	Obtain the Half range Fourier cosine series of the following function: $f(x)=\|x\|$, $0<x<\pi$.	
Q4	**(10 X 2=20 marks)**	
(a)	Solve the following partial differential equation: $(D^2-2DD'+D'^2)z=\sin(x+2y)$.	CO4
(b)	Using the method of separation of variables, solve $\frac{\partial u}{\partial x}=2\frac{\partial u}{\partial t}+u$, where $u(x,0)=6e^{-3x}$.	
(c)	A tightly stretched string with fixed end points $x=0$ and $x=l$ is initially in a position given by $y=y_0\sin^3\left(\frac{\pi x}{l}\right)$. If the string is released from this position, find displacement $y(x,t)$.	

Q5	(10 X 2=20 marks)	
(a)	Show that $J_{1/2}=\sqrt{\frac{2}{\pi x}}\sin x$ and $J_{-1/2}=\sqrt{\frac{2}{\pi x}}\cos x$	CO5
(b)	Prove the Rodrigue's formula $P_n(x)=\frac{1}{2^n n!}(x^2-1)^n$.	
(c)	Prove that $J_{-n}(x)=(-1)^n J_n(x)$.	