End Semester Examination (February 2022)
Academic Year: 2021-2022

Max. Marks: 50	**Duration:** 02 **Hr.**
Class: S Y B Tech	Semester: III
Course: Engineering Mathematics-III	Course Code: BSCO3010T
Program: Computer Engineering	

Instructions:
(1) Solve ANY FIVE questions.
(2) Read the questions carefully.
(3) Assume suitable data wherever required, but justify it.
(4) All questions carry equal marks.
(5) Answer to each new question is to be started on a fresh page.
(6) Figure to the right indicate full marks.
(7) Draw the neat labelled diagrams wherever necessary.

Question No.		Max. Marks
Q1 (a)	Evaluate $\int_0^\infty \frac{cos6t-cos4t}{t}\,dt$	05
Q1 (b)	By Using Convolution theorem , Find $L^{-1}\left\{\frac{1}{s^2(s+1)^2}\right\}$	05
Q2	Find the Fourier Series for the periodic function $f(x)=\frac{(\pi-x)^2}{4}$ in the interval $(0,2\pi)$. Hence deduce that $\frac{\pi^2}{6}=\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\cdots$	10
Q3	Find the Fourier sine transform of $\frac{e^{-ax}}{x}$ and hence evaluate $\int_0^\infty tan^{-1}\frac{x}{a}\,sinx\,dx$	10
Q4 (a)	Find $Z^{-1}\left[\frac{z^2}{\left(z-\frac{1}{2}\right)\left(z-\frac{1}{3}\right)}\right], if\ \frac{1}{3}<\lvert z\rvert<\frac{1}{2}$	05
Q4 (b)	Find $Z\{f(k)\}$ if $f(k)=\frac{a^k}{k!}$, $k\geq 0$	05
Q5	Solve the differential equation by using Laplace transform $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+5y=e^{-t}\,sint$, $y(0)=0$, $y'(0)=1$	10
Q6 (a)	Show that if $0<x<\pi$, $cosx=\frac{8}{\pi}\sum_{m=1}^{\infty}\frac{m}{(4m^2-1)}\,sin2mx$	05
Q6 (b)	Using Parseval's identity prove that $\int_0^\infty \frac{x^2}{(x^2+1)^2}\,dx=\frac{\pi}{4}$	05

All the Best!