SOMAIYA VIDYAVIHAR UNIVERSITY

Semester: August 2022-December 2022		
Maximum Marks: 30 **Examination: In-Semester Examination**		**Duration : 1Hr**
Programme code: 01 **Programme:** B. Tech Computer Engineering	**Class:** SY	**Semester:** III **(SVU 2020)**
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department:** Computer	
Course Code: 116U01C301	**Name of the Course:** Integral transform and Vector calculus.	

Question No.		Max. Marks	CO&BT
Q.1	Attempt any **THREE** of the following		CO1 BT 3
(a)	Find the Laplace transforms of $\int_0^t \frac{1-e^{au}}{u} du$	05	
(b)	Evaluate $\int_0^\infty e^{-3t} t \cos t \cdot dt$ using Laplace transforms.	05	
(c)	Find the inverse Laplace transforms of $\left(\frac{1}{s^2-s-6}\right)$ by using convolution theorem.	05	
(d)	Find the inverse Laplace transforms of $log\left(1+\frac{1}{s^2}\right)$	05	
(e)	Find the Laplace transforms of $(1+2t-t^2+t^3)H(t-1)$	05	
Q.2 (a)	Obtain Fourier series for $f(x) = x \cos x \; in \; (-\pi, \pi)$ **OR** Obtain complex form of Fourier series for $f(x) = e^x$ in $(-1, 1)$	05	CO2 BT 3
(b)	Obtain the Fourier expansion of $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in $0 \le x \le 2\pi$ and $f(x+2\pi) = f(x)$. Also deduce that **(i)** $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$ **(ii)** $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots$ **(iii)** $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \cdots$ **(iv)** $\frac{\pi^4}{90} = \frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \frac{1}{4^4} + \cdots$	10	