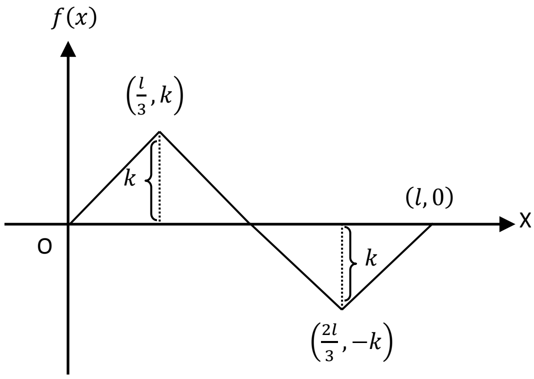
Semester: August 2021 - November 2021 Examination: In Semester Examination		
Programme code: **Programme:**	**Class:** SY	**Semester:** III (SVU 2020)
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department/Section/Center:** COMP	
Course Code: 116U01C301	**Name of the Course:** Integral Transform and Vector Calculus	

Question No.		Max. Marks	CO Mapped
Q1	Choose the correct option from the following MCQ (2 MARK EACH)	10	CO1 CO2
(i)	If $L\left(erf\sqrt{t}\right) = \frac{1}{s\sqrt{s+1}}$ then $L\left(erf3\sqrt{t}\right) =$ (a) $\frac{1}{s\sqrt{s+3}}$ (b) $\frac{3}{s\sqrt{s+1}}$ (c) $\frac{1}{3s\sqrt{s+3}}$ (d) $\frac{3}{s\sqrt{s+9}}$		
(ii)	$L[t^n e^{at}] =$ (a) $\frac{(-1)^n\, n!}{(s-a)^{n+1}}$ (b) $\frac{n!}{(s-a)^{n+1}}$ (c) $\frac{(-1)^n}{(s+a)^{n+1}}$ (d) $\frac{(-1)^n\, n!}{(s+a)^{n+1}}$		
(iii)	$L^{-1}\left[\tan^{-1}\left(\frac{2}{s}\right)\right] =$ (a) $-\frac{1}{t}\sin 2t$ (b) $\frac{2}{t}\sin 2t$ (c) $\frac{1}{t}\sin 2t$ (d) $-\frac{2}{t}\sin 2t$		
(iv)	In Fourier expansion of $f(x) = x\sin x$ in the interval $0 \le x \le 2\pi$. $a_1 =$ (a) $-\frac{\pi}{2}$ (b) $-\frac{1}{2}$ (c) $\frac{1}{2}$ (d) 0		
(v)	In Fourier series $f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty}(a_n\cos nx) + \sum_{n=1}^{\infty}(b_n \sin nx)$ for $f(x) = \lvert x\rvert$ in the range $(-\pi,\pi)$, $a_0 =$ (a) π (b) $-\pi$ (c) $-\frac{\pi}{2}$ (d) $\frac{\pi}{2}$		

Q.2	Attempt any **TWO** of the following	10	CO1
(a)	Find the Laplace transform of $t^{-1}\int_0^t e^{-u}\sin u\,du$		
(b)	Find the inverse Laplace transforms of $\frac{1}{s\sqrt{s+4}}$ by using convolution theorem		
(c)	Express the function $f(t)=\begin{cases}\sin t, & 0<t<\pi\\ \cos t, & t>\pi\end{cases}$ as Heaviside's unit step functions and find its Laplace transform		
Q 3	Attempt any **ONE** of the following	10	CO2
(a)	Obtain Fourier sine series for half – range $(0,l)$ with period $2l$ for the function $f(x)$ represented by the graph 		
(b)	Obtain Fourier series for $f(x)=\cos px\ in\ (-\pi,\pi)$, where p is not an integer .Hence prove that (i) $\cot p\pi=\frac{2p}{\pi}\left[\frac{1}{2p^2}-\frac{1}{p^2-1^2}+\frac{1}{p^2-2^2}-\frac{1}{p^2-3^2}+\cdots\right]$ (ii) $\frac{1}{2}-\frac{\pi\sqrt{3}}{18}=\frac{1}{9\cdot1^2-1}+\frac{1}{9\cdot2^2-1}+\frac{1}{9\cdot3^2-1}+\cdots\ldots\ldots$		