

Reg.No. \_\_\_\_\_



# Karunya UNIVERSITY

(Karunya Institute of Technology &amp; Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

## End Semester Examination – Nov/Dec – 2016

Code : 14MA2004

Semester : 2016-17 ODD

Duration : 3hrs

Sub. Name : Laplace Transforms, Fourier Series and Transforms

Max. marks : 100

### ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks																
1.	a.	Find $L\left(\frac{t\sin at}{2a}\right)$	CO1	10																
	b.	Find $L\left(\frac{\sin \omega t}{t}\right)$	CO1	10																
(OR)																				
2.	a.	Evaluate $\int_0^\infty t e^{-3t} \sin t \, dt$	CO1	10																
	b.	Evaluate $L\left(t \int_0^t \frac{e^{-t} \sin t}{t} dt\right)$	CO1	10																
3.	a.	Find $L^{-1}\left(\log\left(\frac{s+1}{s-1}\right)\right)$	CO1	10																
	b.	Solve $y''+4y'+5y=0, \, y(0)=0, \, y'(0)=1$	CO3	10																
(OR)																				
4.	a.	Using Convolution find $L^{-1}\left[\frac{s^2}{(s^2+a^2)^2}\right]$	CO1	10																
	b.	Solve $y''+y=\sin t, \, y(0)=1, \, y'(0)=\frac{1}{2}$	CO3	10																
5.	a.	Find Finite Fourier Cosine transform of $f(x)=\frac{x}{\pi};$ in the interval $(0, \pi)$	CO1	10																
	b.	Find Fourier transform of $f(x)=\begin{cases} 1 & ; x <1 \\ 0 &  x >1 \end{cases}$ .Hence evaluate $\int_0^\infty \frac{\sin x}{x} dx$	CO2	10																
(OR)																				
6.	a.	Find Finite Fourier Sine Transform of $f(x)=e^{ax};$ in the interval $(0, l)$	CO1	10																
	b.	Find Fourier transform of $f(x)=\begin{cases} a- x  & ; x <a \\ 0 &  x >a \end{cases}$ .Hence evaluate $\int_0^\infty \left(\frac{\sin t}{t}\right)^2 dt$	CO2	10																
7.	a.	Find the half range cosine series for $f(x)=x \sin x$ in $(0,\pi)$	CO3	10																
	b.	Find the Fourier series of the periodic function $f(x)$ with period $2\pi$ given by $f(x)=0$ in $-\pi \leq x \leq 0$ , and $x^2$ in $0 \leq x \leq \pi$ .	CO3	10																
(OR)																				
8.	a.	Find the half range cosine series in $(0, \ell)$ of $f(x)=x$ .	CO3	10																
	b.	Obtain the Fourier series of $f(x)=x \cos x$ in $-\pi < x < \pi$ ,	CO3	10																
<b>Compulsory:</b>																				
9.	a.	Find the Fourier Series up to the third harmonic for $y=f(x)$ in $(0, 2\pi)$ defined by the table of values given below: <table border="1"><tr><td>x</td><td>0</td><td>60</td><td>120</td><td>180</td><td>240</td><td>300</td><td>360</td></tr><tr><td>y</td><td>1.0</td><td>1.4</td><td>1.9</td><td>1.7</td><td>1.5</td><td>1.2</td><td>1.0</td></tr></table>	x	0	60	120	180	240	300	360	y	1.0	1.4	1.9	1.7	1.5	1.2	1.0	CO3	20
x	0	60	120	180	240	300	360													
y	1.0	1.4	1.9	1.7	1.5	1.2	1.0													

ALL THE BEST