Course Code: 2030003 Roll No: **MLRS- R20**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech I Sem Supply End Examination, July-2022

Laplace Transforms Series Solutions and Complex Variables

(EEE & ECE)

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1.	a)	Find the Laplace transform of unit step function	2M	CO1	U
	b)	State the conditions for the existence of a Laplace Transform	2M	CO1	R
	c)	State Dirichlet's conditions for Fourier series	2M	CO2	R
	d)	Explain briefly about Half range cosine series expansion of a function	2M	CO2	U
	e)	Define ordinary point and singular point of a Differential Equation	2M	CO3	R
	f)	Write Bessel's Differential equation of order n.	2M	CO3	U
	g)	Write Cauchy Riemann equations in Cartesian coordinates.	2M	CO4	U
	h)	Define Analytic function.	2M	CO4	R
	i)	State Cauchy integral theorem	2M	CO5	R
	j)	Find the residue of f(z) = $\frac{z^2}{(z-1)(z-2)^2}$ at z=2.	2M	CO5	U

PART- B

(10*5 Marks = 50 Marks)

2	a)	Using Laplace Transforms evaluate the integral $\int_0^\infty te^{-3t}\sin t\,dt$	5M	CO1	AP
	b)	Find Laplace transform of $f(t)=e^{-3t}(2\cos 5t-3Sin5t)$	5M	CO1	U
		OR			
3		Using Laplace transform method, Solve $\frac{d^2x}{dt^2}+3\frac{dx}{dt}+2x=e^{-t}$, given that x(0)=0, $x'(0)=1$.	10M	CO1	AN
4	a)	Find Fourier series of the function $f(x)=x^2$ on 0<x<4.	5M	CO2	U
	b)	Find he Half range Cosine series of $f(x)=(x-1)^2$ in $0<x<1$.	5M	CO2	AP
		OR			

5		Find the Fourier series expansion of $f(x)=\begin{cases}-\pi, & -\pi<x<0\\ 0, & 0<x<\pi\end{cases}$	10M	CO2	AN
6	a)	Prove that $J_n(x)=\frac{x}{2n}[J_{n-1}(x)+J_{n+1}(x)$	5M	CO3	U
	b)	Prove that $J_{\frac{1}{2}}$ (x)=$\sqrt{\frac{2}{\pi x}}\,(sinx)$	5M	CO3	AP
		OR			
7		Explain briefly about Orthogonality of Bessel functions.	10M	CO3	AN
8	a)	Discuss the analyticity of *f(z)* = Z^2	5M	CO4	U
	b)	Determine the Analytic function $f(z)$ whose real part is $e^{2x}(x\cos 2y-y\sin 2y)$.	5M	CO4	AP
		OR			
9		Show that the function $f(z)=\frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$ (z≠0), f(z)=0, z=0 is continuous and Cauchy Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist.	10M	CO4	AN
10	a)	Using Cauchy integral formula evaluate the integral $\oint_c \frac{e^z}{\left(z-\frac{\pi}{6}\right)^3}dz$, where $c:\lvert z\rvert=1$	5M	CO5	U
	b)	Apply Residue theorem to evaluate the integral $\oint_c \frac{1-2z}{z(z-1)(z-2)}dz$, where $c:\lvert z\rvert=1.5$.	5M	CO5	AP
		OR			
11		Find the Laurent's series expansion of $f(z)=\frac{z}{(z-1)(z-3)}$ in the region (i) |z|< 1 (ii) 1< |z|< 3 (iii) |z|> 3	10M	CO5	AN

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