Course Code: 1940003 Roll No: MLRS-R19

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 II Sem Supply End Examination, July 2022

Laplace Transforms, Numerical Methods and Complex Variables

(EEE/ECE)

Time: 3 Hours. **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 $\int_0^\infty t^2 e^{-4t} \sin 2t \, dt$	2M	CO1	BL1
	b)	Find the inverse Laplace transform of the function $\left\{\frac{3s-2}{s^2-4s+20}\right\}$	2M	CO1	BL1
	c)	Derive formula to find square root of N by using Newton Raphson Method.	2M	CO2	BL3
	d)	Write Newton's Backward Interpolation formula.	2M	CO2	BL5
	e)	Write Simpson's $3/8^{th}$ formula.	2M	CO3	BL6
	f)	Use Euler's method to find y(0.1), given $y'=3x^2+1, y(0)=1$.	2M	CO3	BL3
	g)	Determine whether the function $2xy+i(x^2-y^2)$ is analytic.	2M	CO4	BL3
	h)	Define CR equations.	2M	CO4	BL1
	i)	Expand e^z as Taylor's series about z=1.	2M	CO5	BL4
	j)	State Residue theorem.	2M	CO5	BL5

PART- B

(10*5 Marks = 50 Marks)

2	a)	Using Laplace transform, evaluate $\int_0^\infty \frac{\cos at - \cos bt}{t} \, dt$	5M	CO1	BL3
	b)	Find the inverse Laplace Transform of $\log\left(\frac{s+1}{s-1}\right)$	5M	CO1	BL1

OR

3		Solve $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+2y=5\sin t$, using Laplace transform and given that $y(0)=y'(0)=0$.	10M	CO1	BL3

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4 a)	Find a real root of the equation $x^3-4x-9=0$ using False position method correct to three decimal places.	5M	CO2	BL1
b)	Using Gauss Backward difference formula, find y (8) from the following table.	5M	CO2	BL3

x	0	5	10	15	20	25
y	7	11	14	18	24	32

OR

5	Given $u_0=580, u_1=556, u_2=520$ and $u_4=385$ find u_3.	10M	CO2	BL1

6 a)	Evaluate $\int_{0.6}^{2.0} y\,dx$ using Trapezoidal rule.	5M	CO3	BL5

x	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
y	1.23	1.58	2.03	4.32	6.25	8.38	10.23	12.45

b)	Find the value of y for x = 0.4 by Picard's method, given that $y'=x^2+y^2$, $y(0)=0$.	5M	CO3	BL1

OR

7	Use Runge – Kutta method to evaluate y(0.1)and y(0.2) given that $y'=x+y$, $y(0)=1$.	10M	CO3	BL3
8	Find the most analytical function whose real part is $U = x^2-y^2-x$.	10M	CO4	BL3

OR

9	Show that the function $u(x,y)=e^x\cos y$ is harmonic. Determine its harmonic conjugate v(x, y) and the analytic function $f(z)=u+iv$.	10M	CO4	BL2
10 a)	Evaluate $\int_{(0,0)}^{(1,1)}(3x^2+4xy+ix^2)dz$ *along* $y=x^2$	5M	CO5	BL5
b)	Find the Laurent series expansion of the function $f(z)=\dfrac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region $3<\lvert z+2\rvert<5$.	5M	CO5	BL1

OR

11	Evaluate $\int_c \dfrac{12z-7}{(2z+3)(z-1)^2}dz$ Where C is $x^2+y^2=4$. Using Cauchy's Residue theorem.	10M	CO5	BL5

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