SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Regular Examinations February-2025
COMPLEX VARIABLES & NUMERICAL METHODS
(Electrical & Electronics Engineering)

Time: 3 Hours   Max. Marks: 70

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	State Cauchy-Riemann (C-R) equations in cartesian coordinates.	CO1	L1	2M
	b	Show that z^2 is an analytic for all z.	CO1	L2	2M
	c	State Cauchy's integral theorem.	CO2	L1	2M
	d	Expand e^z as Taylor's series in powers of (z-3).	CO2	L2	2M
	e	Write the formula to find the root of an equation by Regula Falsi method.	CO3	L1	2M
	f	Compare Jacoby and Gauss Seidel methods.	CO4	L5	2M
	g	Write Newton's forward interpolation formulae.	CO5	L1	2M
	h	State the two normal equation used in fitting a straight line.	CO5	L1	2M
	i	Write Taylor's formula for (x_1) to solve $y' = f(x,y)$ with $y(x_0)= y_0$.	CO6	L1	2M
	j	If $\frac{dy}{dx} = y - x$; y(0)=2, h=0.2 then Find the value of k_1 in R–K method of fourth order.	CO6	L2	2M

PART-B

(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2	a	Find whether (z)=$sinxsiny-icosxcosy$ is an analytic or not.	CO1	L1	5M
	b	Determine the analytic function whose real part is e^x cosy.	CO1	L5	5M

OR

3		Prove that the function f(z) defined by $f(z) = \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$,(z≠0) and f(z)=0 ,(z=0) is continuous and the Cauchy-Riemann equations are satisfied at origin.	CO1	L5	10M

UNIT-II

4		Evaluate $\int \frac{z-3}{z^2+2z+5} d$ where 'c' is the circle i) $|z|=1$ ii) $|z+1-i|=2$.	CO2	L5	10M

OR

5	a	Expand (z)=$sinz$ in Taylor's expansion of in powers of $(z-\pi/4)$.	CO2	L2	5M
	b	Find the residue of f(z) = $\frac{z^2}{(z-1)^2(z+2)}$ at each pole.	CO2	L1	5M

UNIT-III

6   **a**   Find a positive root of the equation $x^3-x-1=0$ by Bisection method.   **CO3**   **L1**   **5M**

      b   Find a positive root of the equation $x^4-x-10=0$ by iteration method.   **CO3**   **L1**   **5M**

<div align="center">OR</div>

7   Solve the following system of equations by Gauss-Siedel method   **CO4**   **L3**   **10M**
$4x+2y+z=14$; $x+5y-z=10$; $x+y+8z=20$.

UNIT-IV

8   Using Lagrange's interpolation formula, find the value of y(10) from the   **CO5**   **L3**   **10M**
following table:

X	5	6	9	11
Y	12	13	14	16

<div align="center">OR</div>

9   Fit a straight line $y=a+bx$ for the following data   **CO5**   **L3**   **10M**

X	6	7	7	8	8	8	9	9	10
Y	5	5	4	5	4	3	4	3	3

UNIT-V

10   Solve $y^1=x+y$, given $y(1)=0$. find $y(1.1)$ and $y(1.2)$ by Taylor's series   **CO6**   **L3**   **10M**
method.

<div align="center">OR</div>

11   Using Runge – Kutta method of fourth order, solve $\frac{dy}{dx} = x^2 - y$, $y(0)=1$.   **CO6**   **L3**   **10M**
Find $y(0.1)$ and $y(0.2)$.

<div align="center">*** END ***</div>