SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Regular & Supplementary Examinations November-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	Prove that $f(z)=\bar{z}$ is not ananalytic at any point.	CO1	L5	2M
	c	State Cauchy's integral theorem.	CO2	L1	2M
	d	Expand as Taylor's series in powers of (z-3).	CO2	L2	2M
	e	Find the rootof theequation $x^2-5=0$ by using Bisection method.	CO3	L1	2M
	f	Compare Jacoby and Gauss Seidel methods.	CO3	L5	2M
	g	Write Newton's forward interpolation formulae.	CO4	L1	2M
	h	Write Lagrange's interpolation formulae.	CO4	L1	2M
	i	State Euler formula to solve $y'=(x,y), y(x_0)=y_0$ at $x=x_0+h$.	CO5	L1	2M
	j	Write the formula for Runge–Kutta method of fourth order.	CO5	L1	2M

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

UNIT-I

2	a	Determine whether the function$(z)=2xy+i(x^2-y^2)$is analytic.	CO1	L1	5M
	b	Show that $u=2\log(x^2+y^2)$ is harmonic function.	CO1	L2	5M

OR

3	Verify that $u= x^2 - y^2 - y$ is harmonic in the whole complex planeand find a conjugate harmonic function v of u?	CO1	L4	10M

UNIT-II

4	Show that $\int_c (z+1)dz = 0$ where'c' is the boundary of the square whose vertices at the points $z=0$, $z=1$, $z= 1 + i$, $z= i$.	CO2	L1	10M

OR

5	Evaluate $\oint_c \dfrac{4 - 3z}{z(z - 1)(z - 2)} dz$ where c is the circle $|z| = \dfrac{3}{2}$ using residue theorem.	CO2	L5	10M

UNIT-III

6	Find a real root of the equation $x\tan x+1 =0$ using Newton–Raphson method.	CO3	L1	10M

7   Apply Gauss-Siedel iteration method to solve the equations   **CO3**   **L3**   **10M**
$20x+y-2z=17$; $3x+20y-z=-18$; $2x-3y+20z=25$.

UNIT-IV

8   **a**   Applying Newton's forward interpolation formula, compute the value of   **CO3**   **L3**   **5M**
$\sqrt{5.5}$ given that $\sqrt{5} = 2.236$; $\sqrt{6} = 2.449$; $\sqrt{7} = 2.646$; $\sqrt{8} = 2.828$.

     b   Use Newton's backward interpolation formula to find f(32) given   **CO3**   **L5**   **5M**
f(25)=0.2707, f(30)=0.3027, f(35)=0.3386, f(40)=0.3794.

OR

9   Obtain a second degree polynomial to the data by method of least square   **CO4**   **L3**   **10M**

X	1	2	3	4	5
Y	10	12	8	10	14

UNIT-V

10   Solve $y^{1} = x + y$, given $y\,(1) = 0$ find(1.1) and $y(1.2)$ by Taylor's series   **CO5**   **L3**   **10M**
method.

OR

11   Using Runge–Kutta method of fourth order,find(0.1) and $y(0.2)$ given that   **CO5**   **L3**   **10M**
$\frac{dy}{dx}=x+y$, $y(0)=1$.

*** END ***