SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada
Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

DEPARTMENT OF BASIC SCIENCES & HUMANITIES

TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
23BS3T01	COMPLEX VARIABLES & NUMERICAL METHODS	III	EEE	60/6	2024-25	30-07-2024

COURSE OUTCOMES: At the end of this course, the student will be able to

CO1	Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic (k3)
CO2	Evaluate the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues.Make use of the Cauchy residue theorem to evaluate certain integrals (K3)
CO3	Apply the properties of various types of conformal mappings (K3)
CO4	Evaluate the approximate roots of polynomial and transcendental equations by different algorithms and apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (K3)
CO5	Apply numerical integral and differential methods to different Engineering problems. (K3)

UNIT	Out Comes / Bloom's Level	Topic No.	Topics/Activity	Text Book/ Reference	Contact Hour	Delivery Method
I	CO1 Students are able to apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic (k3)		**Functions of a complex variable and complex integration**			Chalk & Talk,Active learning ,PPT and Tutorial
		1.1	Introduction _Limit	T_1&T_2	1	
			Continuity	T_1&T_2	1	
		1.2	Differentiability _	T_1&T_2	1	
			Analyticity	T_1&T_2	1	
		1.3	Cauchy-Riemann equations in Cartesian and polar coordinates	T_1&T_2	1	
				T_1&T_2	1	
		1.4	Harmonicand conjugate harmonic functions	T_1&T_2	1	
				T_1&T_2	1	
		1.5	Milne – Thompson method	T_1&T_2	1	
		1.6	Complex integration: Line integral	T_1&T_2	1	
		1.7	Cauchy's integral theorem	T_1&T_2	1	

			– Cauchy's integral formula	T_1&T_2	1	
		1.8	Generalized integral formula (all without proofs) and problems on above theorems.	T_1&T_2	1	
				T_1&T_2	1	
					14	
II	**Series expansions and Residue Theorem**					
	CO2 Students are able to evaluate the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues.Make use of the Cauchy residue theorem to evaluate certain integrals (K3)	2.1	Radius of convergence	T_1&T_2	1	Chalk & Talk,Active learning ,PPT and Tutorial
		2.2	Expansion of function in Taylor's series	T_1&T_2	1	
		2.3	Maclaurin's series and Laurent series	T_1&T_2	1	
				T_1&T_2	1	
		2.4	Types of Singularities:Isolated_ Essential singularitie	T_1&T_2	1	
				T_1&T_2	1	
		2.5	Pole of order m– Residues – Residue theorem (without proof)	T_1&T_2	1	
				T_1&T_2	1	
		2.6	Evaluation of real integral of thethe types $\int_0^\infty f(x)dx$	T_1&T_2	1	
				T_1&T_2	1	
		2.7	Evaluation of real integral of thethe types $\int_0^{2\pi} f(cos\theta, sin\theta)d\theta$.	T_1&T_2	1	
				T_1&T_2	1	
				Total	12	
III	**Conformal mapping**					
	CO3 Students are able to explain properties of various types of conformal mappings (K5)	3.1	Transformation by e^z lnz,z^2,z^n(n-positive integer)	T_1&T_2	1	Chalk & Talk,Active learning ,PPT and Tutorial
				T_1&T_2	1	
		3.2	Sin z, cos z, z + a/z	T_1&T_2	1	
		3.3	Translation, inversion and bilinear transformation	T_1&T_2	1	
				T_1&T_2	1	
		3.4	fixed point – cross ratio _properties	T_1&T_2	1	
				T_1&T_2	1	
		3.5	invariance of circles	T_1&T_2	1	
				T_1&T_2	1	
				T_1&T_2	1	

	:	3.6	Determination of bilinear transformation for given 3 points .	T_1&T_2	1	
				Total	11	

IV	CO4: Evaluate the approximate roots of polynomial and transcendental equations by different algorithms and apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (K3)	**Iterative Methods**				
		4.1	Introduction – Solutions of algebraic and transcendental equations: Bisection method	T_1&T_2	1	Chalk & Talk,Active learning ,PPT and Tutorial
				T_1&T_2	1	
		4.2	Secant method	T_1&T_2	1	
		4.3	Method of false position	T_1&T_2	1	
				T_1&T_2	1	
		4.4	Iteration method	T_1&T_2	1	
				T_1&T_2	1	
		4.5	Newton-Raphson method-One variable	T_1&T_2	1	
		4.6	Difference Operators-Forward,backward,central and their properties.	T_1&T_2	1	
		4.7	Newton's forward formulae for interpolation	T_1&T_2	1	
		4.8	Newton's backward formulae for interpolation	T_1&T_2	1	
		4.9	Interpolation with unequal intervals – Lagrange's interpolation formula	T_1&T_2	1	
		4.10	Lagrange's interpolation formula	T_1&T_2	1	
					13	
V	CO5 Students are able to apply numerical integral and differential methods to different Engineering problems. (K3)	**Numerical integration, Solution of ordinary differential equations with initial conditions**				
		5.1	Trapezoidal rule	T_1&T_2	1	
		5.2	Simpson's 1/3rd	T_1&T_2	1	
		5.3	Simpson's 3/8th rule	T_1 &T_2	1	
		5.4	Solution of initial value problems by	T_1&T_2	1	

			Taylor's series			
		5.5	Picard's method of successive approximations	T_1&T_2	1	
		5.6	Euler's method	T_1&T_2	1	
		5.7	Modified Euler's method	T_1&T_2	1	
		5.8	Runge-Kutta method (second & fourth order)	T_1&T_2	1	Chalk & Talk, Active learning, PPT and Tutorial
				T1&T2	1	
		5.9	Milne's Predictor and Corrector Method	T_1&T_2	1	
					10	
				Cumulative Proposed Periods	60	

Text Books:	
S.No.	**AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION**
T1	Dr. B.S.Grewal Higher Engineering Mathematics, 43rd Edition, Khanna Publications,2015
T2	Dr.T.K.V.Iyengar, Engineering Mathematics,New Edition, S.Chand Publishers.
Reference Books:	
S.No.	**AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION**
R1	Erwin Kreyszig,Advanced Engineering Mathematics,10th Edition, Wiley-India.
R2	B. V. Ramana,Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
Web Details	
1	https://youtu.be/3j0c_FhOt5U
2	https://youtu.be/3Aw3fNZTrfc
3	https://youtu.be/6HVYX8FRSGA
4	https://youtu.be/4yC4IXcMKJg

		Name	Signature with Date
i.	Faculty	Mrs.R.V.Lakshmi	R.V.Lakshmi
ii.	Course Coordinator	Mrs.R.V.Lakshmi	R.V.Lakshmi
iii.	Module Coordinator	Mr. K.D.N.Murthy	
iv.	Head of the Department	Dr. V.Swaminadham	V.Iwam

Principal