

LESSON PLAN

Name of the Subject: SPECIAL FUNCTIONS AND COMPLEX ANALYSIS(14BT3BS02)

Class & Semester: II B.Tech –I semester - E.C.E, E.E.E. & E.I.E

Name of the faculty Member:

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
UNIT-I: SPECIAL FUNCTIONS				
	Beta and Gamma functions – properties	2	T1	Legendre's differential equation, generating function, recurrence relations and orthogonality.
	Relationship between Beta and Gamma functions and problems.	2	T1	
	Evaluation of improper integrals using beta and gamma functions.	3	T1	
	Bessel function - generating function (without proof) and recurrence relations	2	T1	
	Orthogonality	1	T1	
Total periods required:		10		
UNIT-II: ANALYTIC FUNCTIONS				
	Function of a complex variable. Limits and continuity of functions.	2	T1	
	Differentiability - Analyticity	1	T1	
	Cauchy Riemann equations (both Cartesian and polar)	3	T1	
	Conjugate and harmonic conjugate functions.	2	T1	
	Milne Thompson method.	1	T1	
	Potential functions.	1	T1	
Total periods required:		10		
UNIT-III: COMPLEX INTEGRATION AND POWER SERIES				
	Line integral - evaluation of line integrals along curves and closed contours	2	T1	Cauchy's inequality
	Cauchy's integral theorem (without proof) – problems	1	T1	
	Cauchy's integral formula and derivatives of analytic functions.	1	T1	
	Generalized integral formula- evaluation of integrals.	2	T1	
	Taylor's theorem (without proof) - power series expansion of complex functions.	1	T1	
	Laurent's theorem (without proof) - power series expansion of complex functions.	1	T1	
Total periods required:		8		
UNIT-IV: RESIDUE THEOREM – APPLICATIONS				
	Zeros and types of singularities	1	T1	

	Residues – evaluation of residues pole of order m and pole at infinity	1	T1	Rouche's theorem – Applications. Fundamental theorem of Algebra.
	Residue theorem- evaluation of integrals using residue theorem	1	T1	
	Evaluation of improper and real integrals of the type: $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$	2	T1	
	Evaluation of $\int_{-\infty}^{\infty} f(x) dx$	2	T1	
	Evaluation of $\int_{-\infty}^{\infty} e^{imx} f(x) dx$	2	T1	
Total periods required:		09		
UNIT-V: CONFORMAL MAPPING				
	Conformal mappings definitions and examples	1	T1	
	Mappings defined by $w = e^z, \log z, z^2, \sin z, \cos z.$	3	T1	
	Standard transformations : Translation, rotation, inversion.	1	T1	
	Bilinear transformation - properties - fixed points - cross ratio	1	T1	
	Invariance of circles under bilinear transformation	1	T1	
	Determination of bilinear transformation using three given points.	1	T1	
Total periods required:		8		
Grand total periods required:		45		

TEXT BOOKS:

T1 . T.K.V. Iyenger, B. Krishna Gandhi, etal, **Text book of Engineering Mathematics, Vol- III**, S. Chand & Company, 8/e., 2011

REFERENCE BOOKS:

R1. Grewal, B.S, Higher Engineering Mathematics, Khanna Publishers, Delhi, 42/e,2012.
R2 . Shahnaz Bathul, Special Functions and Complex Variables, PHI Learning, 2 /e, 2010