w.e.f: 2026-2027

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC Autonomous Institution)

Course Code	Course Title						Core/Elective
25BS212MT	**COMPLEX VARIABLES, FOURIER SERIES AND FOURIER TRANSFORMS** Branch: B.E. (ECE)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
MDC, DENM	L	T	D	P			
	3	0	0	0	40	60	3

Course Objectives: To learn

1. Understand Limit, Continuity and Analyticity of complex variables.
2. Apply Cauchy's theorem and Cauchy's integral formula.
3. Apply Residue theorem and understand Bilinear transformation.
4. Perform Fourier series for a given range.
5. Perform Fourier sine and cosine transformations.

Course Outcomes: After learning the contents of this course, the student must be able to

1. Examine analyticity in Cartesian and Polar forms.
2. Evaluate contour integrals of functions of complex variables.
3. Evaluation of real integrals using complex variables.
4. Obtain the Fourier series for a given function.
5. Obtain the Fourier sine and cosine transformations.

Unit-I: Complex Variables: Limit, Continuity of a function, Analytic function, Cauchy – Riemann Equations (Both Cartesian and Polar forms), Harmonic function.

Unit-II: **Complex integration**: Cauchy's theorem, Cauchy's integral formula, Taylor's series, Laurent's series.

Unit-III: **Residues and Transformations**: Zeros, Singularities, Residues, Residue theorem, Evaluation of real integrals using Residue theorem, Bilinear transformation.

Unit-IV: **Fourier Series**: Even and Odd functions, Dirichlet's conditions, Expansion of a function for a given range $(0,2\pi), (-\pi,\pi), (0,2l), (-l,l)$, Half-range sine and cosine series.

Unit-V: **Fourier Transforms**: - Fourier transformation - sine, cosine transformations - simple illustrations.

Suggested Reading:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication 43 rd Edition, 2014.
2. R. K Jain, S.R.K Iyengar, Advanced Engineering Mathematics, Narosa Publication. 4Th Edition, 2014.

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25/7/26