w.e.f: 2026-2027

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

Course Code	Course Title						Core/Elective
25BS214MT	**PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX VARIABLES** Branch: B.E. (CIVIL)						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 Lagrange's equation and Charpit's method.
2. Perform Fourier series for a given range.
3. Understand wave equation, one-dimensional heat equation.
4. Understand Limit, Continuity and Analyticity of complex variables.
5. Apply Cauchy's theorem and Cauchy's integral formula.

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

1. Formation of Partial Differential Equations.
2. Obtain the Fourier series for a given function.
3. Determine the solution of a PDE by the method of separation of variables.
4. Examine analyticity in Cartesian and Polar forms.
5. Evaluate contour integrals of functions of complex variables.

Unit-I: **Partial Differential Equations**: Formation of Partial Differential Equation, First order Partial Differential Equation, Solution of first order linear Partial Differential Equation, Lagrange's equation, Non-linear first order Partial Differential Equation, Charpit's method.

Unit-II: **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 expansions.

Unit-III: **Applications of Partial Differential Equations**: Second order linear Partial Differential Equation and their classification, Method of separation of variables, vibrations of stretched string wave equation, one-dimensional heat equation.

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

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

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.
3. M.D.Rai Singhania, Ordinary and Partial Differential Equations, S.Chand and Co., 2024, 20th Edition.

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CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO 1	3	2		1	1						1	2	2
CO 2	3	2		1	2						1	2	2
CO 3	3	3	1	2	2						1	3	3
CO 4	3	2		2	1						1	1	2
CO 5	3	3		2	2						1	1	2