ENGINEERING MATHEMATICS – IV

B.Tech. Second Year, II - Semester

Common for ECE & EEE

[R-15 Regulation]

Credits	Periods			Exam Hrs.	Sessional Marks	Exam Marks	Total Marks
	Theory	Tutorial	Lab				
3	3	1	-	3	40	60	100

Course Objective :

The knowledge of Mathematics is necessary for a better understanding of almost all the engineering and science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their engineering degree in different disciplines.

Course Outcomes : At the end of the course student will be able to

1	Understand, interpret and use the basic concepts : Analytic function, harmonic function , Taylor and Laurent Series , Singularity , Residues and evaluation of improper integrals.
2	Familiarize the concepts of Finite Differences and Interpolation techniques.
3	Familiarize the concept of Differentiation and Integration by numerical methods.
4	Understand the characteristics and properties of Z-transforms and its applications.
5	Analyze the Statistical data by using statistical tests and to draw valid inferences about the population parameters.

CO – PO Mapping :

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	2										1
CO-2	3	2										1
CO-3	3	2										1
CO-4	3	2										1
CO-5	3	2										1

SYLLABUS

UNIT – I : FUNCTIONS OF A COMPLEX VARIABLE (14 Periods)

Introduction – Limit of a complex function – Derivative of $f(z)$ – Analytic functions – Harmonic functions – Applications to flow problems. Complex Integration – Cauchy's theorem – Cauchy's integral formula – Series of complex terms (Statements of Taylor's and Laurent's Series without proof) – Zeros of an analytic function – Residues – Calculation of residues – Evaluation of real definite integrals (Integration around the unit circle, Integration around the small semi circle , Indenting the contours having poles on the real axis).

Geometric representation of $f(z)$, Some standard transformations ($w = z + c, w = cz$, $w = \frac{1}{z}$, $w = \frac{az+b}{cz+d}$).

UNIT – II : FINITE DIFFERENCES & INTERPOLATION (12 Periods)

Finite differences – Forward differences – Backward differences – Central differences – Differences of a polynomial – Factorial notation – Other difference operators – To find one or more missing terms – Newton's interpolation formulae – Central difference interpolation formulae – Interpolation with unequal intervals – Lagrange's interpolation formula – Inverse interpolation.

UNIT – III: NUMERICAL DIFFERENTIATION AND INTEGRATION (10 Periods)

Numerical differentiation – Formulae for derivatives – Maxima and minima of a tabulated function – Numerical integration – Newton-Cotes quadrature formula – Trapezoidal rule – Simpson's $\frac{1}{3}^{rd}$ –rule , Simpson's $\frac{3}{8}^{th}$ –rule.

UNIT – IV : Z – TRANSFORMS (12 Periods)

Introduction – Definition – Some standard Z-transforms – Linearity property – Damping rule – Some standard results – Shifting U_n to the right, Shifting U_n to the left – Two basic theorems (Initial value theorem and Final value theorem) – Convolution theorem – Convergence of Z-transforms – Two sided Z-transform of U_n – Evaluation of inverse Z-transforms (Power series method, Partial fraction method, Inverse integral method) – Applications to difference equations.

UNIT – V : SAMPLING THEORY (12 Periods)

Introduction – Sampling distribution – Testing a hypothesis – Level of significance – Confidence limits – Test of significance of large samples (Test of significance of single mean, difference of means) – Confidence limits for unknown – Small samples – Students t-distribution – Significance test of a sample mean – Significance test of difference between sample means – Chi-Square (χ^2) Test – Goodness of fit.

TEXT BOOK:

1. **Dr. B.S. Grewal**, "*Higher Engineering Mathematics*", 43rd edition, Khanna Publishers, New Dehli.

REFERENCE BOOKS:

1. **Dr. N.P. Bali, Dr. Ashok Saxena, Dr. N.Ch. S. Narayana**, "*A Text book on Engineering Mathematics*", Laxmi Publications (P)Ltd., New Delhi.
2. **H. K. Dass**, "*Advanced Engineering Mathematics*", S. Chand and Company Ltd.
3. **Erwin Kreyszig**. "*Advanced Engineering Mathematics*", John Wiley and Sons, New York.