COMPLEX VARIABLES, PROBABILITY & SAMPLING

ENGINEERING MATHEMATICS – IV

II/IV B.Tech. II - Semester [R-19 Regulation]

Common for MECHANICAL and CHEMICAL

	Credits:3
Instruction: 3 Periods & 1 E/week	Sessional Marks:40
End Exam: 3 Hours	End Exam Marks:60

Pre- requisites: Complex Numbers, Differentiation, Integration, Binomial expansions and partial fractions.

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

Analyze limit, continuity and differentiation of functions of complex variables and understand Cauchy-Riemann equations, analytic functions and various properties of analytic functions.
 Understand Cauchy theorem and Cauchy integral formulas and apply these to evaluate complex contour integrals and represent functions as Taylor and Laurent series and determine their intervals of convergence.
 Be familiar with numerical solution of ordinary differential equations.
 Examine, analyze and compare Probability distributions.
 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

[12 Lectures]

Complex function – Real and Imaginary parts of complex function – Limit – Continuity and derivative of a complex function – Cauchy-Riemann equations – Analytic function – Entire function – Singular point – Conjugate function – Cauchy-Riemann equations in polar form – Harmonic functions – Milne-Thomson method – Simple applications to flow problems – Applications to flow problems – Some standard transformations(Translation, Inversion and reflection , Bilinear transformations and its fixed points).

Sections: 20.1, 20.2, 20.3, 20.4, 20.5, 20.6 and 20.8.

UNIT - II: COMPLEX INTEGRATION & SERIES OF COMPLEX TERMS

[12 Lectures]

Complex integration – Cauchy's theorem – Cauchy's integral formula – Series of complex terms: Taylor's series – Maclaurin's series expansion and Laurent's series (without proofs).

Sections: 20.12, 20.13, 20.14 and 20.16.

UNIT – III: NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS [12 Lectures]

Numerical solution of ordinary differential equations: Picard's Method – Taylor's series method – Euler's Method – Runge-Kutta Method – Predictor-Corrector methods – Milne's method.

Sections: 32.1,32.2,32.3,32.4,32.732.8 and 32.9

UNIT – IV: PROBABILITY AND DISTRIBUTIONS

[12 Lectures]

Introduction – Basic Terminology – Probability and set notations – Addition Law of probability – Independent events – Baye's theorem – Random variable – Discrete probability distribution: Binomial distribution – Continuous probability distributions: Poisson distribution and Normal distribution (mean, variance, standard deviation and their properties without proofs).

Sections: 26.1, 26.2, 26.3, 26.4, 26.5, 26.6, 26.7, 26.8, 26.9, 26.14, 26.15 and 26.16.

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 ,single proportion,) – Confidence limits for unknown mean – Small samples – Students t-distribution – Significance test of a sample mean – Significance test of difference between sample means – χ^2 – test – Goodness of fit.

Sections: 27.1, 27.2, 27.3, 27.4, 27.5, 27.7,27.8, 27.11, 27.12,27.13, 27.14, 27.15, 26.16, 27.17 and 27.18.

TEXT BOOK

1. **B. S. Grewal**, "Higher Engineering Mathematics", 43rd edition, Khanna publishers, 2017.

REFERENCE BOOKS

- 1. **N P. Bali and Manish Goyal**, "A text book of Engineering mathematics", Laxmi publications, latest edition.
- 2. **Erwin Kreyszig**, "Advanced Engineering Mathematics", 10th edition, John Wiley & Sons, 2011.
- 3. **R. K. Jain and S. R. K. Iyengar**, "Advanced Engineering Mathematics", 3rdedition, Alpha Science International Ltd., 2002.
- 4. **George B. Thomas, Maurice D. Weir and Joel Hass,** "*Thomas Calculus*", 13thedition, Pearson Publishers.