II Year-II Semester (20MA4007) Complex Variables & Statistical Methods

Int.	Marks	Ext. Marks	Total Marks	

30 70 100

Pre- Requisites: None

Course Objectives:

At the end of semester, the students able to understand the concepts of:

- To familiarize the Complex Variables
- Series expansions and Residue theorems.
- Discrete and Continuous random variables
- To familiarize the students with the foundations of probability and statistical Methods
- To equip the students to solve application problems in their disciplines.

UNIT-I:

Functions of a complex variable and Complex integration:

Introduction – Continuity – Differentiability – Analyticity – Properties – Cauchy Riemann equations in Cartesian and polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method. Complex integration: Line integral - Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula (all without proofs).

UNIT-II:

Series expansions and Residue Theorem: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurentseries. Types of Singularities: Isolated – pole of order m – Essential – Residues – Residue theorem

Improper real integrals $\int_{-\infty}^{\infty} f(x) dx$; $\int_{C}^{C+2\pi} f(\cos\theta, \sin\theta) d\theta$;

UNIT-III:

Probability and Distributions: Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

UNIT-IV:

Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction χ^2 and F-distributions – Point and Interval estimations – Standard error and Maximum error of estimate.

UNIT-V:

Tests of Hypothesis: Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance- Confidence limits-Test of significance for large samples-single and two means – single and two proportions- Student's t- distribution- significance test of a sample mean – significance test of difference between sample means. F-test, chi-square test (χ^2) and test of goodness of fit.

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Course Outcomes:					
S.No.	Course outcomes	BTL			
	Apply Cauchy Riemann equations to Complex valued functions to determine whether a	L6			
1	given continuous function is analytic.				
	Find the differentiation and Integration of Complex valued functions used in engineering	L2			
2	problems and make use of the Cauchy residue theorem to evaluate certain integrals.				
3	Apply Discrete and Continuous probability distributions.	L6			
4	Design the components of a classical hypothesis test	L2			
5	Infer the Statistical inferential methods based on small and large sampling tests.				

Correlation of COs with POs& PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	2	-	1	-	-	-	-	-	-	-	1
2	3	2	-	1	-	-	-	-	-	-	-	1
3	2	2	-	2	-	-	-	-	-	-	-	1
4	2	2	2	-	-	-	-	-	-	-	-	1
5	1	2	-	2	-	1	-	-	2	-	-	1

CO	PSO1	PSO2	PSO3
1	-	-	2
2	-	-	2
3	-	-	2
4	-	-	2
5	-	-	2

Text Books:

- 1. Advanced Engineering Mathematics: BS Grewal, Khanna Publishers(42nd Ed).
- 2. Probability and Statistics for Engineers: Miller and John E. Freund, PrenticeHall of India.

Reference Books:

- 1. Probability And Statistics: Dr.T.K.V.Iyengar, Dr.B. K. Krishna Gandhi, S.Ranganatham, Dr. M.V.S.S.N. Prasad, S.Chand Publications.
- 2. Probability, Statistics and Random Processes, Murugesan, AnuradhaPublishers, Chennai.
- 3. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley India Edition.
- 4. Advanced Engineering Mathematics: Michael Greenberg, Pearson.
- 5. Probability and Statistics for Engineers and Scientists: Ronald E. Walpole, Sharon L. Mayers and Keying Ye: Pearson.

Web Links:

- 1. https://nptel.ac.in/courses/111/103/111103070/
- $2. \ \underline{https://onlinecourses.nptel.ac.in/noc17_ma17/preview}$
- 3. <u>https://onlinecourses.nptel.ac.in/noc16_ma03/preview</u>