PROBABILITY THEORY

Semester	Subject Code	Category	Lecture		Theory		Practical	Credits
III	21CPMA3D	Core – Paper XII	Hrs/week	Hrs/Sem	Hrs/week	Hrs/Sem	0	5
			6	90	6	90		

COURSE OBJECTIVES:

The students will be able to

- Understand axiomatic approach to probability theory
- Study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basic limit theorems of probability.

COURSE OUTCOMES:

On the successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Understand the important concepts of the random experiments.	K2
CO2	Explain about the properties of characteristic function and find distribution function by the characteristic function.	K3
CO3	Examine a random variable or to characterize its distribution by a few parameters of the random variable.	K3
CO4	Apply discrete and continuous distributions in detail that plays an important role in many engineering applications as special probability distributions.	K3
CO5	Learn the concept of convergence in probability and prove naming theorems for independently and identically distributed random variables	K4

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze.

MAPPING WITH PROGRAM ME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	M	M	S
CO2	S	M	S	M	M	S
CO3	S	S	M	M	S	S
CO4	S	M	S	S	M	S
CO5	S	S	M	M	M	S

S- Strong; M – Medium; L – Low

UNIT- I: RANDOM EVENTS AND RANDOM VARIABLES **18 Hours**

Random events – Probability axioms – Combinatorial formulae – conditional probability – Bayes Theorem – Independent events – Random Variables – Distribution Function – joint Distribution – Marginal Distribution – Conditional Distribution - Independent random variables – Functions of multi dimensional random variables.

Chapter 1: Sections 1.1 to 1.7

Chapter 2: Sections 2.1 to 2.9

UNIT- II: PARAMETERS OF THE DISTRIBUTION **18 Hours**

Expectation – Moments – The Chebyshev's Inequality – Absolute moments – Order parameters – Moments of random vectors – Regression of the first and second types.

Chapter 3: Sections 3.1 to 3.8

UNIT-III: CHARACTERISTIC FUNCTIONS **18 Hours**

Properties of characteristic functions – Characteristic functions and moments – semi – invariants – characteristic function of the sum of the independent random variables –Determination of distribution function by the Characteristic function – Characteristic function of multidimensional random vectors – Probability generating functions

Chapter 4: Sections 4.1 to 4.7

UNIT- IV: SOME PROBABILITY DISTRIBUTIONS **18 Hours**

One point, two point, Binomial – Polya –Hypergeometric – Poisson [discrete] distributions – Uniform – normal gamma – Beta – Cauchy and Laplace [continuous] distributions.

Chapter 5: Section 5.1 to 5.10

UNIT-V: LIMIT THEOREMS **18 Hours**

Stochastic convergence – Bernoulli law of large numbers – Convergence of sequence of distribution functions – Levy-Cramer Theorems – De Moivre Laplace theorem – Poisson, Chebyshev, Khintchine Weak law of large numbers –Lindberg Theorem –Lyapunov theorem- Borel-Cantelli Lemma – Kolmogorov Inequality and Kolmogorov Strong law of large numbers

Chapter 6: Sections 6.1 to 6.4, 6.6 to 6.9, 6.11 and 6.12 [omit sections 6.5, 6.10, 6.13 to 6.15]

DISTRIBUTION OF MARKS: THEORY 80% AND PROBLEMS 20%

TEACHING METHODOLOGY

1. Class room teaching
2. Giving Assignments for all units
3. Discussions
4. Home test
5. PPT presentation

TEXT BOOK

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	MarekFisz	Probability Theory and Mathematical Statistics	John Wiley and Sons, New York	1963

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	R.B. Ash	Real Analysis and probability	Academic Press, New York	1972
2.	K.L.Chung	A Course in Probability	Academic Press, New York	1974
3.	R.Durrett	Probability Theory and Examples [2nd Edition]	Duxbury press, New York	1996
4.	V.K. Rohatgi	An Introduction to Probability Theory and Mathematical Statistics[3rd print]	Wiley Eastern Ltd., New Delhi	1988
5.	S.I.Resnick	A Probability Path	Birhauser, Berlin	1999
6.	B.R. Bhat	Modern Probability Theory [3rd Edition]	New Age International [P] Ltd, New Delhi	1999

WEB SOURCES:

1. www.researchgate.net/publication/272237355_probability_and_mathematical_statistics.pdf

2. www.freebookcentre.net/Mathematics/Probability-Theory-Book.html

SYLLABUS DESIGNER

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