CURRICULUM TRANSACTIONAL STRATEGY

MMT-E404- Probability Theory II

Syllabus

Pre-requisites: Basic knowledge of measure theory and an undergraduate course of probability .

COURSE OBJECTIVES

- To understand the measure theoretical version of probability.
- To understand σ fields and monotone class theorem.
- Dynkin π-λ and Caratheodory theorems.
- To understand lebesgue measure and measurable functions.
- To differentiate between Monotone convergence theorem and Dominated convergence theorem.
- To understand distribution function and its properties.
- To applyTchebyschev's inequality and Markov inequality for different problems.
- Product spaces and Fubini's theorem.
- Kolmogorov 0-1 law.
- To understand convergence in distribution, probability and almost sure convergence.
- To acquire knowledge about hierarchy of convergence.
- Weak and strong law of large numbers.
- BorelCantelli lemmas with applications.
- To understand characteristic functions with properties.
- Inversion and Uniqueness Theorem.
- Levy Continuity Theorem.
- Central limit theorem for i.i.d. random variables

COURSE OUTLINE

UNIT I

- Definition of σ fields and monotone class theorem.
- Dynkin π-λ and Caratheodory theorems.
- Definition of Lebesgue measure and measurable functions.
- Monotone convergence theorem.
- Dominated convergence theorem and Fatou's lemma

UNIT II

- Probability measure on R.
- Distribution function and its properties.
- Tchebyschev's inequality and Markov inequality.
- Product spaces and Fubini's theorem.
- Kolmogorov 0-1 law.

UNIT III

- Convergence in distribution, probability and almost sure convergence.
- Hierarchy of convergence.
- Weak and strong law of large numbers.
- BorelCantelli lemmas.

UNIT IV

- Characteristic functions with properties.
- Inversion and Uniqueness Theorem.
- Levy Continuity Theorem.
- Central limit theorem for i.i.d. random variables

Classroom Transaction

Unit	Topic	Activity	No. of	No. of

			Tutorials	lectures
I	Definition of σ fields and monotone class theorem	Assignment	02	04
	Dynkin π-λ and Caratheodory theorems	Assignment	02	03
	Definition of Lebesgue measure and measurable functions	Assignment and Presentation	01	02
	Monotone convergence theorem	Assignment	02	01
	Dominated convergence theorem and Fatou's lemma	Assignment	03	02

Unit	Topic	Activity	No. of Tutorials	No. of lectures
II	Probability measure on R	Assignment and Presentation	03	03
	Distribution function and its properties	Assignment	01	02
	Tchebyschev's inequality and Markov inequality	Assignment	01	04
	Product spaces and Fubini's theorem	Assignment	02	04
	Kolmogorov 0-1 law	Assignment	01	04

Unit	Topic	Activity	No. of Tutorials	No. of lectures
III	Convergence in distribution	Assignment	02	04
	Convergence in probability and almost sure convergence	Assignment	02	03
	Hierarchy of convergence	Assignment and Presentation	01	04
	Weak and strong law of large numbers	Assignment	02	02
	BorelCantelli lemmas	Assignment	02	03

Unit	Topic	Activity	No. of Tutorials	No. of lectures
IV	Characteristic functions with properties	Assignment	01	04
	Inversion and Uniqueness Theorem	Assignment	01	02
	Levy Continuity Theorem	Assignment and Presentation	01	01
	Central limit theorem for i.i.d. random variables	Assignment	01	03

Text Books:

1. H. T. H. Piaggo, Differential equations; CBS Publishers & Distributors Pvt. Ltd.
2. D. Somasundaram, Ordinary differential equations- A first course; Narosa Publishing House.
3. Coddington

Reference Books:

1. M. D. Raisinghania, Ordinary and partial differential equations; S. Chand & Company Ltd.
2. Shepley L. Ross, An introduction to the ordinary differential equations
3.