Semester	**TWO**
Course	**Major**
Paper Code	**C1ST230222T/C1ST230222P**
Paper Title	**Probability and Probability Distributions II**
No. of Credits	**4**
Theory / Practical /Composite	**Composite**
Classes per week	**3 Theory + 2 Practical**
Module	**1**

Course Outcomes

1. **Remember** the origin, properties and probability mass/density functions of standard univariate discrete and continuous probability distributions.
2. **Understand** the theoretical characteristics, relationships, and limiting cases of standard univariate probability distributions.
3. **Apply** appropriate probability distributions to solve real-life and numerical problems involving random variables.
4. **Analyze** the structure and properties of standard bivariate probability distributions, including trinomial and bivariate normal distributions.
5. **Evaluate** probabilistic bounds and variability using probability inequalities such as Markov's and Chebyshev's inequalities.
6. **Create** suitable probabilistic models for real-world phenomena by selecting and justifying appropriate distributions.

Syllabus

Unit /Module	Content	No. of lectures	CO mapping	Cognitive levels
Unit 1	Standard Univariate Discrete Probability Distributions: Binomial, Poisson, Geometric, Negative Binomial, Hypergeometric, Uniform.	14	CO1 CO2 CO3	K1 K2 K3
Unit 2	Standard Univariate Continuous Probability Distributions: Rectangular, Normal, Exponential, Cauchy, Beta, Gamma, Lognormal, Logistic, Double Exponential and Pareto along with their properties and limiting/approximation cases.	16	CO1 CO2 CO3	K1 K2 K3

Unit 3	Standard Bivariate Probability Distributions: Trinomial and Bivariate Normal.	6	CO4 CO6	K4 K6
Unit 4	Probability Inequalities: Markov & Chebyshev	3	CO5	K5

Reading/Reference list

1. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, Seventh Ed, Pearson Education, New Delhi.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
3. Myer, P.L. (1970): Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New Delhi .
4. S.M. Ross : A First Course in Probability.
5. K.L. Chung : Elementary Probability Theory with Stochastic Process.
6. https://youtu.be/TvkdX6Dw994

Evaluation

Paper Structure	Theory CIA:15 Semester Exam: 45		Practical	
	5 Marks Questions	15 Marks Questions	CA: 40	Semester Exam: NA
	3 out of 5	2 out of 3		

CO	CO Description	Cognitive levels
CO1	**Remember** the origin, properties and probability mass/density functions of standard univariate discrete and continuous probability distributions.	K1
CO2	**Understand** the theoretical characteristics, relationships, and limiting cases of standard univariate probability distributions.	K2
CO3	**Apply** appropriate probability distributions to solve real-life and numerical problems involving random variables.	K3
CO4	**Analyze** the structure and properties of standard bivariate probability distributions, including trinomial and bivariate normal distributions.	K4
CO5	**Evaluate** probabilistic bounds and variability using probability inequalities such as Markov's and Chebyshev's inequalities.	K5
CO6	**Create** suitable probabilistic models for real-world phenomena by selecting and justifying appropriate distributions.	K6