Semester	ONE
Course [*1]	Major
Paper Code	C1ST230121T
Paper Title	Probability and Probability Distributions I
No. of Credits	4
Theory / Practical / Composite	Theory
Minimum No. of preparatory hours per week a student has to devote	4
Number of Modules	1
Syllabus	**UNIT 1:** ***Probability:*** Introduction, random experiments, sample space, events. Definitions of Probability – classical, statistical and axiomatic. [5L] **UNIT 2:** **Rules of Probability and their Applications:** Derivation of the probability of at least one event out of n events, n (>1) being finite. Statement of the probabilities of at least m and exactly m out of n events, n (>m) being finite. [7L] **UNIT 3:** ***Conditional Probability:*** The concept of Conditional Probability, theorem of compound probability, theorem of total probability, Bayes theorem and its applications, independent events. [10L] **UNIT 4:** ***Univariate probability distribution:*** Random Variables – discrete and continuous. Concept of the probability distribution of a random variable. Probability Mass and Density functions. Cumulative distributions function (CDF) and the statement of properties of CDF. Illustrations in both discrete and continuous situations. Moments and Quantiles. Measures of Central Tendency, Dispersion, Skewness and Kurtosis. [20L] **UNIT 5:** ***Bivariate probability distribution:*** Discrete and Continuous Joint Distributions. Bivariate Probability Mass and Density functions. Cumulative distributions function (CDF) and the statement of properties of CDF. Marginal and Conditional distributions. Independence. Correlation and Linear Regression. [10L]
Learning Outcomes	*At the end of the course a student should*

<table>
<tr><td></td><td colspan="2">Understand different definitions and meaning of Probability.
Know different laws of probability and the theorems connecting them.
Be able to apply the laws of probability.
Know the notion of conditional probability.
Understand what is a random variable and its probability distribution.
Understand different aspects of univariate probability distribution - both discrete and continuous.
Understand different aspects of bivariate probability distribution - both discrete and continuous.</td></tr>
<tr><td>Reading/Reference Lists</td><td colspan="2">Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, Seventh Ed, Pearson Education, New Delhi.
Miller, Irwin and Miller, Marylees (2006): John E. Freund’s Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
Myer, P.L. (1970): Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New Delhi .
S.M. Ross : A First Course in Probability.
K.L. Chung : Elementary Probability Theory with Stochastic Process.
https://www.coursera.org/learn/introductiontoprobability
https://www.udemy.com/topic/statistics/</td></tr>
<tr><td>Evaluation</td><td>Theory
CIA: 30
Semester Exam: 70</td><td>Practical (Not applicable)
CA:
Semester Exam:</td></tr>
<tr><td rowspan="2">Paper Structure for Theory Semester Exam</td><td>Short Questions (5 Marks Each)</td><td>Long Questions (15 Marks Each)</td></tr>
<tr><td>5 out of 7</td><td>3 out of 5</td></tr>
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