Semester	**ONE**
Paper Number	**HSTCR1022T & HSTCR1022P**
Paper Title	**Probability and Probability Distributions I**
No. of Credits	**6**
Theory/Composite	**Composite**
No. of periods assigned	Th: 4 Pr: 3
Modules	Single
Course description/objective	*At the end of the course a student should* o Understand different definitions and meaning of Probability. o Know different laws of probability and the theorems connecting them. o Be able to apply the laws of probability. o Know the notion of conditional probability. o Understand what is a random variable and its probability distribution. o Understand different aspects of univariate discrete probability distribution. o Understand different aspects of bivariate discrete probability distribution.
syllabus	**UNIT 1:** ***Probability:*** Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical and axiomatic. [10L] **UNIT 2:** ***Theorems of Probability:*** Theorem of compound probability, theorem of total probability, Bayes theorem and its applications, independent events. [10L] **UNIT 3:** ***Random variables:*** discrete random variables, p.m.f. and c.d.f., statement of properties of c.d.f, illustrations and properties of random variables. Derivation of moments (discrete situation). [8L] ***Standard discrete probability distributions:*** Binomial, Poisson, geometric, negative binomial, hypergeometric, uniform. [12L] **UNIT 4:** ***Two dimensional random variables:*** discrete type, joint, marginal and conditional, p.m.f and c.d.f., statement of properties of c.d.f, independence of variables, trinomial distribution. [12L]
List of Practical	1. Numerical sums using classical definition. 2. Numerical sums on conditional probability. 3. Fitting of binomial distribution for given n and p. 4. Fitting of binomial distribution after computing mean and variance 5. Fitting of Poisson distribution for given value of

<table>
<tr><td></td><td colspan="2">lambda
6. Fitting of Poisson distribution after computing mean.
7. Fitting of negative binomial.
8. Fitting of suitable distribution.
9. Application problem based on binomial distribution
10. Application problem based on Poisson distribution.
11. Application problem based on negative binomial distribution.</td></tr>
<tr><td>Reading/Reference Lists</td><td colspan="2">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.</td></tr>
<tr><td>Evaluation</td><td>Theory
CIA: 10
End-Sem: 50
Total: 60</td><td>Practical
Continuous assessment: 40</td></tr>
<tr><td rowspan="2">Paper Structure for End Sem Theory</td><td>Short questions (5 marks each)</td><td>Long questions (15 marks each)</td></tr>
<tr><td>4 out of 6</td><td>2 out of 3</td></tr>
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