SRI SATHYA SAI INSTITUTE OF HIGHER LEARNING
(Deemed to be University)
Department of Mathematics and Computer Science

TUTORIAL-I

Topics: Elements of Probability & Discrete Random Variables

UDSC-201: Probability and Statistics	Instructor: Dr. D Bhanu Prakash	Date: 17-07-2026

Q1. A committee of 5 is to be chosen from 7 men and 6 women. Using counting techniques, find the number of ways to form the committee if it must contain at least 3 women. Also find the probability that the committee has exactly 3 women. *[BTL-3]*

Q2. In a factory, machines M1, M2, and M3 produce 30%, 45%, and 25% of items respectively, with defect rates of 2%, 3%, and 1% respectively. If an item is found defective, apply Bayes' formula to find the probability it was produced by machine M2. *[BTL-3]*

Q3. A batch of 20 items contains 5 defects. A sample of 4 items is drawn without replacement. Model this using an appropriate special distribution, justify your choice, and find the probability that exactly 2 defective items are selected. *[BTL-4]*

Q4. A basketball player has a free-throw success probability of 0.7 on each attempt. Using the Negative Binomial distribution, find the probability that the player's 4th successful throw occurs exactly on the 6th attempt. Also find the mean and variance of the number of attempts needed. *[BTL-3]*

Q5. A machine has a probability of 0.1 of failing on any given day (failures modeled by a Geometric distribution). Find the probability that the first failure occurs on day 5. Given that the machine has survived without failure for the first 3 days, analyze the probability that it survives at least 2 more days without failure, and relate your answer to the memoryless property of the Geometric distribution. *[BTL-4]*

Q6. Design a probabilistic decision model for a quality-control process where items pass through two independent inspection stages with known detection probabilities p1 and p2. Formulate the sample space and events, derive the overall probability of a defective item escaping detection using conditional probability and Bayes' theorem, then propose and justify which discrete distribution (Binomial, Negative Binomial, or Geometric) best models the number of items inspected until the first defect is caught. Critically evaluate the assumptions of your model. *[BTL-6]*

— End of Tutorial —