SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF MATHEMATICS
21MAB301T - PROBABILITY AND STATISTICS
ASSIGNMENT – 1

Part – A

1. A box contains 4 bad and 6 good tubes. Two are drawn out from the box at a time. One of them is tested and found to be good. What is the prob. that the other one is also good?
2. A lot consists of 10 good articles, 4 with minor defects and 2 with major defects. Two articles are chosen from the lot at random (without replacement). Find the probability that (i) Both are good (ii) At least 1 is good.
3. In a coin tossing experiment, if the coin shows head, 1 die is thrown and the result is recorded. But if the coin shows tail, 2 dice are thrown and their sum is recorded. What is the prob. that the recorded number will be 2?
4. If X has the distribution function $F(x) = \begin{cases} 0, & x < 1 \\ \frac{1}{3}, & 1 \le x < 4 \\ \frac{1}{2}, & 4 \le x < 6 \\ \frac{5}{6}, & 6 \le x < 10 \\ 1, & x \ge 10 \end{cases}$. Find the probability distribution of X.
5. The first four moments of a distribution about $x = 4$ are 1, 4, 10, 45. Show that $\mu_3 = 0, \mu_4 = 26$.

Part – B

6. A company has two plants to manufacture scooters. Plant I manufactures 80% of the scooters and the plant II, the rest. At Plant I, 85 out of 100 scooters are rated higher quality and in plant II, only 65 out of 100 scooters are rated higher quality. What is the probability that the scooter came from plant II, if it is known that the scooter is of higher quality.
7. A discrete random variable X has the following probability distribution

x	-2	-1	0	1	2	3
$p(x)$	0.1	K	0.2	2K	0.3	3K

Find (i) K (ii) $P(X < 2)$ (iii) $P(-2 < X < 2)$ (iv) the cdf of X (v) the mean of X.

8. A random variable X has a Probability density function $f(x) = kx^2e^{-x}, x \ge 0$.
Find k, mean, variance and $E(3X^2 - 2X)$.
9. A random variable X has the probability function $f(x) = \frac{1}{2^x}, x = 1, 2, 3\ldots$
Find the (i) moment generating function (ii) Mean.
10. The cumulative distribution function of a continuous random variable X is given by

$$F(x) = \begin{cases} 0, & x < 0 \\ x^2, & 0 \le x < \frac{1}{2} \\ 1 - \frac{3}{25}(3-x)^2, & \frac{1}{2} \le x < 3 \\ 1, & x \ge 3 \end{cases}.$$

Find the probability density function of X and evaluate $P(|X| \le 1)$ and $P\left(\frac{1}{3} \le X < 4\right)$ using both the probability density function and cumulative distribution function.