B. Math. (Hons.) I Year
Mid-Semestral Examination
Probability I

Date: 26-09-2001 | Time: 3 hours | Max. Marks: 100

1. For any two events A and B in a probability space, show that $P(A \cap B) \geq P(A) + P(B) - 1$. Generalise this inequality to n events. [10]

2. An unbiased die is thrown eight times and the observations are recorded in a sequence. Find the probability that the number 4 appears in at least four consecutive throws. [20]

3. An urn contains two balls. It is known that the urn was filled by tossing a fair coin twice and putting a white ball in the urn for each head and a black ball in the urn for each tail. A ball is drawn from the urn and is found to be white. Find the probability that the other ball in the urn is also white. [15]

4. Give an example of five stochastically dependent events, any four of which are mutually stochastically independent. [15]

5. Three persons are seated at random in a row having six seats. A person is said to be isolated if the seats on his left and his right side are empty. Find the probability distribution of the number of isolated persons. Hence or otherwise find the expected number of isolated persons. [20]

6. In a lottery, m tickets are drawn at a time out of n tickets numbered from 1 to n. Find the variance of the sum of the numbers on these m tickets. [20]