B.Sc. DEGREE EXAMINATION, APRIL 2018.

I YEAR I SEMESTER

Core Major-Paper II - PROBABILITY AND RANDOM VARIABLES

Time : 3 Hours Max. Marks : 60

SECTION A – (10 × 1 = 10 marks)

(Q. No. 1-12)Answer any *TEN* questions

1. Define probability.
2. Write the axioms of probability.
3. Define conditional probability.
4. A coin is tossed twice. Find the probability of getting atleast one head.
5. Define discrete random variable.
6. Define marginal probability distribution.
7. If C is a constant, then show that E(C ) = C.
8. Define correlation.
9. Define moment generating function.
10. Define characteristic function.
11. Write the statement of addition theorem on probability.
12. Define Baye’s theorem.

SECTION B – (5 × 4 = 20 marks)

(Q. No. 13-19)Answer any *FIVE* questions

1. The probability that a student passes in Statistics examination is 2/3 and the probability

that he/she will not pass in mathematics examination is 5/9.The probability that he/she will pass in atleast one of the examinationa is 4/5.Find the probability that he/she will pass in both the examinations.

1. A machine consists of two parts A and B. In a sample of 100 items in part – A, there are

5 defectives and in a sample of 100 items in part – B, there are 10 defectives. One item is chosen from each of these samples and the machine is composed. What is the probability that the machine composed is non-defective?

1. Write the properties of distribution function.
2. Prove that E(aX+b) = aE(X) + b, where a and b are constants.
3. State the properties of moment generating function.
4. State and prove addition theorem on Expectation for the two random variables.
5. Five men in a company of 20 are graduates. If 3 men are picked out from this 20 persons

at random, What is the probability that (i) all are graduates (ii) atleast one is a graduate.

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SECTION C – (3 × 10 = 30 marks)

(Q. No. 20-24)Answer any *THREE* questions

1. State and prove Boole’s Inequality.
2. A company has three machines M1, M2, M3 which produces 20%, 30% and 50% of the products respectively. Their respective defective percentages are 7, 3 and 5. From these products one is chosen and inspected. Its is defective. What is the probability that it has been made by machine M3?
3. A random variable X has the following probability function.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| P(x) | 0 | k | 2k | 2k | 3k | 2k2 | 7k2+k |

(i) Find k

(ii)P(X<6)

(iii)P (X≥6)

(iv)P (0 < X < 5)

1. State and prove Chebychev’s Inequality.
2. Explain (i) uniqueness theorem on mgf.

(ii) weak law of large numbers.