**B.Sc. DEGREE EXAMINATION, NOVEMBER 2016.**

**I YEAR — I SEMESTER**

**Major Paper II — PROBABILITY AND RANDOM VARIABLES**

**Time : 3 hours Max. Marks : 60**

**SECTION A — (10 × 1 = 10 marks)**

**Answer any *TEN* questions**

* + - 1. Define Random experiment.
			2. Define probability of an event.
			3. State multiplication theorem on probability.
			4. Define mutually independent events.
			5. Define probability mass function.
			6. Define continuous random variable.
			7. Define mathematical expectation of a continuous random variable.
			8. State any two properties of mathematical expectation.
			9. Define moment generating function of a discrete random variable.
			10. State any two properties of characteristic function.
			11. Find the expectation of the number on a die when it is thrown.
			12. State the addition theorem on probability for two events if they are mutually exclusive.

**SECTION B — (5 × 4 = 20 marks)**

**Answer any *FIVE* questions**

* + - 1. A bag contains 7 white, 6 red and 5 black balls. Two balls are drawn at random. What is the probability that they are of the same color?
			2. If *A* and *B* are independent events then prove that $\overline{A } and \overline{B }$ are also independent.
			3. In a continuous distribution whose relative frequency density function is given by

f(x) = A. x(2-x), 0≤x≤2. A is a constant. Find the mean of the distribution.

* + - 1. State and prove Addition theorem on expectation for two random variables.
			2. Let X be a random variable with following probability distribution. Find E(2X+1)2

|  |  |  |  |
| --- | --- | --- | --- |
|  *X:* | *-3* | *6* | *9* |
| *P(x=x):* |  |  |  |

* + - 1. Find the moment generating function of the random variable whose moments are $μ\_{r}^{'}=\left(r+1\right)! 2^{r}$
			2. State the properties of characteristic function.

[P.T.O.]

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions**

* + - 1. State and prove Addition theorem on probability.
			2. There are 4 work station of type A, each having 6 fitters and 3 turners. And there are 3 work stations of type B, each having 2 fitters and 4 turners. One station is selected random and a person is chosen at random from it. If he is a turner what is the chance that he came from type B station.
			3. The joint probability density function of x and Y is given by $f(x,y)\_{=}\frac{9\left(1+x+y\right)}{2\left(1+x\right)^{4}\left(1+y\right)^{4}} ; \left(\begin{array}{c}0\leq x<\infty \\0<y<\infty \end{array}\right) $

Find the conditional distribution of X given Y = y

* + - 1. State the prove Chebychev’s inequality.
			2. (i) Define Cumulant generating function.

(ii) Prove the additive property of cumulants.

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