Reg. ....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, MARCH 2012

(CCSS)

Statistics—Complementary Course

ST 2C 02—PROBABILITY DISTRIBUTION

Time : Three Hours Maximum : 30 Weightage

I. Answer *all* 12 questions

1 The joint cumulative distribution function F (x, y) lies within the limits.

(a) —1 and 1. (b) —1 and 0.

(c) $-\infty$ and $+\infty$. (d) 0 and 1.

2 P {X ≤ *a*, Y < = P {X < *a*, Y *b*} provided.

(a) X and Y are discrete random variables.

(b) X and Y are continuous random variables.

(c) X and Y are independent random variables.

(d) X and Y are dependent random variables.

3 If X and Y are independent random variables, then

(a) P PC *x*, Y y} =P {X ——P {Y

(b) $E(XY) = E(X) \cdot E(Y)$.

(d) All the above.

4 The (1,1) product moment μ_1 of a bivariate distribution is called.

(a) Coefficient of Correlation. (b) Coefficient of determination.

(c) Covariance. (d) None of these.

5 E {E (NY)} =

(a) Zero. (b) one.

(d) E (X).

Turn over

6 If X and Y are independent binomial B( ) variates, then Z = X + Y follows

(a) $B\left(6, \frac{1}{2}\right)$. (b) $B\left(3, \frac{1}{2}\right)$.

(c) BI 6, $\frac{1}{4}\big)$. (d) $B\left(3, \frac{1}{4}\right)$.

7 Variance of a discrete uniform distribution over the range [1, 111 is :

(a) 3. (b) 6.

(c) 10. (d) None of these.

8 If X has density f $(x) = X$ $x > 0, \lambda > 0$, then $E(X^{-})$ is

(a) λ^2 (b) $\frac{1}{\lambda^2}$.

(c) $2\lambda^{-}$. (d) $\frac{2}{\lambda^2}$.

9 Gamma distribution G (a) is :

(a) Leptokurtic. (b) Mesokurtic.

(c) Plattikurtic. (d) Leptokurtic when a > 1.

10 If X_1 and X_2 are independent standard normal variates, $E(X_1 - X_2)^2$ is

(a) 0.5. (b) 0.

(c) 1. (d) 2.

11 If X is a standard normal variate, the value of t for which $P\{|X| > t\} = 0.05$ is

(a) 1.645. (b) 1.96.

(c) 1.98. (d) 2.34.

12 The income of people exceeding a certain limit follows :

(a) Cauchy. (b) Lognormal.

(c) Pareto. (d) Beta.

(12 x = 3 Weightage)

II. Short answer type questions. Answer *all* 9 questions.

13 Define cumulative distribution function of a bivariate random vector (X, Y).

14 Define conditional probability density function of Y given X.

15 Define conditional expectation in discrete case.

16 Define mathematical expectation of a bivariate random vector.

17 State the lack of memory property of geometric distribution.

18 Find the moment generating function of a degenerate distribution.

19 Define standard exponential distribution.

20 State the additive property of gamma distribution.

21 Define Pareto distribution.

(9 x 1= 9 weightage)

III. Short essay or paragraph questions. Answer any *five* questions.

22 Let $f = \begin{cases} 2, & 0 < x < 1;\ 0 < y < x \\ 0, & \text{otherwise,} \end{cases}$

check whether X and Y are independent.

23 For a distribution with joint probability density function

$$\begin{cases} x e^{-x(1+y)}, & x > 0;\ y \geq 0 \\ 0, & \text{elsewhere,} \end{cases}$$

Find E (Y) and E (XY).

24 Obtain an expression for variance of a random variable X in terms of conditional variance.

25 Derive the moment generating function of a rectangular distribution over $[-a, a]$. Hence obtain its variance.

26 Obtain the mode of a Poisson distribution.

27 Derive an expression for mean deviation about mean of normal distribution.

28 For a distribution with probability mass function $p(x) = 2$, $x = 1, 2, \ldots$, Obtain a lower bound to the probability $p\{|X - 2| : 2\}$, by using Chebychev's inequality.

(5 x 2 = 10 weightage)

Turn over

N. Essay questions. Answer any *two* questions.

29 Three coins are tossed. Let X denote the number of heads on the first two coins and Y denote the number of heads on the last two : Find (i) E $(Y|X = 1)$ and (ii) Correlation coefficient between X and Y.

30 (a) State and establish Renovsky formula.

(b) Explain important properties and applications of normal distribution.

31 (a) State Bienayme-Chebychev's inequality.

(b) State and prove Lindberg-Levy form of CU.

(2 x 4 = 8 weightage)