Reg. No.....

SECOND SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT) EXAMINATION, APRIL/MAY 2015

(UG—CCSS)

Complementary Course—Statistics

ST 2C 02—PROBABILITY DISTRIBUTION

Time : Three Hours Maximum : 30 Weightage

I. Answer all *twelve* question.

1 As $x \to -\infty$, the joint cumulative distribution function F (x, y) of a bivariate random variable (X, Y) becomes :

(a) Zero.

(b) One.

(c) A number between zero and one.

(d) None of these.

2 The heights of fathers aid their sons form bivariate variables which are :

(a) Discrete variables. (b) Continuous variables.

(c) Pseudo variables. (d) None of these.

3 If X and Y are independent discrete variables, then P {X x, Y y} is equal to:

(a) $P\{X < x, Y < y\}$. (b) $P\{X = x, Y = y\}$.

(c) P {X = x} · P {Y = (d) P {X x} · P y}.

4 For any bivariate distribution, which of the following is true ?

(a) $f^{1}_{02} = 1 - f^{1}_{20}$. (b) $f^{1}_{11} = f^{1}_{22}$.

(c) (d) $f^{1}_{12} = f^{1}_{21}$.

5 $E\{XY \mid Y = 1\} =$

(a) E (X). (b) E (X I Y = 1).

(c) E (X Y). (d) E (X) E(Y).

Turn over

6 When $n = 1$, the binomial distribution B (n, p) reduces to ———— distribution.

(a) Standard binomial. (b) Pseudo binomial.

(c) Point binomial. (d) Poisson binomial.

7 The Poisson distribution P (λ) is leptokurtic for :

(a) X > 1 only. (b) All values of X.

(c) X < 1 only. (d) $\lambda \neq$ L

8 The moment generating function of geometric distribution with parameter p *is* :

(a) $p\,(1 - pe^{t}$ (b) $p\,(1 - pe^{t})^{-}$

$p\left[1 - (1 - p)e\right.$. (d) $\mathbf{p[1-}$ $\mathbf{- p)e}\,]^{-}$.

9 For large values of X, the gamma distribution y (X) tends to :

(a) Uniform. (b) Exponential.

(c) Normal. (d) Cauchy.

10 Standard deviation of standard exponential distribution is :

(a) 1. (b) $\frac{1}{2}$.

(c) $\frac{1}{4}$. (d) None of these.

11 If X is a standard normal variate, then P (X > 5) equals

(a) 0.6. (b) 0.45.

(c) 0.25. (d) None of these.

12 If X follows Pareto distribution, then P (X = 0.5) is

(a) 0.5. (b) 1.

(c) 0. (d) None of these.

(12 x $\frac{1}{4}$ = 3 weightage)

II. Short Answer Type questions. Answer all *nine* questions :-

13 Define marginal probability density function.

14 Define conditional distribution function of a continuous random variable Y given X.

15 Define conditional variance of a random variable X given Y.

16 Define joint central moments of a bivariate distribution.

17 Define a degenerate random variable.

18 Obtain second raw moment of discrete uniform distribution.

19 Find the moment generating function of a Bernoulli distribution.

20 Define rectangular distribution.

21 Define Cauchy distribution.

(9 x 1 = 9 weightage)

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

22 If X and Y are random variables with joint probability density function :

$$f(x, y) \begin{cases} e^{-(x+y)}, 0 < x, y < \infty \\ 0 \quad , \text{elsewhere,} \end{cases}$$

find P (X > 1).

23 If X, Y, Z are independent and identically distributed random variables, show that

$E(Y - Z)^2 = 2\,\mathrm{Var}(X)$.

24 Let $p(x, y) = \frac{1}{}$ for $x = 1, 2, \ldots, n$ and $y = 1, 2, \ldots, n$. Verify whether X and Y are independent.

25 Establish Renovsky formula.

26 Derive the moment generating function fo a Poisson variate. Hence obtain its first four central moments.

27 Obtain the median of normal distribution.

28 State and prove Bernoulli's law of large numbers.

(5 x 2 = 10 weightage)

IV. Essay questions. Answer any *two* questions :

29 Let the joint probability density function of (X, Y) be

$f(x, y) =$ 0 **, elsewhere.**

Find (i) **E (Y I X = x) ; and (ii)** Cor **(X, Y).**

30 (a) If X and Y are independent Poisson variates, **obtain the conditional distribution of X given X + Y.**

(b) Find the r^{th} **central moment of normal distribution.**

31 (a) State and prove Chebyshev's **inequality.**

(b) Briefly explain weak law of large numbers.

(2 x 4 = 8 weighta

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