

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
BSc DEGREE EXAMINATION DECEMBER 2018  
(Third Semester)

Branch- STATISTICS

**PROBABILITY DISTRIBUTIONS**

Time ; Three Hours

Maximum : 75 Marks

**SECTION-A (20 Marks)**

Answer ALL questions

ALL questions carry EQUAL marks (10x2 = 20)

- 1 Define Characteristic function.
- 2 Define convergence in probability.
- 3 What is meant by a bi-variate distribution?
- 4 Define the independence of two random variables.
- 5 Which the part of Binomial distribution.
- 6 Define Hyper geometric distribution.
- 7 Define Gamma distribution.
- 8 Write the pdf of Normal distribution.
- 9 Define Chi-square distribution.
- 10 Write any two applications of 'f-distribution.

**SECTION - B (25 Marks)**

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5x5 = 25)

- 11 a What is moment generating function? Write the properties of MGF.

OR

b State and prove Bernoulli's Law of Large Numbers.

- 12 a<sup>1</sup> The joint probability distribution of two random variables X and Y is given by:

$$P(x = 0, y = 1) = y; P(x = 1, y = -1) = -|; \text{ and } P(x = 1, y = 1) = \pm.$$

Find (i) marginal distributions of x and y and

(ii) conditional probability distribution of x given y=1.

OR '

b, Joint distribution of X and Y is given by

$$f(x,y) = 4xy e^{-(x^2+y^2)}; x > 0; y > 0.$$

Test whether X and Y are independent. Also find the conditional density of x given Y=y.

- 13 a Obtain the mean and variance of Binomial distribution.

OR

b Find the MGF of Geometric distribution and hence find its mean and variance.

- 14 a Obtain the mean and variance of Beta distribution of first kind.

OR

b List down the properties of normal distribution.

- 15 a What are the applications of Chi-square distribution?

OR

b Derive student's 'f-distribution.

**SECTION - C (30 Marks)**Answer any **THREE** Questions**ALL** Questions Carry **EQUAL** Marks (3 x 10 = 30)

- 16 State and prove Weak Law of Large Numbers.
- 17 The joint probability density function of a two-dimensional random variable (X,Y) is given by,  $f(x,y) = \begin{cases} 2 & 0 < x < 1, 0 < y < x \\ 0 & \text{elsewhere} \end{cases}$
- i) Find the marginal density functions of X and Y.
- ii) Find the conditional density functions of  
a) Y given X=x and b) X given Y=y.
- iii) Verify the independence of X and Y.
- 18 Derive the recurrence relation for the moments of Poisson distribution.
- 19 Find the moment generating function of Normal distribution.
- 20 Obtain the relationship between F and Chi-square distribution.

Z-Z-Z

END