

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2019
(Third Semester)

Branch- **STATISTICS**

PROBABILITY DISTRIBUTIONS

Time : Three Hours

Maximum : 75 Marks

SECTION-A 120 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 x 2 = 20)

- 1 Define characteristic function.
2 State central limit theorem.
3 Define marginal probability density functions.
4 State mathematical expectation.
5 Define binomial distribution.
Write the mean and variance of hypergeometric distribution.
Define Beta distribution of first kind.
Write any two properties of normal distribution.
Define F-distribution.

NOT FOR MARKS

10 Write any two applications of X -distribution.

SECTION - B 125 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a If the moments of variate x are defined by $E(x^2) = 0.6$; $x = 1, 2, 3, \dots$. Show that
 $P(x = 0) = 0.4$, $P(x=1) = 0.6$, $P(x > 2) = 0$.

OR

b State and prove weak law of large numbers.

12 a The joint probability distribution of two random variables x and y is given by
 $P(x = 0, y = 1) = 1/3$; $P(x = 1, y = -1) = 1/3$ and $p(x = 1, y = 1) = 1/3$. Find the
conditional probability distribution of x given $y = 1$.

OR

b Joint distribution of x and y is given by : $f(x, y) = 4xy e^{-x-y}$; $x > 0, y > 0$.
Test whether x and y are independent. For the above joint distribution, find the
conditional density of x given $y = y$.

13 a Obtain the recurrent relation for moments of the Poisson distribution.

OR

b Derive the mean and variance of negative binomial distribution.

14 a Derive the mean and variance of rectangular distribution.

OR

b Obtain the MGF of normal distribution.

15 a List out the applications of 'f - distribution.

OR

b Describe the relation between "F" and x^2 - distribution.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 i) State and prove Bernoulli's law of large numbers.

ii) For geometric distribution $P(x) = 2^{-x}$; $x = 1, 2, 3, \dots$. Prove that Chebychev's
inequaility given $P\{|x - 2| < 2\} > 1/2$, while the actual probability is 15/16.

17 Let $f(x, y) = 8xy$; $0 < x < y < 1$
 0 ; elsewhere

Find (i) $E(y/x = x)$, (ii) $E(xy/x = x)$ and (iii) $V(y/x = x)$.

18 Define geometric distribution and also derive its mean and variance,

19 retain limitmo rasp and additive nronerty of Gamma distribution.