# PSG COLLEGE OF ARTS & SCIENCE
## (AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2017          j A ^
(Third Semester)

Branch- STATISTICS

### PROBABILITY DISTRIBUTIONS

Time : Three Hours                                   Maximum : 75 Marks

### SECTION-A (20 Marks)
Answer ALL questions
ALL questions carry EQUAL marks          $(10 \times 2 = 20)$

1    Define characteristic function.

2    Write down the statement of Tchebychev's inequality.

3    Give the formula of conditional expectation for continuous variable.

4    Define random variable.

5    Define binomial distribution.

6    Define geometric distribution.

7    State any two characteristics of normal distribution.

8    Define rectangular distribution.

9    Define $N^2$ distribution.

10    Define t-distribution.

### SECTION - B (25 Marks)
• Answer ALL Questions
- ALL Questions Carry EQUAL Marks $(5 \times 5 = 25)$

11 a    State and prove Bernoulli law of large numbers.

                    OR

 b State and prove the pioperties of MGF.

     A two-dimensional r.v.(X, Y) have a bi-variate distribution given by

     $f(x, y) = 4xye^{"^x +y ^}$; x > 0, y > 0

     Test whether X and Y are independent.

                    OR

 b    Let X and Y be jointly distributed with p.d.f.

     $$f(x, y) = < \frac{Li+xy)}{4}, \quad X |< 1,| y !< 1$$
     $$0; \qquad otherwiae'$$

     Find the marginal density functions of X and Y. Are X and Y
     independent.

13 a    Find the mean and variance of hypergeometric distribution.

                    •          ' OR

 b    Find the mean and variance of geometric distribution.

14 a    Show that the linear combination of independent normal variate is also a
         normal variate.               '. •        .

                    OR

 b    Find the mean and variance of rectangular distribution.

15 a Derive F-distribution.

<div align="center">OR</div>

b Write down the application of ft* distribution.

<div align="center">

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

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16 State and prove weak law of large numbers.

17   Two random variables X and Y have the following joint probability density functions:

$$f2;< x < 1; \quad 0 < y < x$$

f($^x$> y)~ \ o ■ otherwise
1

Find (i) Marginal distributions of X and Y (ii) Conditional distribution of X given Y and Y given X.

18   Find the mean and variance of Poisson distribution.

19   Show that the normal distribution as a limiting case of binomial distribution

20   Establish the relationship between F and N² distributions.

<div align="center">7^7 ,7          END</div>