PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2024
(Third Semester)

Branch – **STATISTICS**

PROBABILITY DISTRIBUTIONS /
PROBABILITY & DISTRIBUTION - II

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. Which of the following statements is correct for Binomial distribution?
   (i) Mean = Variance (ii) Mean > Variance
   (iii) Mean < Variance (iv) Mean ≠ Variance

2. The probability of success changes from trial to trial in
   (i) Multinomial distribution (ii) Negative Binomial distribution
   (iii) Hypergeometric distribution (iv) Geometric distribution

3. Mean and Variance of U(2, 4) are
   (i) 1 and 1/3 (ii) 3 and 1/3 (iii) 1 and 3 (iv) 3 and 3

4. The normal curve is symmetrical and for symmetrical distributions, the values of all odd order moments about meal will always be
   (i) 0 (ii) 1 (iii) 0.5 (iv) 0.25

5. The range of t distribution is
   (i) $0 < t < \infty$ (ii) $-1 < t < 1$ (iii) $-\infty < t < \infty$ (iv) $0 < t < 1$

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. a State and prove the additive property of Poisson distribution.
   OR
   b Explain the Binomial and Poisson distributions and their properties.

7. a Obtain the mean and variance of geometric distribution.
   OR
   b Derive the moment generation function of the negative binomial distribution.

8. a Students of a class were given an aptitude test. Their marks were found to be normally distributed with a mean of 60 and a standard deviation of 5. What percentage of students scored? i) More than 60 marks (ii) Less than 56 marks (iii) Between 45 and 65 marks
   OR
   b Explain normal distribution and state their properties.

9. a Define exponential distribution and prove the memory-less property.
   OR
   b Explain the Beta distribution of the first and second kind and their properties.

10. a Derive the moment-generating function of Chi-square distribution.
    OR
    b State the assumptions and applications of Students t and F distributions.

Cont...

SECTION -C (30 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11. a State and prove the Poisson distribution is a limiting case of binomial Distribution.

OR

b Find the first four central and raw moments of Binomial distribution.

12. a Derive the variance of the multinomial distribution.

OR

b Obtain the mean and variance of Hypergeometric distribution.

13. a Derive the Moment generating function of Normal distribution.

OR

b Define uniform distribution over an interval [a,b]. Find its MGF, mean, and variance.

14. a Derive the moment generating function and variance of Gamma distribution.

OR

b Find the mean and harmonic mean of the beta distribution of the first kind.

15. a Define F distribution and derive the probability density function of F distribution.

OR

b Obtain the probability density function of the student's t distribution.

Z-Z-Z END