SECTION - B (35 Marks)
Answer ALL Questions
ALL Questions Carry EQUAL Marks   (5 x 7 = 35)

11. a. Explain principal steps in the sample survey.

(or)

b. Write short notes on sampling and non-sampling error.

12. a. Prove that in SRSWOR the variance of the sample mean is given by $Var(\bar{y}_n) = \left(\frac{N-n}{Nn}\right)S^2$.

(or)

b. Explain simple random sampling for attributes.

13. a. State the advantages of stratified random sampling method.

(or)

b. Explain optimum allocation in stratified sampling.

14. a. Obtain the relative efficiency of the estimate of the population mean in systematic over SRSWOR.

(or)

b. Explain cluster sampling.

15. a. Obtain the regression estimate when the co-efficient is computed from the sample.

(or)

b. Prove that in large samples with simple random sampling the ratio estimate $\hat{Y} = N\bar{y}$ if $\rho > \frac{1}{2}\left(\frac{S_x}{\bar{X}}\right)/\left(\frac{S_y}{\bar{Y}}\right)$.

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

16. Prove that the sample mean is the best linear unbiased estimate of the population mean.

17. A simple random sample of size $n = n_1 + n_2$ with mean $\bar{y} = \bar{y}_n$ is drawn from a finite population and a sample random sub-sample of size n_1 is drawn from it with mean $\bar{y}_1 = \bar{y}_{n_1}$, show that $V(\bar{y}_1 - \bar{y}_2) = V(\bar{y}_{n_1} - \bar{y}_{n_2}) = \left(\frac{1}{n_1} + \frac{1}{n_2}\right)S^2$.

18. Prove that $Var(\bar{y}_{st})$ is minimum for fixed total size of the sample n.

given $n_i \propto N_i S_i$.

19. If the population consist of a linear trend prove

$Var(\bar{y}_{st}) \leq Var(\bar{y}_{sys}) \leq Var(\bar{y}_n)_R$.

20. Obtain the bias of the linear regression estimate.

Z-Z-Z   END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2022
(Third Semester)

Branch – STATISTICS

PROBABILITY & DISTRIBUTIONS – II

Time: Three Hours

Maximum: 50 Marks

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

1. If $X \sim B(n, p)$ the distribution of $Y = (n - X)$ is
   - (i) $B(n, q)$
   - (ii) $B(n, x)$
   - (iii) $B(n, p)$
   - (iv) $B(n, 1)$

2. The distribution in which the characteristic function is not useful in finding the moments is
   - (i) Negative Binomial distribution
   - (ii) Hyper Geometric distribution
   - (iii) Binomial distribution
   - (iv) None of the above.

3. Mode of the normal curve lies at the point $x =$
   - (i) σ
   - (ii) μ
   - (iii) σ^2
   - (iv) φ

4. As regarding if the peakedness, the gamma distribution curve has __
   - (i) Leptokurtic
   - (ii) symmetrical
   - (iii) mesokurtic
   - (iv) hyperbolic

5. Which of the following distributions is used to compare two variances?
   - (i) t – distribution
   - (ii) F – distribution
   - (iii) Chi-square distribution
   - (iv) Normal distribution

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

6. (a). Write the cumulants of Binomial distribution.

OR

  (b). Derive the moment generating function of Poisson distribution.

7. (a). Find the mean and variance of Negative Binomial distribution.

OR

  (b). Explain the property lack of memory in geometric distribution.

8. (a) Write the significant in characteristics of Normal distribution.

OR

  (b). Derive the moment generating function for continuous Uniform distribution.

9. (a). State probability density function and moment generating function of Gamma distribution.

OR

  (b). State any three properties of Beta distribution of first kind.

10.(a). Write the relationship between t and F distribution.

OR

  (b). State uses of F-distribution.