

Faculty of Science

B.Sc (Statistics) II-Year, CBCS –III Semester

Backlog Examinations –June/July, 2022

PAPER: Statistical Methods and Theory of Estimation

Time: 3 Hours

Max Marks: 80

Section-A

I. Answer any *eight* of the following (8x4=32 Marks)

1. Explain Bi-variate data and scattered diagram.
2. Calculate the Rank correlation co-efficient to the following:

X	57	62	65	71	58	60
Y	62	70	64	72	59	64

3. Explain method of fitting Straight line.
4. If $r_{12} = 0.59$, $r_{13} = 0.46$, and $r_{23} = 0.77$ then find Partial Correlation Coefficient $r_{12.3}$ and Multiple Correlation Coefficient $R_{1.23}$
5. Define Consistency. Write the conditions for consistency involvement of three attributes.
6. Define Tcherprow's Coefficient of contingency.
7. Obtain the relation between **t** and **F** distributions.
8. If $T = (-2)^X$ is unbiased estimator of $e^{-3\lambda}$ where λ is a Poisson parameter on a sample of size 1.
9. Define χ^2 distribution.
10. Write any four properties of Maximum likelihood estimator.
11. Obtain MLE for λ in Poisson population.
12. Define Interval estimation and Confidence interval.

Section-B

II. Answer the following (4x12=48 Marks)

13. (a) Define principles of least squares. Derive the normal equations for fitting of a quadratic equation of the form $Y = aX^2 + bX + c$.

(OR)

- (b) Define Regression and Regression Co-efficients. State and prove its properties.

14. (a) Define Partial Correlation and Multiple Correlation and write the properties of Multiple Correlation.

(OR)

- (b) Define Yule's Co-efficient of association and Yule's Co-efficient of Colligation and obtain the relation between them

15. (a) Explain the criteria of a good estimator with appropriate examples.

(OR)

- (b) Define χ^2 distribution. Find its moment generating function and also find its mean and variance from it

16. (a) Explain maximum likelihood method of estimation. What is Minimum variance unbiased estimator? How can it be determined?

(OR)

- (b) Write the statement of Neyman's Factorization theorem. In random sampling from normal populations $N(\mu, \sigma^2)$. Find the MLE For (i) μ , when σ^2 unknown (ii) σ^2 when μ is unknown

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Section-A

- I. Answer any *five* of the following (5x4=20 Marks)
1. Correlation Co-efficient is independent of change of origin and scale-Prove it
 2. Define Regression co-efficient and give suitable examples.
 3. Describe the properties of multiple correlation coefficients.
 4. What do you mean by independence of attributes? Give a criterion of independence of attributes
 5. Obtain the relation between **t** and **F** distributions.
 6. Derive Mode of χ^2 distribution.
 7. Explain the method of Moments. Write its properties.
 8. Obtain MLE for θ in Exponential distribution.

Section-B

- II. Answer the following (4x15=60 Marks)
9. (a) Derive the expression to find Rank correlation co-efficient. Distinguish between correlation and regression.
(OR)
 - (b) Define the term "Regression". Derive the line of regression Y on X. Show that correlation coefficient is the geometric mean of regression coefficients.
 10. (a) What is Curve fitting. Explain in detail fitting of straight line.
(OR)
 - (b) Explain in detail the methods of studying of association of attributes
 11. (a) Define **F** - distribution. Find its mean and variance and also write its properties.
(OR)
 - (b) Define χ^2 distribution. Derive its moment generating function.
 12. (a) Define the terms:
(i) Consistency (ii) Unbiasedness (iii) Efficiency
(iv) Sufficiency with examples and also when do say that the estimator is good estimator.
(OR)
 - (b) Define Interval estimation and Confidence interval.
In random sampling from normal populations **N** (μ, σ^2). Find the **MLE** for μ , when σ^2 is unknown.
