

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-AI. 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

Faculty of Science

B.Sc (Statistics) II-Year, CBCS –III Semester Regular Examinations –Jan, 2023**PAPER: Statistical Methods and Theory of Estimation**

Time: 3 Hours

Max Marks: 80

Section-A

- I. Answer any *eight* of the following questions (8x4=32 Marks)
1. Define Bi-variate data and scattered diagram with an example
 2. Explain least square principle in fitting straight line
 3. Define correlation and write the formula of probable error of the same
 4. Explain partial correlation and Explain how do you measure it
 5. Explain about coefficient an colligation.
 6. Write the consistency conditions for three attributes
 7. Define population, sample statistic and parameter with an example
 8. Define t-distribution. State its properties.
 9. Explain the concept of mean square error of an estimate
 10. State the Neymann's factorization theorem
 11. Find the moment estimator for parameter p in case of binomial distribution
 12. Define confidence interval of estimation with suitable example.

Section-B

- II. Answer the following questions (4x12=48 Marks)
- 13.(a) Define Rank correlation and derive its limits.
(OR)
(b) Define Regression and derive any one of regression line.
 - 14.(a) Define multiple correlations. In trivariate distribution $r_{12} = 0.7$, $r_{23} = r_{13} = 0.5$ then find (i) $r_{23.1}$ (ii) $R_{1.23}$
(OR)
(b) Define an Attribute and show that for 'n' attributes $A_1, A_2, A_3, \dots, A_n$
 $(A_1 A_2 A_3 \dots A_n) \geq ((A_1) + (A_2) + (A_3) + \dots + (A_n))$
 - 15.(a) Define χ^2 -variate. Establish relationship between χ^2 and F distribution.
(OR)
(b) Define point estimation and explain the criteria's for good estimator in detail.
 - 16.(a) Stating the assumptions explain maximum likelihood method of estimation. Also state its properties
(OR)
(b) Extract the confidence intervals are the parameters of Normal population.

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B.Sc(Statistics) II Year CBCS –III Semester Backlog Examinations –June, 2023
Paper –III (Statistical Methods and Theory of Estimation)

Time: 3 Hours.

Max Marks: 80

Section –AI Answer any **EIGHT** of the following questions**(8 X 4 = 32 Marks)**

1. Explain Bi-variate data and scattered diagram.
2. Explain method of fitting Power curve.
3. Calculate the Coefficient of correlation between A and B.

A	25	30	28	29	32	24	26	28	27	21
B	18	20	21	16	14	13	22	15	19	12

4. Describe the properties of Multiple correlation coefficient.
5. Examine the consistency of the following data:
N = 150, (A) = 80, (B) = 60, (AB) = 35
6. Define Coefficient of contingency.
7. Obtain the relation between **F** and χ^2 distributions.
8. Explain the concept of bias and mean square error of an estimator.
9. Define t-distribution. Write any 6 properties of t-distribution.
10. Explain the method of Moments. Write its properties.
11. Define Interval estimation and Confidence interval.
12. Obtain MLE for Binomial population parameter p (Proportion).

Section –B

II Answer the following questions:

(4 X 12= 48Marks)

13. (a) Define "Correlation Ratio" and write its properties and also show that correlation co-efficient is independent of change of origin and scale. If X and Y are uncorrelated, can we say that X and Y are independent?

(OR)

- (b) Derive the line of regression X on Y. Show that correlation coefficient is the geometric mean of regression coefficients.

14. (a) Explain the partial association and define Yule's coefficient of partial Association. Write the conditions for consistency involvement of three attributes.

(OR)

- (b) Explain in detail the methods of studying association of attributes. Find A and B are independent, positively associated or negatively associated in the following cases:

$$(AB) = 256; (aB) = 786; (A\beta) = 48; \text{ and } (a\beta) = 144.$$

15. (a) Define **F** - distribution. Find its mean and variance and also write its properties.

(OR)

- (b) Define χ^2 distribution. Write its probability density function and also find its mean and variance using pdf.

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

(OR)

- (b) Obtain a MLE for the distribution having probability mass function

$$f(x, \theta) = \theta^x (1-\theta)^{1-x}; \quad x = 0 \text{ \& \ } 1 \\ 0 \leq \theta \leq 1$$
