

[LD 1013]

OCTOBER 2013

Sub. Code: 2863

M.Sc NON-MEDICAL DEGREE EXAMINATION

FIRST YEAR

BRANCH II - BIOSTATISTICS

PAPER III – STATISTICAL INFERENCE, SAMPLING METHODS AND
SAMPLE SIZE

Q.P. Code : 282863

Time : 3 hours

Maximum : 100 marks

I. Elaborate on :

(2X20=40)

1. a) Explain the Neyman – Pearson theory of testing of hypothesis.
b) Prove that every most powerful test is unbiased.
2. a) Describe the procedure of stratified sampling and highlight its importance.
b) In the usual notations prove that
$$V_{st} \leq V_{sys} \leq V_{srs}$$

II. Write notes on:

(10X6=60)

1. The application of normal test for confidence interval
2. Point estimation and Interval estimation.
3. Prove that T^2 is a consistent estimator of Q^2 if T is a consistent estimator of Q .
4. Define most powerful test. Does it exist always? Justify your claim.
5. PPS sampling with replacement
6. Des Raj's ordered estimator
7. Observational errors in sample surveys.
8. The test for goodness of fit.
9. Double Sampling for Ratio estimator
10. Non-response errors and How are they controlled?

[LE 0414]

APRIL 2014

Sub. Code: 2863

**M.Sc NON-MEDICAL DEGREE EXAMINATION
FIRST YEAR
BRANCH II - BIostatISTICS
PAPER III – STATISTICAL INFERENCE, SAMPLING METHODS AND
SAMPLE SIZE**

Q.P. Code : 282863

Time : 3 hours

Maximum : 100 marks

Answer All Questions

I. Elaborate on : **(2X20=40)**

1. Obtain an unbiased estimate of the population total with stratified random sample and obtain an expression for the standard error.
2. Describe method of estimating a 95 percent of confidence Interval for the variance σ^2 if a sample of size n is taken when the mean is 1) known and 2) unknown.

II. Write notes on: **(10X6=60)**

1. What is a best linear unbiased estimator.
2. Explain the estimation of population proportion in stratified random sampling with SRSWS and its sampling variance.
3. Explain the chi square test for testing the goodness of fit.
4. Explain t test for testing the significance of correlation and regression coefficients.
5. Show that most powerful test obtained by Neyman Pearson lemma is unbiased.
6. Explain Sequential Probability Ratio test.
7. Describe sampling for ratio estimate.
8. Explain the types of errors in testing the hypothesis.
9. Explain PPS sampling with replacement.
10. Discuss the scope and limitations of convenient and judgment sampling in Biostatistical analysis.

[LF 1014]

OCTOBER 2014

Sub. Code: 2863

**M.Sc., NON-MEDICAL DEGREE EXAMINATION
FIRST YEAR
(New Regulation)
BRANCH II - BIOSTATISTICS
PAPER III – STATISTICAL INFERENCE, SAMPLING METHODS AND
SAMPLE SIZE**

Q.P. Code : 282863

Time : Three hours

Maximum : 100 marks

I. Elaborate on :

(2 x 20 = 40)

1. a) Derive Kolmogorov Smirnov Test.
b) Apply Manwhitney U Test for the following data represent the lifetimes(hours) of batteries for two different Medical equipments:
Equipment A : 40, 30, 40, 45, 55, 30
Equipment B : 50, 50, 45, 55, 60, 40
Are these equipments different with respect to average life and also whether they have come from the same population.
2. Methods of Sampling Techniques.

II. Write notes on:

(10 x 6 = 60)

1. Estimate, Consistent Estimate and Unbiased Estimate
2. Give example for Cramer Rao inequality, when the underlying regularity conditions are violated?
3. Invariance property of MLE
4. Test for independence of contingency tables
5. Quantile tests
6. MVUE and BLUE
7. Differentiate Multiphase and Multistage Sampling
8. Systematic sampling and explain when we should not use systematic sampling
9. Compare census and sample survey
10. Non-probability sampling techniques

[LH 0415]

OCTOBER 2015

Sub. Code: 2863

**M.Sc., NON – MEDICAL DEGREE COURSES
BRANCH II - BIOSTATISTICS
FIRST YEAR
PAPER III – STATISTICAL INFERENCE, SAMPLING METHODS AND
SAMPLE SIZE**

Q.P. Code: 282863

Time: Three hours

Maximum: 100 marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Minimum variance unbiased estimator and BLUE.
b) Confidence interval for difference between two proportions.
2. a) Estimation of variance of SRSWOR.
b) Multistage sampling.

II. Write notes on:

(10 x 6 = 60)

1. Properties of Point Estimators.
2. Confidence interval for mean of sample samples.
3. Rao – Blackwell inequality.
4. UMP and UMP unbiased test.
5. Wilcoxon Mann – Whitney test.
6. Stratified Sampling.
7. Various of SRS under Proportional allocation
8. Estimation of mean in Cluster Sampling.
9. Ratio estimate.
10. Double sampling.

[LJ 1016]

OCTOBER 2016

Sub. Code: 2863

M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
PAPER III – STATISTICAL INFERENCE, SAMPLING METHODS
AND SAMPLE SIZE

Q.P. Code: 282863

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Write about stratified, systematic, quota and snowball sampling.
b) Write about cluster sampling and compare it with simple random sampling.
2. a) Suppose that y_1, y_2, \dots, y_n denote a random sample from Poisson distribution with mean λ .
 - i) Find MLE $\hat{\lambda}$ for λ .
 - ii) Find the expected value and variance for $\hat{\lambda}$.
 - iii) What is the MLE for $P(Y=0) = \exp(-\lambda)$?
- b) Write about parametric and non-parametric tests based on t and F distributions.

II. Write notes on:

(10 x 6 = 60)

1. Correlation and regression.
2. Sample size on difference between two means.
3. Regression estimator.
4. Intra class correlation coefficient (ICC).
5. Properties of an estimator.
6. Rank sum test.
7. State Rao-Blackwell and Cramer-Rao inequality.
8. Multiphase sampling.
9. Confidence interval for a single mean.
10. MVUE and BLUE.

[LL 1017]

OCTOBER 2017

Sub. Code: 2863

**M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
PAPER III – STATISTICAL INFERENCE, SAMPLING METHODS AND
SAMPLE SIZE**

Q.P. Code: 282863

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Show that the sample mean \bar{x}_{mean} in random sampling from
$$f(x, \theta) = \begin{cases} (1/\theta)\exp(-(x/\theta)), & 0 < x < \infty, \\ 0 & \text{otherwise,} \end{cases}$$
when $0 < \theta < \infty$, is an MLE estimator of θ and has variance θ^2/n
b) Cramer Rao inequality, Bhattacharya inequality and Rao-blackwell inequality.
2. a) Methods of drawing SRS.
b) Multiphase and multistage sampling.

II. Write notes on:

(10 x 6 = 60)

1. Confidence interval for difference of two sample proportions.
2. Method of modified minimum chi-square.
3. Neymen Pearson test of hypothesis.
4. Test based on F-distribution.
5. Mann-Whitney test.
6. Parameter, statistic and sampling distribution.
7. Estimation of mean and variance of SRSWOR.
8. Quota sampling for proportions.
9. Non-sampling errors.
10. Interpenetrating sub sampling.

[LM 0518]

MAY 2018

Sub. Code: 2863

**M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
PAPER III – STATISTICAL INFERENCE, SAMPLING METHODS AND
SAMPLE SIZE**

Q.P. Code: 282863

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Confidence interval for mean and variance of normal distribution.
b) Let x_i 's, $i=1,2,\dots,n$ is a random sample from the distribution.
 $f(x,\theta)=\exp(-(x-\theta))$, $0 < x < \infty$; $-\infty < \theta < \infty$. Obtain sufficient statistic for θ .
2. Types of probability and non-probability sampling.

II. Write notes on:

(10 x 6 = 60)

1. BLUE.
2. Method of moments.
3. Likelihood ratio.
4. Test of independence of attributes.
5. SPRT.
6. Advantageous of sampling.
7. Variance of sample mean of stratified sampling.
8. Cluster sampling.
9. Ratio and regression estimate.
10. Double sampling.

[LN 1018]

OCTOBER 2018

Sub. Code: 2863

**M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
PAPER III – STATISTICAL INFERENCE, SAMPLING METHODS AND
SAMPLE SIZE**

Q.P. Code: 282863

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Minimum variance unbiased estimator and Best linear unbiased estimator.
b) Cramer-Rao inequality.
2. a) Methods of drawing Simple Random Sampling.
b) Multiphase and multistage sampling.

II. Write notes on:

(10 x 6 = 60)

1. Confidence interval for difference of two sample proportions.
2. Explain simple hypothesis and composite hypothesis with example.
3. Test of independence of attributes.
4. Neymen Pearson test of hypothesis.
5. Mann-Whitney test.
6. State Rao-Blackwell.
7. Estimation of sample size for clinical experiments.
8. Systematic sampling and explain when we should not use systematic sampling
9. Stratified Sampling.
10. Discuss the scope and limitations of convenient and judgment sampling in biostatistical analysis.

[LP 1019]

OCTOBER 2019

Sub. Code: 2863

**M.Sc. BIOSTATISTICS EXAMS
FIRST YEAR
PAPER III – STATISTICAL INFERENCE, SAMPLING METHODS AND
SAMPLE SIZE**

Q.P. Code: 282863

Time: Three hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. Types of probability and non-probability sampling.
2. a) Cramer-Rao inequality.
b) Rao-Blackwell inequality.

II. Write notes on:

(10 x 6 = 60)

1. Critical region and level of significance.
2. Method of Moments.
3. BLUE.
4. The convenience and Judgment sample.
5. Any two non-parametric tests.
6. Sampling and its advantages.
7. Some important points of Estimation of sample size.
8. Properties of point estimators.
9. UMP unbiased test.
10. Systematic sampling and its advantages.
