INTERNAL ASSIGNMENT QUESTIONS

M.Sc. (Statistics) II Semester

2026-2027

PROF. G. RAM REDDY CENTRE FOR DISTANCE EDUCATION
(RECOGNISED BY THE DISTANCE EDUCATION BUREAU, UGC, NEW DELHI)

OSMANIA UNIVERSITY
(A University with Potential for Excellence and Re-Accredited by NAAC with "A" + Grade)

DIRECTOR
Sr. Prof. N.Ch. Bhatracharyulu
Hyderabad – 7 Telangana State

PROF.G.RAM REDDY CENTRE FOR DISTANCE EDUCATION| OSMANIA UNIVERSITY, HYDERABAD – 500 007

Dear Students,

Each student has to write the answers to the Assignment questions with neat own handwriting using Blue Pen (Black Ink not allowed) for each paper. Assignments have to submit after the payment of Rs.500/- by showing the receipt of the same. If the Assignment is not submitted within stipulated time i.e. before the theory exams / last date is treated as absent.

Methodology for writing the Assignments (Instructions) :

- First read the subject matter in the course material that is supplied to you.
- If possible read the subject matter in the books suggested for further reading.
- You are welcome to use the PGRRCDE Library on all working days for collecting information on the topic of your assignments. (10.30 am to 5.00 pm).
- Give a final reading to the answer you have written and see whether you can delete unimportant or repetitive words.
- The cover page of the each theory assignments must have information as given in FORMAT below.

FORMAT

1. **NAME OF THE STUDENT :**
2. **ENROLLMENT NUMBER :**
3. **NAME OF THE COURSE :**
4. **SEMESTER (I, II, III & IV) :**
5. **TITLE OF THE PAPER :**
6. **DATE OF SUBMISSION :**

- Write the above said details clearly on every subject assignments paper, otherwise your paper will not be valued.
- Tag all the assignments paper wise and submit them in the concerned counter.

Submit the assignments on or before **17.11.2026** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

DIRECTOR

ASSIGNMENT QUESTIONS
M.Sc. (STATISTICS) II-SEMESTER
PAPER-I: (Statistical inference)
Note: Assignments should be written with candidate hand written with blue pen only.
SECTION-A (5 Q X 2 M = 10 MARKS)
Answer the following Questions.

1. Let a sample of size 'n' drawn from a distribution with density $f(x) = \theta\, x^{\theta-1}$, $0<x<1$, $\theta>0$, obtain the uniformly most powerful test for size α test for testing H_0: $\theta < \theta_0$ against H_1: $\theta > \theta_0$.
2. Let $x_1, x_2 \ldots x_m$ and $y_1, y_2 \ldots y_n$ be two independent random samples drawn from N μ_1, σ_1^2) and N(μ_2,σ_2^2) obtain the test statistic for testing (i) H_0: $\mu_1=\mu_2$ vs H_1:$\mu_1\neq\mu_2$. (ii) H_0: $\mu_1=\mu_2$ vs H_1:$\mu_1\neq\mu_2$, under the assumption that variance is same for the populations
3. Describe sequential probability ratio test procedure when observations are drawn from N(μ,σ^2) for testing Ho: $\mu = \mu_0$against H1: $\mu= \mu_1(>\mu_0)$. Obtain its OC and ASN functions.
4. Obtain the expression for stopping bounds of SPRT in terms of its strength $\theta$for testing H_0: $\theta= \theta_0$ where successive observations come from Poisson with θ. Obtain OC function of the test.
5. Let ($x_1, x_2, \ldots x_n$) and ($y_1, y_2, \ldots y_n$) are paired random samples drawn from populations with distribution functions F(x) and G(y) with a common variance then obtain the asymptotic relative efficiency of a parametric test used over a nonparametric test used to test the hypothesis of identical distributions.

SECTION-B (2 Q X 5 M = 10 MARKS)
Answer the following Questions.

6. Compare the tests Sign test, Wilcoxon signed rank test, Kolmogorov-Smirnov, Mann-Whitney and Wald-Wolfowitz tests by stating assumptions underlying, hypothesis to be tested, test statistic, limitations, asymptotic approximation and which test when to use and how?
7. Suppose X is distributed as B(n, θ) with a prior distribution $f(\theta)=1$, find its posterior distribution also find the Bayes estimator of θ under squared error loss function. Suppose the prior distribution is Beta(α,β), then what is the change? And find the bayes risk?

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ASSIGNMENT QUESTIONS
M.Sc. (STATISTICS) II-SEMESTER
PAPER-II:Linear Models &Design of Experiments

SECTION-A (5 Q X 2 M = 10 MARKS)

Answer the following Questions.

1. State the five assumptions in Gauss-Markoff Theorem and discuss its necessity and implication?
2. Write the complete design models in the form of a general linear model and write its parameter vector estimate? Write the problem involved in its estimation?
3. In 2^4 factorial experiment, the principal blocks of 3 replicates are: Replicate-1: (1), (ab), (ac), (bc), (d), (abd), (acd), (bcd); Replicate-2: (1), (ab), (c), (abc), (ad), (bd), (acd), (bcd). ; Replicate-3: (1), (a), (bc), (abc), (bd), (abd), (cd), (acd). Examine whether experiment is full factorial or total or partial confounded or fractional?explain in detail?
4. Identify the design based on its association matrices, for design contains the 3 blocks: (1 2 3); (4 5 6); (7 8 9).
5. Derive the C-matrix for a balanced incomplete block designs and state its properties?

SECTION-B (2 Q X 5 M = 10 MARKS)

Answer the following Questions.

6. Discuss in detail on Full factorial, total and partial confounding, fractional replications that which design when we have to apply with suitable examples? Discuss their limitations and advantages?
7. Construct a PBIBD (2) with 10 treatments and write its association schemes the treatments? How can you estimate the parameters and can analyse that design?

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ASSIGNMENT QUESTIONS
M.Sc. (STATISTICS) II-SEMESTER
PAPER-III: Sampling Theory

SECTION-A (5 Q X 2 M = 10 MARKS)

Answer the following Questions.

1. Define Stratified random sampling. Compare SRSWR and linear systematic sampling for estimating population mean.
2. Derive an unbiased estimator for population total in ratio method of estimation?
3. Obtain the relation between S^2, S_b^2, and S_w^2in cluster sampling of equal cluster size?
4. Define Horvitz-Thompson estimator and derive its variance. Also give the Yate's and Grundy corrected variance for Hortvitz-Thompson estimator?
5. State and explain the different sources and treatments of non-sampling errors?

SECTION-B (2 Q X 5 M = 10 MARKS)

Answer the following Questions.

6. In PPSWR, obtain the unbiased estimator of the population total and derive its variance?
7. Write the method for cluster sampling along with its merits and demerits. Also obtain the estimator of mean and its variance in terms of intra cluster correlation co-efficient?

ASSIGNMENT QUESTIONS
M.Sc. (STATISTICS) II-SEMESTER

PAPER-IV: Multivariate analysis
SECTION-A (5 Q X 2 M = 10 MARKS)

Answer the following Questions.

1. Let $\underline{X}$ be a tri-variate Normally distributed random vector with mean vector 0 and Covariance matrixΣ. Find the conditional distribution of X_1 given $X_2=x_2$ and $X_3=x_3$.

$$\text{Where } \Sigma = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 3 & 2 \\ 1 & 2 & 2 \end{vmatrix}.$$

2. Let X be a random sample of size 'n' in p-variate drawn from a Multi-variate Normal distribution with parameters μ and Σ. Obtain Maximum Likelihood Estimators for μ and Σ.
3. Define and state the goals of Discriminant Analysis.? How can you obtain the discriminant function?
4. Let X be a random sample of size 'n' in p-variate drawn from a Multi-variate Normal distribution with parameters μ and Σ. Obtain the distribution of sample mean vector $\overline{X}$. Prove that the sample mean vector and sample covariance are independent.
5. Define Principal components and obtain the procedure for obtaining Principal components

SECTION-B (2 Q X 5 M = 10 MARKS)

Answer the following Questions.

6. Derive the null and non-null distributions of sample correlation coefficient
7. Define the Canonical pair of variables and their correlations. Also obtain the procedure for obtaining the canonical pair of variables and their correlations