

**INTERNAL ASSIGNMENT QUESTIONS
M.Sc. (STATISTICS) FINAL**

2024



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

Prof. G.B. Reddy

Hyderabad – 7 Telangana State

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

Dear Students,

Every student of M.Sc. (Statistics) Final year has to write and submit **Assignment** for each paper compulsorily. Each assignment carries **20 marks**. The marks awarded to the students will be forwarded to the Examination Branch, OU for inclusion in the marks memo. If the student fail to submit Internal Assignments before the stipulated date, the internal marks will not be added in the final marks memo under any circumstances. The assignments will not be accepted after the stipulated date. **Candidates should submit assignments only in the academic year in which the examination fee is paid for the examination for the first time.**

Candidates are required to submit the Exam fee receipt along with the assignment answers scripts at the concerned counter on or before **30-04-2024** and obtain proper submission receipt.

ASSIGNMENT WITHOUT EXAMINATION FEE PAYMENT RECEIPT (ONLINE) WILL NOT BE ACCEPTED

Assignments on Printed / Photocopy / Typed will not be accepted and will not be valued at any cost. Only HAND WRITTEN ASSIGNMENTS will be accepted and valued.

Methodology for writing the Assignments (Instructions) :

1. First read the subject matter in the course material that is supplied to you.
2. If possible read the subject matter in the books suggested for further reading.
3. 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).
4. Give a final reading to the answer you have written and see whether you can delete unimportant or repetitive words.
5. 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. NAME OF THE PAPER :
5. DATE OF SUBMISSION :
6. Write the above said details clearly on every subject assignments paper, otherwise your paper will not be valued.
7. Tag all the assignments paper wise and submit them in the concerned counter.
8. Submit the assignments on or before **30-04-2024** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

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INTERNAL ASSIGNMENT QUESTION PAPER 2023-24

COURSE: M.Sc. (FINAL) STATISTICS

PAPER-I: STATISTICAL INFERENCE

MAX. MARKS 20

Note: Write the answers to the assignment questions with your own hand in the order of questions given 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 $x_1, x_2 \dots x_m$ and $y_1, y_2 \dots y_n$ be two independent random samples drawn from $N(\mu_1, \sigma_1^2)$ and $N(\mu_2, \sigma_2^2)$ 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 $N(\mu, \sigma^2)$ for testing $H_0: \mu = \mu_0$ against $H_1: \mu = \mu_1 (> \mu_0)$. Obtain its OC and ASN functions.
4. Obtain the expression for stopping bounds of SPRT in terms of its strength θ for testing $H_0: \theta = \theta_0$ where successive observations come from Poisson with θ . Obtain OC function of the test.
5. Let $(x_1, x_2, \dots x_n)$ and $(y_1, y_2, \dots y_n)$ 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 $B(n, \theta)$ 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 $Beta(\alpha, \beta)$, then what is the change? And find the bayes risk?

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INTERNAL ASSIGNMENT QUESTION PAPER 2023-24

COURSE: M.SC. (FINAL) STATISTICS

PAPER-II: LINEAR MODELS & DESIGN OF EXPERIMENTS MAX. MARKS 20

Note: Write the answers to the assignment questions with your own hand in the order of questions given only.

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?

Faculty: Prof. N.Ch. Bhattacharyulu, CBOS, Department of Statistics, O.U.

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INTERNAL ASSIGNMENT QUESTION PAPER 2023-24

COURSE: M.SC. (FINAL) STATISTICS

PAPER-III: OPERATIONS RESEARCH

MAX. MARKS 20

Note: Write the answers to the assignment questions with your own hand in the order of questions given only.

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

1. Write the need of study the duality and write the relationship in finding the optimal solution to its primal?
2. Compare the similarities and dissimilarities and merits, demerits and limitations of critical path method with program evaluation review technique?
3. A manufacturer has to supply his customers 600 units of his product per year. Shortages are not allowed and the inventory carrying cost amount to Rs. 0.60 per unit year the setup cost per run is Rs. 80. Find the economic order quantity, minimum average yearly cost and the optimum number of orders per year?
4. What is dynamic programming technique? Explain how the forward, backward and recursive approaches used in it?
5. Explain in detail about perishable inventory models when demand in uniform, with and without shortages, where the units are discrete and continuous.

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

6. Find the optimal solution to the following LPP using revised simplex method

Minimize

$$Z = X_1 + 2X_2 + 3X_3 + 4X_4$$

subject to the constraints

$$X_1 + 3X_2 + X_3 + X_4 \geq 18;$$

$$X_1 + 2X_2 + 3X_3 + 4X_4 \geq 25;$$

$$5X_1 + 3X_2 + 2X_3 + 4X_4 \geq 35;$$

$$X_1, X_2, X_3, X_4 \geq 0;$$

7. How can you solve the given game of two players with $m \times n$ strategies under with and without saddle points.

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INTERNAL ASSIGNMENT QUESTION PAPER 2023-24

COURSE: M.SC. (FINAL) STATISTICS

PAPER-IV: STATISTICAL QUALITY CONTROL & TIME SERIES ANALYSIS

MAX. MARKS 20

Note: Write the answers to the assignment questions with your own hand in the order of questions given only.

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

1. What are the various smoothing techniques used in time series model fitting and which method when we have to use? Write the step-by-step procedure for any two methods?
2. Derive stationarity, invertibility and Auto-covariance generating function of a general linear process?
3. Explain, how can you identify the time series model for the given data? Write its step-by-step procedure?
4. Explain in brief about OC and ARL functions of Shewhart control charts for mean and range
5. Discuss rectifying inspections with AOQ and ATI curves?

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

6. Derive the estimates of parameters, autocovariance and in auto regressive (2), moving average (2) models using maximum likelihood estimation method.
7. Explain CUSUM chart. How do you improve CUSUM responsiveness for large shifts? What are the disadvantages of v-mask procedure?

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