INTERNAL ASSIGNMENT QUESTIONS
M.Sc. (Statistics) I SEMESTER

2025

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)

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

Dear Students,

Every student of M.Sc. Statistics I semester has to write and submit **Assignment** for each paper compulsorily. Each assignment carries **30 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 **30-07-2025** 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

Students are advised not to use Black Pen.

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. SEMESTER (I, II, III & IV) :
5. TITLE OF THE PAPER :
6. 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 **30-07-2025** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

DIRECTOR

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INTERNAL ASSIGNMENT QUESTION PAPER

COURSE: M.Sc(STATISTICS) I SEMSTER

PAPER: I (MATHEMATICAL ANALYSIS AND LINEAR ALGERBRA) SUBJECT: STATISTICS

TOTAL MARKS:30

SECTION- A

UNIT-I Answer the following questions(each question carries two marks) (5X2=10)

1. (a) Define Bounded variation of a function and prove that every monotonic function has bounded variation on the given interval.
   (b) state and prove Additive property of Total variation.
2. State and prove necessary and sufficient condition for differentiability at a point.
3. Define stationary, extreme and saddle points. Investigate the maxima and minima of $f(x, y) = 2x^4 - 3x^2 + y^2$. $2x^4 - 3x^2 + y^2$
4. State and prove any three properties of Linear Independent and Dependent sets of vectors.
5. (i) Define (a) Linear forms (b) Bilinear Forms (3) Quadratic Forms

   (ii) State and prove Hadamard's Inequality.

Section - B.

UNIT-II Answer the following Questions.(Each question carries ten marks) (2X10=20)

1. (a) State and Prove First and Second Mean value theorem for R-S Intergal
   (b) Show that $f_{xy}(0,0) \neq f_{yx}(0,0)$ where $f(x,y) = \frac{xy(x^2-y^2)}{x^2+y^2}$, $(x,y)\neq(0,0)$, $f(0,0)=0$ $x^2+y^2+u^2-v^2=0$
2. (a) Define Jacobian function of 'n' variables. If x2+y2+u2-v2=0 and uv + xy = 0, find the Jacobian of transformation and the derivatives x y u and $\partial u/\partial x$, $\partial v/\partial y$.

   (b) If A+ is the Moore Penrose inverse of a matrix A then show that

   (i) (A+)+ = A and (ii) $\rho(A) = \rho(A+)$.

Paper-II: PROBABILITY THEORY

Section – A (5 × 2 = 10 marks)

Answer the following questions

1. Define Borel Field and Minimal σ-field with suitable real-life examples
2. Obtain Bose-Einstein Distribution in Probability theory
3. State Glivenko-Cantelli lemma and write its applications
4. Define Weak and strong Law of Large Numbers. State the properties to obey the LLN. Illustrate each with a suitable examples?
5. What is the Lindeberg–Levy Central Limit Theorem? Write its importance and illustrate with suitable applications?

Section – B (2 × 10 = 20 marks)

Answer the following questions

6. State and prove the Slutsky's theorem.
7. State and prove the Kolmogorov's strong law of large numbers in case of iid random variables

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INTERNAL ASSIGNMENT QUESTION PAPER

COURSE : M.Sc. (Statistics) I Semester

Paper : III Subject : DISTRIBUTION THEORY

Total Marks: 30

Section – A

Answer the following short questions (each question carries two marks) **5 x 2 = 10**

1. Derive the moments and cumulative function of Double Exponential distribution.
2. Write the applications of Pareto distribution.
3. Illustrate on Mixture distribution.
4. State and derive the Exponential Family of distributions for Binomial, Poisson, and Exponential distributions.
5. Write the step-by-step procedure of obtaining the distributions of functions of random variables using the method of Jacobian transformation.

Section – B

Answer the following Questions (each question carries ten marks) **2 x 10 = 20**

1. Explain Compound distributions. Derive
   (a) Compound Binomial distribution
   (b) Compound Poisson distribution

2. Explain the functions of several Random Variables Algorithm step by step with an example of Poisson distribution.

Name of the Faculty : _____

Dept. : _____

Paper-IV: ESTIMATION THEORY

Section – A (5 × 2 = 10 marks)

Answer the following questions.

1. Explain the concept of the criteria of "sufficiency" and "efficiency" of estimates of parameters. Write their properties and illustrate each with suitable examples.
2. What is a UMVU estimator And Fisher Information? How do they help us choose the best estimator in real life
3. Define CAN and BAN estimators. What conditions make an estimator BAN, and how do these estimators relate to asymptotic efficiency in large samples
4. What are Median Unbiased Estimators and Model Unbiased Estimators? How are they different from each other?
5. Explain Bootstrap method of estimation? Explain with suitable example.

Section – B (2 × 10 = 20 marks)

Answer the following questions

1. State and prove the Cramér–Rao inequality. Illustrate it with suitable examples.
2. State and prove the Lehmann–Scheffé Theorem. Provide a real-life example to illustrate its application in statistical estimation.