

INTERNAL ASSIGNMENT QUESTIONS M.Sc. (STATISTICS) SEMESTER-IV

2026



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**

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) :

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 **31-03-2026** at the concerned counter at PGRRCDE, OU on any working day and obtain receipt.

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OSMANIA UNIVERSITY, HYDERABAD-500 007

INTERNAL ASSIGNMENT QUESTION PAPER

COURSE: M.Sc. (Statistics) IV Semester

Paper-I: STOCHASTIC PROCESS

SECTION-A

Answer the following short questions (each question carries two marks)

5 x 2 = 10

1. State the properties of a Markov Chain Transition Probability Matrix.
2. Define the Null Recurrent State of a Markov Chain. Explain with a Suitable Example.
3. Describe the Gambler ruin problem. How is it related to random walk problem.
4. Under what conditions a stationary distribution of a Markov Chain exists.
5. Define the Stationary distribution of a Markov Chain.

SECTION-B

Answer the following questions (each question carries ten marks)

2x10 = 20

1. Prove that a state i of a Markov chain is persistent or transient if $\sum_{i=1}^{\infty} p_{ii}^{(n)} = \infty$ and $\sum_{i=1}^{\infty} p_{ii}^{(n)} < \infty$.
2. Explain the terms- mean recurrence time and period of a state. In a manufacturing process, the probability that next item is defective, given that the previous item is defective is $2/3$; and the probability that the next item is non-defective, given that the previous item is non-defective is $4/5$. Classify the states, and obtain the mean recurrence times of recurrent states.

Name of the Faculty: Sr. Prof. N.Ch. Bhattacharyulu

Department of Statistics, U.C.S, O.U

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INTERNAL ASSIGNMENT QUESTION PAPER

COURSE: M.Sc. (Statistics) IV Semester

Paper-II: RELIABILITY THEORY

SECTION-A

Answer the following short questions (each question carries two marks)

5 x 2 = 10

1. What is coherent system? Explain bounds on systems reliability and improved bounds on system reliability.
2. Derive the expression of limiting availability in terms of mean functioning period and mean repair period for a coherent system.
3. Distinguish between component reliability and system reliability.
4. What are replacement policies.
5. Show that $G(2, \lambda)$ IS NBU distribution.

SECTION-B

Answer the following

questions (each question carries ten marks)

2x10 = 20

1. Show that for an item of exponential up time between failures availability and average availability over $[0, t_0]$ are decreasing functions of t_0 .
2. Show that component redundancy is better than system redundancy with standard notation and give an example.

Name of the Faculty: Sr. Prof. N.Ch. Bhattacharyulu

Department of Statistics, U.C.S, O.U

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INTERNAL ASSIGNMENT QUESTION PAPER

COURSE: M.Sc. (Statistics) IV Semester

Paper-III: ADVANCED MACHINE LEARNING TECHNIQUES

SECTION-A

Answer the following short questions (each question carries two marks)

5 x2 = 10

1. Why is it important to identify the correct measurement scale before applying statistical methods?
2. Define Decision Stump. In which algorithm is it commonly used?
3. Why is Lift considered more informative than Confidence in association rule mining?
4. What is an activation function? Mention its properties.
5. Explain a scenario where a decision tree would provide more interpretable results than clustering.

SECTION-B

Answer the following questions (each question carries ten marks)

2x10 = 20

1. Distinguish between Hard Margin SVM and Soft Margin SVM.
2. List and explain the three fundamental components of a Hidden Markov Model.

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INTERNAL ASSIGNMENT QUESTION PAPER

COURSE: M.Sc. (Statistics) IV Semester

Paper-IV: ADVANCED OPERATIONS RESEARCH

SECTION-A

Answer the following short questions (each question carries two marks)

5 x 2 = 10

1. What is the principle of optimality in dynamic programming? Explain with an example.
2. A company must allocate 10 units of resources among 3 projects. The profit obtained from each project depends on resources allocated. Determine the optimal allocation.
3. A hospital wants to minimize the waiting time and operating cost. Formulate a goal programming model to achieve these goals.
4. Why is convexity important in non-linear programming?
5. What is Lagrange multiplier? Why it is used?

SECTION-B

Answer the following questions (each question carries ten marks)

2x10 = 20

1. Show how the functional equation technique of dynamic programming can be used to determine the shortest route when it is constrained to pass through a set of specified nodes, which is a definite subset of the set of nodes of a given network.
2. Solve the non-linear programming problem

$$\text{Maximize } Z = x_1^2 + 2x_2$$

subject to

$$x_1 + x_2 \leq 4$$

$$x_1, x_2 \geq 0$$