Assignment MST-026

for

M.Sc. (Applied Statistics) (MSCAST)

Valid from January 2025 to December 2025

SCHOOL OF SCIENCES
Indira Gandhi National Open University
New Delhi - 110068

Dear Learner,

Welcome to the M.Sc. (Applied Statistics) Programme.

As per the university guidelines, you need to complete the assignment for each theory course. Note that there are no assignments for lab courses in the MSCAST programme, namely, MSTL-011, MSTL-012, MSTL-013, MSTL-014, and MSTL-015. You should remember that writing answers to an assignment's questions will improve your writing skills and prepare you for the term-end examination.

It is compulsory to submit the assignments within the stipulated time to be eligible to appear in the term-end examination. You will not be allowed to appear for the term-end examination for a course if you do not submit the assignment for that course by the due date. As per the University guidelines, if you appear in the term-end examination of a course without submitting its assignment, the result of the term-end examination is liable to be cancelled/ withheld.

The assignments constitute the continuous component of the evaluation process and have 30% weightage in the final grading.

Before you write the assignments, you are advised to first go through the self-learning material for that course and then prepare the assignments carefully by following the instructions pertaining to the assignments. Your responses should not be a verbatim reproduction of the textual materials provided for self-learning purposes, but it should be in your own words.

If you have any doubts or problems pertaining to the course material and assignments, contact the programme in charge or the academic counsellor at your study centre. If you still have problems related to this assignment, feel free to contact the course coordinator.

Wishing you all the best in successfully completing the programme.

(Dr. Rajesh)
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Mob. No. : 9416413104/8860416548

Instructions:

- Submit the assignments within the stipulated time. Otherwise, you will not be permitted to appear for the term-end examination.
- Solve the latest assignments uploaded for the current year/session.
- Read the instructions related to the assignments mentioned in the Programme Guide.
- Use only A-4 size paper to write your responses. It is mandatory to write all assignments neatly in your own handwriting. Typed or printed copies of the assignments will not be accepted. Note that you may use the printout only if a question specifically asks for the output of a program in MST-015 and MST-024.
- All questions given in the assignments are compulsory for each course.
- Express your response in your own words. You are advised to restrict your response based on the marks assigned to it. This will also help you to distribute your time in writing or completing your assignments on time.
- Securely fasten multiple pages together (you can staple or tie them) and number them carefully for each assignment separately.
- Do not forget to enclose the assignment question sheet of that course after the cover page of the assignment response (answer sheets). It is not compulsory to write each question separately before answering the question. Mention the question number for each answer.
- The solved assignment must be submitted at the Study Centre allotted to you before the due date set by the University. Please check the IGNOU website for updated information regarding the due date of assignment submission.
- You are advised to mention all information on the first page of the assignment response sheet, given on the next page.
- **Keep a copy of the assignment answer sheets with you before submission for future reference.**

ASSIGNMENT CODE: MST-026/TMA/2025

NAME: _____

ENROLLMENT NO: _____

ADMISSION CYCLE: _____

PROGRAMME CODE: MSCAST

COURSE CODE: MST-026

COURSE TITLE: INTRODUCTION TO MACHINE LEARNING

REGIONAL CENTRE CODE: _____

STUDY CENTRE CODE: _____

ADDRESS: _____

_____

_____

CONTACT NUMBER: _____

EMAIL ID: _____

DATE OF SUBMISSION: _____

School of Sciences

Indira Gandhi National Open University

Maidan Garhi, New Delhi-110068 (INDIA)

TUTOR MARKED ASSIGNMENT

MST-026: Introduction to Machine Learning

Course Code: MST-026

Assignment Code: MST-026/TMA/2025

Maximum Marks: 100

Note: All questions are compulsory. Answer in your own words.

1. Explain each of the following with an example

- Supervised Learning,
- Unsupervised learning,
- Reinforcement Learning,
- Semi-supervised. **(7+6+6+6)**

2. What is the role of loss function in machine learning algorithms? Explain any two commonly used loss functions in machine learning algorithms. **(25)**

3. If the input vectors are $I_1 = \begin{bmatrix} -1 \\ 0 \end{bmatrix}$, $I_2 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, $I_3 = \begin{bmatrix} \sqrt{2} \\ 1/\sqrt{2} \end{bmatrix}$ and initial values of three weight vectors are $\begin{bmatrix} 0 \\ -1 \end{bmatrix}$, $\begin{bmatrix} -2/\sqrt{5} \\ 1/\sqrt{5} \end{bmatrix}$, $\begin{bmatrix} -1/\sqrt{5} \\ 2/\sqrt{5} \end{bmatrix}$, then calculate the resulting weight found after training the competitive layer with Kohonen's rule and a learning rate α of 0.5 on the input-series in order I_1, I_2 and I_3. **(25)**

4. Consider the following table for the connections between the input neurons and the hidden layer neurons.

Input neuron	Hidden layer neurons	Connection weights
1	1	1
1	2	0.1
1	3	–1
2	1	1
2	2	–1
2	3	–1
3	1	0.2
3	2	0.3
3	3	0.6

The connections weights from Hidden layer neurons to the output neurons are 0.5, 0.3 and 0.6 for first, second and third neurons respectively corresponding threshold value for output layer is 0.5 and for hidden layer 1.8, 0.05 and – 0.2 for first, second and third neuron respectively,

(a) Draw the diagraph of the network.
(b) Write the results of activation and interpret. **(25)**