Assignment MST-021

for

M.Sc. (Applied Statistics) (MSCAST)

Valid from January 2025 to December 2025

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.

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Mob. No. : 9013873713

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-021/TMA/2025

NAME: _____

ENROLLMENT NO: _____

ADMISSION CYCLE: _____

PROGRAMME CODE: MSCAST

COURSE CODE: MST-021

COURSE TITLE: CLASSICAL AND BAYESIAN INFERENCE

REGIONAL CENTRE CODE: _____

STUDY CENTRE CODE: _____

ADDRESS: _____

_____

_____

CONTACT NUMBER: _____

EMAIL ID: _____

DATE OF SUBMISSION: _____

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THE PEOPLE'S
UNIVERSITY

School of Sciences
Indira Gandhi National Open University
Maidan Garhi, New Delhi-110068 (INDIA)

Course Code: MST-021
Assignment Code: MST-021/TMA/2025
Maximum Marks: 100

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

1(a) State whether the following statements are **True** or **False**. Give reasons in support of your answer: **(5×2=10)**

(i) If the form of the population is not known and data are in ordinal form then we apply the Wilcoxon Signed rank test for testing hypothesis about average.

(ii) The Neyman-Pearson lemma provides the most powerful test of size α for testing a simple hypothesis against a simple alternative hypothesis.

(iii) The Rao-Blackwell theorem enables us to obtain a manimum variance unbiased estimator through complete statistic.

(iv) For testing goodness of fit when the data are in categorical form, we use K-S test.

(v) In the Bayesian approach, we treat the parameter as a constant.

(b) Differentiate between Rao-Blackwell and Lehmann-Scheffe theorems. **(10)**

2. A faculty member of a university receives a number of emails. If X represents the number of spam emails in n emails and follows a binomial distribution with parameters (n, θ) where θ is the probability of getting spam email, then find the posterior distribution of θ considering the following beta distribution.

$$f(\theta) = \frac{1}{\beta(a,b)} \theta^{a-1} (1-\theta)^{b-1} \quad 0 \le \theta \le 1, a, b > 0$$

Also, find the posterior mean of θ. **(20)**

3. A food processing company packages 10 gm of honey in small jars. Previous experience suggests that the volume of a randomly selected jar of the company's honey is normally distributed with a known variance of 2 gm. Drive likelihood ratio test for testing

$$H_0 : \mu = 10 \text{ against } H_1 : \mu \ne 10$$

at a α level of significance. Given $\left[P\left[-\infty < Z < 1.64 \right] = 0.95 \right]$ **(20)**

4. If the number of weekly accidents occurring on a mile stretch of a particular road follows a Poisson distribution with parameter λ. Then

(i) Find the Cramer-Rao lower bound for the variance.

(ii) Also, find the UMVUE of λ. **(20)**

5. The following data give the sales of 6 models of mobiles at four different stores. The sales of each mobile (in number of mobiles sold) from each store are given as follows:

Store A	Store B	Store C	Store D
58	74	35	78
55	57	51	85
38	65	41	62
63	48	52	75
41	83	54	87
50	61	53	57

Test whether there is a significant difference in the sales of the four stores by using the Kruskal Wallies test at 1% level of significance (Given $\left(\chi^2_{(3),0.01} = 11.34\right)$ **(20)**