ASSIGNMENT BOOKLET

Post Graduate Diploma in Applied Statistics

(Specialisations in Industrial Statistics/Biostatistics)

MST-004: Statistical Inference

(Valid from 1st January 2026 to 31st December, 2026)

It is compulsory to submit the assignment before filling the Examination Form. Candidates should submit the latest assignment for the courses for which they filled the examination form. Only Work books/Lab Record Books are needed to be submitted for the Lab Courses.

School of Sciences
Indira Gandhi National Open University
Maidan Garhi, New Delhi-110068
(2026)

Dear Student,

Please read the information on assignments in the Programme Guide that we have sent you after your enrolment. A weightage of 30%, as you are aware, has been earmarked for continuous evaluation, **which would consist of one tutor-marked assignment** for this course. The assignment for the theory course MST-004 has been given.

Instructions for Formatting Your Assignments

Before attempting the assignment, please read the following instructions carefully:

1) On top of the first page of your answer sheet, please write the details exactly in the following format:

ENROLLMENT NO :……………………………………………

NAME :……………………………………………

ADDRESS :……………………………………………

……………………………………………

……………………………………………

PROGRAMME CODE: PGDAST

COURSE CODE: MST-001

COURSE TITLE: FOUNDATION IN MATHEMATICS AND STATISTICS

STUDY CENTRE: ………………………..……. DATE: ………………….……………...

PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.

2) Use only foolscap size writing paper (but not of very thin variety) for writing your answers.

3) Leave 4 cm margin on the left, top and bottom of your answer sheet.

4) Your answers should be precise.

5) This assignment is to be submitted at the Study Centre.

   We strongly suggest that you should retain a copy of your answer sheets.

6) This assignment is valid from January 1st, 2026 up to December 31, 2026.

7) The latest assignments should be submitted by the candidate.

8) **You cannot fill the Exam Form for this course** till you have submitted this assignment. So solve it and **submit it to your study centre at the earliest.** If you wish to appear in the **TEE, June 2026,** you should submit your TMAs by **March 31, 2026.** Similarly, If you wish to appear in the **TEE, December 2026,** you should submit your TMAs by **September 30, 2026.**

We wish you good luck.

TUTOR MARKED ASSIGNMENT

MST-004: Statistical Inference

Course Code: MST-004

Assignment Code: MST-004/TMA/2026

Maximum Marks: 100

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

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

(a) The Wilcoxon rank-sum test is a non-parametric alternative to the two-sample t-test when normality is not assumed.

(b) The power of a statistical test is the probability of accepting the null hypothesis when it is true.

(c) If the sample size tends to infinity, the variance of a consistent estimator must tend to zero.

(d) In the method of moments, population moments are equated to corresponding sample moments.

(e) The chi-square distribution is symmetric for all degrees of freedom.

2. A school caretaker looks after 6 children. The ages (in years) of the children are given below:

Child	Age (in years)
Meena	5
Aarav	4
Nisha	6
Kabir	4
Pooja	5

(i) What is the nature (type) of the population of the ages of children?

(ii) Construct the sampling distribution of the sample mean for all possible samples of size n = 2.

(iii) Comment on whether the sampling distribution is approximately normal.

(iv) Find the mean and standard error of the sampling distribution. **(20)**

3. Let $X_1, X_2, \ldots, X_n$ be a random sample from a population with mean μ and variance σ^2. Consider the estimator

$$\hat{\mu} = \frac{1}{n}\sum_{i=1}^{n} X_i + 2$$

(i) Find the bias of the estimator $\hat{\mu}$.

(ii) Find the variance of $\hat{\mu}$.

(iii) Check whether it is more efficient than sample mean. **(20)**

4. A survey was conducted to study the preference for online learning among students from urban and rural areas. Out of 300 urban students, 210 preferred online learning, while out of 250 rural students, 150 preferred online learning. Construct a 95% confidence interval for the difference between the population proportions of students preferring online learning in urban and rural areas. **(10)**

5. A researcher wants to compare the average test scores of students taught using Method A and Method B. A random sample of students was selected from each group, and their scores are given below:

Student	Method A	Method B
1	68	72
2	74	75
3	71	78
4	69	70
5	73	76
6	70	74
7	72	77
8	75	79

Assuming that the populations are normally distributed with equal variances. For testing whether there is a significant difference between the mean scores of the two teaching methods at the 5% level of significance

(i) State the null and alternative hypotheses.

(ii) Name the appropriate and justify your choice.

(iii) Compute the test statistic and critical value.

(iv) State your conclusion. **(20)**

6. Let $X_1, X_2, \ldots, X_n$ be a random sample from the Exponential distribution with pdf

$$f(x;\theta) = \theta e^{-\theta x}, x > 0,\ \theta > 0$$

(i) Obtain the maximum likelihood estimator (MLE) of θ.

(ii) Hence, find the maximum likelihood estimate of θ for the observed sample: **(10)**

$$2.1,\ 1.6,\ 3.4,\ 0.9,\ 2.5$$

7. Describe the following:

(i) t-distribution

(ii) General procedure of Testing of hypothesis **(5+5)**