

# **ASSIGNMENT BOOKLET**

## **Post Graduate Diploma in Applied Statistics** (Specialisations in Industrial Statistics/Biostatistics)

**MSTE-003**

(Valid from 1<sup>st</sup> January 2025 to 31<sup>st</sup> December, 2025)

**It is compulsory to submit the assignment before filling the Examination Form. Candidate should submit the latest assignment for the course for which they filled the examination form. Only Workbooks/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**  
**(2025)**

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 MSTE-003 has been given in this booklet.

### 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:

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ENROLLMENT NO :.....

NAME :.....

ADDRESS :.....

.....

.....

PROGRAMME CODE: .....

COURSE CODE: .....

COURSE TITLE: .....

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

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**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 1<sup>st</sup>, 2025 up to December 31, 2025.
- 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 2025**, you should submit your TMAs by **March 31, 2025**. Similarly, If you wish to appear in the **TEE, December 2025**, you should submit your TMAs by **September 30, 2025**.

We wish you good luck.

## TUTOR MARKED ASSIGNMENT

### MSTE-003: Biostatistics-I

Course Code: MSTE-003

Assignment Code: MSTE-003/TMA/2025

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: (2×5=10)
  - (a) Suppose A is the exposure, and B is a confounding factor for outcome C, then there will be a path from A to C via B.
  - (b) Doing exercise may also be a regimen.
  - (c) In clinical trials, a control only may be: treatment or no treatment.
  - (d) In Greville's method, the central death rate is more in the life table than the population.
  - (e) In a slope ratio assay, both regression lines have common slope.
2. Explain with examples:
  - (a) Various sources of demographic data in India
  - (b) Types of bioassays
  - (c) LD50 and ED50 (5+5+5)
- 3.(a) Differentiate between complete and abridged life tables.
  - (b) The data on population and number of deaths for different age groups of Districts A and B in the year 2001 were collected in the following table:

Age Group (Years)	District A		District B	
	Population	No. of Deaths	Population	No. of Deaths
0 - 5	55,300	385	51,165	805
5 –15	109,125	410	98,170	510
15-35	1,72,050	675	1,68,450	790
35-50	1,15,600	1625	1,40,625	990
50 & above	2,65,775	3288	2,40,900	2485

Calculate standardised death rate by direct method, taking population of District A as the standard population. (5+5)

4. In a parallel-line assay, total 18 guinea pigs, 4 guinea pigs each from 3 different breeds were selected and classified into 4 groups for each breed. Two groups were administered with two doses of the standard preparation and remaining two groups with two doses of the test preparation. The responses of these doses are recorded in the following table:

	Dose (Standard)			Dose (Test)		
Breed	10 (in $\mu\text{L}$ )	15 (in $\mu\text{L}$ )	20 (in $\mu\text{L}$ )	5 (in $\mu\text{L}$ )	10 (in $\mu\text{L}$ )	15 (in $\mu\text{L}$ )
1	25	42	55	20	43	64
2	23	47	52	23	42	66
3	22	38	58	24	44	67

- Determine the dose-response regression models for both preparations.
- Test whether the dose-response curves of both preparations are linear and parallel to each other or not.
- Interpret whether the relative potency and its confidence interval can be computed or not.

(8+15+2)

- 5.(a) If  $D^+$  and  $D^-$  denote presence and absence, respectively, of a disease and  $T^+$  and  $T^-$  denote test result as positive and negative, respectively, then on the basis of the following information:

	$D^+$	$D^-$	Total
$T^+$	145	2000	2145
$T^-$	15	48000	48015
Total	160	50000	50160

Find: (i) sensitivity (ii) specificity (iii) positive and negative predictive values.

- (b) Obtain sample size for the following given information:

$$\delta = 0.04, \pi_1 = 0.72, \pi_2 = 0.84, \alpha = 0.01, \beta = 0.25$$

(5+5)

- 6.(a) Explain design and analysis of data of case control study in detail.

- (b) Creatinine excretion is a parameter of kidney function. Generally speaking, lower values indicate better health. This depends on body weight. A researcher conducted a study on creatinine excretion in test group and control group to find the efficacy of a new drug. The subjects were randomly divided. He included 100 subjects in each group but for this exercise consider only 10 subjects in each group. The data obtained on creatinine level in these 10 subjects are as follows:

Test group: 16.6 19.8 17.1 17.0 15.6 20.3 24.7 18.5 17.6 22.0

Control group: 23.2 22.0 21.9 16.7 14.2 23.2 24.8 25.5 28.1 21.8

Do you think that creatinine excretion was really lower in the test group on average?

(15+5)

7. Suppose you try a regimen A on 1000 subjects and regimen B on 1600 subjects. Results of the trial show that the efficacies of regimen A and B are 76% and 82% respectively. Suppose the doctor determines 4% as a superiority margin. Can you consider regimen B as superior to regimen A.

(10)