ASSIGNMENT BOOKLET

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

MST-003: Probability Theory
(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-003 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:

<div align="center">

ENROLLMENT NO :…………………………………………

NAME :…………………………………………

ADDRESS :…………………………………………

…………………………………………

…………………………………………

</div>

PROGRAMME CODE: <u>PGDAST</u>

COURSE CODE: <u>MST-003</u>

COURSE TITLE: <u>PROBABILITY THEORY</u>

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-003: Probability Theory

Course Code: MST-003   Assignment Code: MST-003/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 a reason in support of your answer.

(2+3+3+2)

   (a)   If events A, B and C are three mutually exclusive and exhaustive events, then it is possible that P(A) = 1/3, P(B) = 1/4 and P(C) = 5/12.

   (b)   If X is a discrete random variable, then X cannot take countably infinite values.

   (c)   If X is a standard normal variate, then $P(-0.8 \le X \le 0.8) = 0.5763$.

   (d)   If random variables X and Y follow Bernoulli distributions with parameters 1/2 and 1/3 respectively then the random variable X + Y also follows a Bernoulli distribution with parameter 5/6.

2.   If a problem is randomly selected from a particular book, then probability that students A, B and C can solve the problem are 1/2, 1/3 and 1/4 respectively. If a problem is selected randomly from this book and given to the students A, B and C then what is the probability that problem is solved. They solve the problem independently. **(10)**

3.   A factory produces certain type of output by 3 machines. The respective daily production figures are- machine X : 4500 units, machine Y: 2000 units and machine Z: 3500 units. Past experience shows that 2% of the output produced by machine X is defective. The corresponding fractions of defectives for the other two machines are 5 and 10 percent respectively. An item is drawn from the day's production. If the drawn item is found to be defective, what is the probability that it has been produced by machine Y?

(10)

4.   Find the probability that a third child in a family is the family's second daughter, assuming the male and female are equally probable. **(10)**

5.   Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the expected value for the number of kings. **(10)**

6.   Three unbiased coins are tossed simultaneously. In which of the following cases are the events A and B independent?

   (i)   A be the event of getting exactly one tail

        B be the event of getting exactly one head

   (ii) A be the event that first coin shows tail

        B be the event that third coin shows head

(10)

7.   Write any 10 characteristics of normal distribution. **(20)**

8. Four coins were tossed and number of heads noted. The experiment is repeated 200 times. The number of tosses showing 0, 1, 2, 3 and 4 heads were found distributed as under. Fit a binomial distribution to these observed results assuming that the nature of the coins is not known. **(20)**

Number of heads:	0	1	2	3	4
Number of tosses	15	35	90	40	20