BSTM-162

ASSIGNMENT BOOKLET

ELEMENTARY PROBABILITY AND PROBABILITY DISTRIBUTIONS

Valid from 1st Jan, 2026 to 31st Dec, 2026

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

(2026)

Dear Student,

Please read the section on assignments in the Programme Guide that we sent you after your enrolment. A weightage of 30 per cent, as you are aware, has been earmarked for continuous evaluation, **which would consist of one tutor-marked assignment** for this course. The assignment is 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:

ROLL NO.: ……

NAME: ……

ADDRESS: ……

……

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COURSE CODE: …….

COURSE TITLE: …….

ASSIGNMENT NO.: ……..…

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) While solving problems, clearly indicate which part of which question is being solved.

6) This assignment is **valid from 1st Jan, 2026 to 31st Dec, 2026**. If you have failed in this assignment or fail to submit it by Dec, 2026, then you need to get the assignment for the year 2027, and submit it as per the instructions given in the Programme Guide.

7) **You cannot fill the examination form for this course** until you have submitted this assignment.

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

We wish you good luck.

Assignment
(To be done after studying all the blocks)

Course Code: BSTM-162
Assignment Code: BSTM-162/TMA/2026
Maximum Marks: 100

1. Which of the following statements are ***True*** or ***False***? Give short proof or counter example in support of your answer: (5x4 = 20)

   (a) A woman has seven friends. The number of ways she may invite one or more friend(s) for lunch is 128.

   (b) Let $\Omega = \{a, b, c, d\}$ be a sample space with a, b, c, d being different outcomes. Outcome a is two times as likely as outcome b; outcome b is four times as likely as outcome c; outcome c is two times as likely as outcome d. Then $\mathcal{P}(\text{getting outcome d}) = \frac{1}{27}$.

   (c) A random variable X has PMF $p_X : \Omega \to \mathbb{N}$ defined as

   $$f(x) = \begin{cases} \frac{c}{10^x}; & x = 1, 2, 3, 4, \ldots \\ 0; & \text{otherwise} \end{cases}$$ where c is a real constant

   Value of c is 10/9.

   (d) A random variable X has PDF defined as

   $$f(x) = \begin{cases} \lambda e^{-\lambda x}; & x \geq 0 \\ 0; & \text{otherwise} \end{cases}$$

   If median of the random variable is 2 then value of $\lambda = \frac{1}{2}$.

2. In a room there are n people who are randomly selected from a population. Find the probability of sharing a birthday. Assume that birth rate is uniform throughout the year and all people born in non-leap years. (20)

3. A random variable X has distribution function

$$F_X(x) = \begin{cases} 0; & \text{if } x < 0 \\ \frac{x^2}{2}, & \text{if } 0 \leq x < 1 \\ \frac{2}{3}, & \text{if } 1 \leq x < 2 \\ \frac{3}{4}, & \text{if } 2 \leq x < 3 \\ 1, & \text{if } x \geq 3 \end{cases}$$

Find the following probabilities: (20)

(a) $\mathcal{P}(X \leq 1)$ (b) $\mathcal{P}(X < 1)$ (c) $\mathcal{P}(X = 1)$ (d) $\mathcal{P}(X \leq 1)$ (e) $\mathcal{P}(X < 2)$

(f) $\mathcal{P}(X = 2)$ (g) $\mathcal{P}(X > 2)$ (h) $\mathcal{P}(2 < X \leq 4)$

4. Of three types of spark plugs 6% of type A spark plugs are defective, 4% of type B spark plugs are defective and 2% of type C spark plugs are defective. A spark plug is selected at random from a batch of spark plugs containing 50 Type A plugs, 30 Type B plugs and 20 Type C plugs. The selected plug is found to be defective. What is the probability that the selected plug was Type A? (20)

5. On a 100-marks exam, the grades were normally distributed with mean 75 marks and variance 100. How should the curve be set so that the top 20% get A's? (20)