

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 assignments for the theory courses MST-001 to MSTE-004 have 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:

ENROLLMENT NO :

NAME :

ADDRESS :

.....

.....

PROGRAMME CODE:

COURSE CODE:

COURSE TITLE:

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, 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-001: Industrial Statistics-I

Course Code: MSTE-001

Assignment Code: MSTE-001/TMA/2025

Maximum Marks: 100

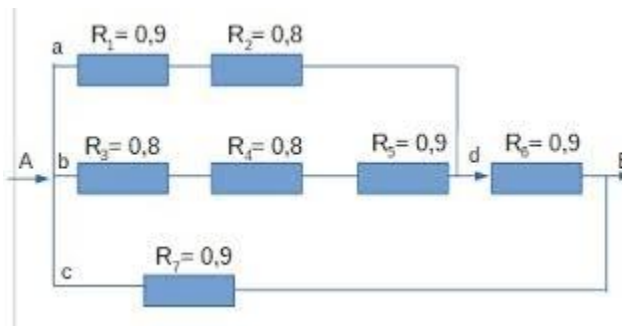
Note: All questions are compulsory. Answer in your own words.

1. State whether the following statements are **True** or **False**. Give reason in support of your answer: (5×2=10)
 - (a) Statistical quality control (SQC) is a technique of process control only.
 - (b) Twenty pieces of different length of cloth contained 2, 4, 1, 3, 5, 4, 2, 7, 3, 5, 2, 2, 4, 5, 6, 4, 2, 1, 2, 4 defects respectively. To check the process is under control with respect to the number of defects, we should use np-chart.
 - (c) If the probabilities are not associated with the occurrence of different states of nature, then the situation is known as decision making under risk.
 - (d) In single sampling plan, if we increase acceptance number then the OC curve will be steeper.
 - (e) A system has four components connected in parallel configuration with reliability 0.2, 0.4, 0.5, 0.8. To improve the reliability of the system most, we have to replace the component which reliability is 0.2.
2. Twenty samples each of size 10 were inspected. The number of defectives detected in each of them is given below: 0, 1, 0, 3, 9, 2, 0, 7, 0, 1, 1, 0, 0, 3, 1, 0, 0, 2, 1, 0 Find the control limits for the number of defectives and establish quality standards for the future. Plot the graph and interpret. (10)
3. A manufacturer of men's jeans purchases zippers in lots of 500. The jeans manufacturer uses single-sample acceptance sampling with a sample size of 10 to determine whether to accept the lot. The manufacturer uses $c = 2$ as the acceptance number. Suppose 3% nonconforming zippers are acceptable to the manufacturer and 8% nonconforming zippers are not acceptable. Let incoming quality be 4%.
 - i) Construct an OC curve.
 - ii) Average outgoing quality (AOQ), if the rejected lots are screened and all defective zippers are replaced by non-defectives.
 - iii) Average total inspection (ATI). (6+2+2)
4. An office supply company ordered a lot of 400 printers. When the lot arrives the company inspector will randomly inspect 12 printers. If more than three printers in the sample are non-conforming, the lot will be rejected. If fewer than two printers are non-conforming, the lot will be accepted. Otherwise, a second sample of size 8 will be taken. Suppose the inspector finds two non-conforming printers in the first sample and two in the second sample. Also AQL and LTPD are 0.05 and 0.10 respectively. Let incoming quality be 4%.
 - i) What is the probability of accepting the lot at the first sample?
 - ii) What is the probability of accepting the lot at the second sample?
 - iii) Find AQL and ATI (15)

5. A two-person zero-sum game having the following payoff matrix for player A

		Player B				
		I	II	III	IV	V
Player A	I	2	4	3	8	4
	II	5	6	3	7	8
	III	6	7	9	8	7
	IV	4	2	8	4	3

- (i) Check whether saddle point exist or not.
- (ii) If saddle point does not exist then determine optimal strategies for both the manufacturers and value of the game. (2+8)
6. A system has seven independent components and reliability block diagram of it shown below:



Find reliability of the system. (10)

7. The failure data for 40 electronic components is shown below:

Operating Time (in hours)	0-5	5-10	10-15	15-20	20-25	25-30
Number of Failures	5	7	6	4	5	4
Operating Time (in hours)	30-35	35-40	40-45	45-50	≥50	
Number of Failures	4	0	2	1	2	

Estimate the reliability, cumulative failure distribution, failure density and failure rate functions. (15)

8. At a call centre, callers have to wait till an operator is ready to take their call. To monitor this process, 5 calls were recorded every hour for the 8-hour working day. The data below shows the waiting time in seconds:

Time	Sample Number				
	1	2	3	4	5
9 a.m	8	9	15	4	11
10	7	10	7	6	8
11	11	12	10	9	10
12	12	8	6	9	12

1 p.m.	11	10	6	14	11
2	7	7	10	4	11
3	10	7	4	10	10
4	8	11	11	11	7

- i) Use the data to construct control charts for mean and variability and comments about the process. If process is out of control, then calculate the revised control limits.
- ii) If the specification limits as the 8 ± 2 , then find the process capability. Does it appear that the process is capable of meeting the specification requirements?

(20)