BT-8/M-20 **38173**

QUALITY ASSURANCE AND RELIABILITY

Paper–ME-406-N

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. Discuss the statement, "Higher quality of design means higher costs" quite often it also means higher values.

   15

2. What do you mean by manufacturing planning for quality? State the quality aspects of planning for manufacture. 15

UNIT–II

3. The mean and the standard deviation of a sample of 100 observations was calculated as 40 and 5.1 respectively. While comparing with the original data it was found that by mistake of a figure of 40 was miscopied as 50 for one observation. Calculate the correct mean and standard deviation of the sample.

   15

4. In a capacity study of a lathe used in turning a shaft to a diameter of 23.75 ± 0.1 mma sample of 6 consecutive pieces was taken each day for 8 days. The diameters of these shafts are as given below :

Ist day	2nd day	3rd day	4th day
23.77	23.80	23.77	23.79
23.80	23.78	23.78	23.76
23.78	23.76	23.77	23.79
23.73	23.70	23.77	23.74
23.76	23.81	23.80	23.82
23.75	23.77	23.74	23.76

5th day	6th day	7thday	8thday
23.75	23.78	23.76	23.76
23.78	23.76	23.78	23.79
23.78	23.73	23.75	23.77
23.77	23.76	23.76	23.72
23.76	23.74	23.81	23.78
23.79	23.78	23.80	23.78

Calculate the $\overline{X}$ and R chart and find out the process capability for the machine. 15

UNIT–III

5. In a factory producing spark plug. The number of defective found in inspection of 20 lots of 100 each, is given below :

Lot No.	No. of defectives	Lot No.	No. of defectives
1	5	11	4
2	10	12	7
3	12	13	8
4	8	14	3
5	6	15	3
6	4	16	4
7	6	17	5
8	3	18	8
9	3	19	6
10	5	20	10

(a) Construct appropriate control chart and state whether the process is in Statistical control.

(b) Determine the sample size when a quality limit not worse than 9% is desirable and a 10% bad product will not be permitted more than three times in thousand. 15

6. What is an item by item sequential sampling plan? Explain stating its applications. 15

UNIT–IV

7. (a) It is desired to have a reliability of atleast 0.9900 for a specified service period of 8000 hours on the assumption of a uniform failure rate. What is the least value of q that will yield this desired realibility? 8

    (b) What are the basic elements of reliability? 7

8. Write notes on the following :

    (a) Element redundancy. 8

    (b) Reliability of series connected system. 7