



10ME668

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Statistical Quality Control

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Use of SQC tables are permitted.

PART - A

- 1 a. Distinguish between: i) Quality and Reliability ii) Inspection and quality control. (06 Marks)
 b. Explain four categories of quality costs. (06 Marks)
 c. Explain briefly the different dimensions of quality. (08 Marks)
- 2 a. Explain Mean, Median, Mode and standard deviation with an example. (06 Marks)
 b. With a neat sketch explain Deming's Funnel experiment. (04 Marks)
 c. What are the characteristics of a normal distribution curve? (04 Marks)
 d. Assuming that the life in hours of a bulb is a random variable following normal distribution with mean of 2000 hours and standard deviation of 400 hrs. find the expected number of bulb from a random sample of 2000 bulbs having life i) More than 3000 hours ii) Between 2600 and 2800 hours. (06 Marks)
- 3 a. Distinguish between chance causes and assignable causes of variation with an example. (05 Marks)
 b. Explain the objective control charts. (05 Marks)
 c. Explain briefly the analysis of pattern on control charts and warning limits. (10 Marks)
- 4 a. What are the limitation of \bar{X} and R charts? (04 Marks)
 b. Explain Type I and Type II errors. (04 Marks)
 c. Following data were obtained over 100 days period to initiate \bar{X} and R charts. The sub group size is 5 and two subgroups were taken/day.

Sample No	\bar{X}	R	Sample No	\bar{X}	R
1	177.6	23	11	179.8	9
2	176.6	8	12	176.4	8
3	178.4	22	13	178.4	7
4	176.6	12	14	178.2	4
5	177.0	7	15	180.6	6
6	179.4	8	16	179.6	6
7	178.6	15	17	177.8	10
8	179.6	6	18	178.4	9
9	178.8	7	19	181.6	7
10	178.2	12	20	177.6	10

- i) Determine trail control limits for \bar{X} and R charts. Construct the charts.
- ii) What conclusions can you draw about the statistical control from observation and control charts?
- iii) Determine process capability. (12 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

= 4 FEB 2020

PART – B

- 5 a. Explain process capability and the method of estimating it. (06 Marks)
 b. Define C_p and C_{pk} . (04 Marks)
 c. \bar{X} and R control charts have been initiated and maintained for 50 sub grouping 5 each with samples taken from production every 2 hrs. Specification requirements for the measured quality are 119 ± 10 and standard deviation of 5. Assuming that it is normally distributed, approximately what percentage of defective product is being produced? How much of this can be reworked? Also find C_p and C_{pk} (10 Marks)
- 6 a. Distinguish between defect and defective with an example. (06 Marks)
 b. Compare control charts for variables and control charts for attributes. (06 Marks)
 c. A factory is producing spark plugs. The number of defectives found in inspection of 20 lots of 100 each in given below :

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

Construct an appropriate control chart and state whether it process is under control or not. (08 Marks)

- 7 a. State and explain the advantages and disadvantages of acceptance sampling over 100% inspection. (06 Marks)
 b. Explain double sampling plan with a flow chart. (08 Marks)
 c. Explain the characteristics OC curve. (06 Marks)
- 8 a. What is EWMA control chart? Explain. (10 Marks)
 b. Explain briefly the basic principle of construction of CUSUM control chart. (10 Marks)

= 4 FEB 2020,