

5E6204

Roll No. _____

Total No of Pages: **3**

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B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015

Mechanical Engineering

5ME4A Quality Assurance and Reliability

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks Main: 26

Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. Data Tables

2. NIL

UNIT-I

Q.1 Discuss the following in detail:

[4×4=16]

- (a) Dimensions of quality
- (b) History of quality
- (c) Quality improvements
- (d) Quality control

OR

Q.1 (a) What do you understand by probability distribution?

[8]

(b) Construct an OC curve for the sampling plan where the lot size is 2000, the sample size is 50, and the acceptance number is 2.

[8]

[5E6204]

Page 1 of 3

[10700]

UNIT-II

- Q.2 (a) Explain X-bar and R charts with suitable examples. [8]
 (b) How patterns on control chart are analysed? [8]

OR

- Q.2 (a) Discuss the seven major statistical quality control problem solving tools. [8]
 (b) The thickness of the magnetic coating on audio tapes is an important characteristic. Random samples of size 4 are selected, and the thickness is measured using an optical instrument. Table-1 shows the standard deviation for 20 samples. The specifications are 38 ± 14.5 microns. If a coating thickness is less than the specifications called for, the tape can be used for a different purpose by running it through another coating operation. Draw an S-chart with control limits.

Table -1

Sample	1	2	3	4	5	6	7	8	9	10
Standard Deviation	4.6	3.7	5.2	4.3	4.4	3.9	5.0	6.1	4.1	5.8
Sample	11	12	13	14	15	16	17	18	19	20
Standard Deviation	5.3	3.5	4.7	5.6	5.0	4.1	5.6	4.8	4.7	5.4

[8]

UNIT-III

- Q.3 (a) Discuss the process capability analysis using Histogram. [8]
 (b) The number of non-conformities in carpets is determined for 20 samples, but the amount of carpet inspected for each sample varies. Results of the inspection are shown in table-2. Construct a control chart for the number of nonconformities per $100m^2$. [8]

Table -1

Sample	1	2	3	4	5	6	7	8	9	10
Amount Inspected (m ²)	200	300	250	150	250	100	200	150	150	250
Number of Nonconformities	5	14	8	8	12	6	20	10	6	10
Sample	11	12	13	14	15	16	17	18	19	20
Amount Inspected (m ²)	300	250	200	250	100	200	200	100	300	200
Number of Nonconformities	9	16	12	10	6	8	5	5	14	8

OR

Q.3 Classify the control charts for fraction nonconforming. Explain them. [16]

UNIT-IV

Q.4 (a) Discuss quality rating and quality audit in detail. [8]
(b) What are the sampling methods? Explain in detail. [8]

OR

Q.4 (a) Discuss the sampling plans in detail. [8]
(b) Construct an AOQ curve for the sampling plan where the lot size is 2000, the sample size is 100, and the acceptance number is 3. [8]

UNIT-V

Q.5 (a) Explain maintainability and availability. Also explain Taguchi method. [8]
(b) Explain failure, its types and causes of failure. [8]

OR

Q.5 Discuss the following in detail: [4×4=16]
(a) Hazard rate
(b) Bath-tub curve
(c) MTTF
(d) Redundancy