

5E6204

Roll No. _____

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B. Tech. V Sem. (Main/Back) Exam., Nov.-Dec.-2016
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.

(Mentioned in form No. 205)

1. NIL

2. NIL

UNIT - I

- Q.1 (a) Discuss the importance of Quality Control in the success of an organization. Explain factors affecting quality. [8]
- (b) Define quality policy. Differentiate between Quality Control and Inspection. [8]

OR

- Q.1 (a) Explain normal and exponential probability distributions along with their applications. [8]
- (b) A process is known to produce 5% nonconforming items. A sample of 40 items is selected from the process. Determine the distribution of nonconforming item in the sample. Also find the probability of obtaining no more than 3 nonconforming items in the sample. [8]

UNIT - II

- Q.2 (a) What are the benefits of using control charts? Discuss the causes of variation in control charts. [8]

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- (b) The following data shows the number of defective items discovered in 10 items taken on 10 consecutive days of a month. Construct control chart for number of defects per units. [8]

Data	1	2	3	4	5	6	7	8	9	10
Defects/unit	1	2	4	16	4	3	5	20	16	4

OR

- Q.2 (a) What do you mean by process capability? Explain the objectives of an analysis of process capability. [8]
- (b) Explain the difference in interpretation of an observation on an \bar{X} chart and on an R chart. [8]

UNIT - III

- Q.3 (a) What are the advantages and disadvantages of Control Charts for Attributes. [8]
- (b) Discuss the different types of Quality Audits. What is the role of ISO-9000. [8]

OR

- Q.3 The number of nonconforming cables is found for 20 samples of size 100 as given. Construct a control chart for the proportion of nonconforming cables. Revise the control limits, assuming special causes for points outside the control limits. [16]

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

UNIT - IV

- Q.4 (a) What is the importance of the OC curve in the selection of sampling plans? Describe the impact of the sample size and the acceptance number on the OC curve. [8]
- (b) A sampling plan is desired to have a producer's risk of 0.05 at AQL = 0.9% and a consumer's risk of 0.10 at LQL = 6.5% of nonconforming. Find the single sampling plan that meets the consumer's stipulation. [8]

OR

- Q.4 (a) What do you understand by acceptance sampling? Describe briefly double sampling plan. [8]
- (b) Find a double sampling plan for lot size 3000 where it is desired to reject lots that are 2% nonconforming no more than 10% of the time. Assume that the size of the second sample is twice that of the first sample and that the consumer's stipulation is to be satisfied exactly. [8]

UNIT - V

- Q.5 (a) Discuss the role of reliability in quality control and improvement. What are the ways of improving reliability of a system? [8]
- (b) Explain the items in concept with reliability:- [8]
- (i) Failure Rate.
 - (ii) MTBF.
 - (iii) Weibull distribution.

OR

- Q.5 A sample of 12 electronic components is tested for 1000 h, with no replacement of failed components. The time to failure is exponentially distributed. Three components failed within the prescribed test time, the failure times being 650, 680 and 720 hr. Estimate the mean time to failure and the failure rate. Find a 90% confidence interval for the mean time to failure. [16]