

5E6204

Roll No. : _____

Total Printed Pages : **4****5E6204****B. Tech. (Sem. V) (Main/Back) Examination, November 2018****Mechanical Engg.****5ME4A Quality Assurance and Reliability****Time : 3 Hours****Total Marks : 80****Min. Passing Marks : 24***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

- 1 (a) Discuss the cost of quality in detail. 6
- (b) Differentiate between :
- (i) Inspection and Quality Control, and
- (ii) Quality of design and Quality of conformance. 5+5

OR

- 1 (a) Explain the various types of continuous probability distributions. 8

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- (b) A machine shop produces steel pins. The width of 100 pins was checked after machining and data was recorded as follows :

Width in mm	Frequency	Width in mm	Frequency
9.50 - 9.51	6	9.58 - 9.59	22
9.52 - 9.53	2	9.60 - 9.61	8
9.54 - 9.55	20	9.62 - 9.63	6
9.56 - 9.57	32	9.64 - 9.65	4

- (i) Find the arithmetic mean, standard deviation and variance.
(ii) What percentage of the pins manufactured has width of 9.52 to 9.63 ?

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UNIT - II

- 2 (a) Define SQC and discuss the benefits of SQC.

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- (b) Describe the method of constructing $\bar{X}$ and R charts.

8

OR

- 2 (a) What is meant by process capability ? How will we determine the same ?

6

- (b) The following table shows the averages and ranges of the spindle diameters in millimeters for 30 subgroups of 5 items each.

$\bar{X}$	R	$\bar{X}$	R	$\bar{X}$	R
45.020	0.375	45.600	0.275	45.260	0.150
44.950	0.450	45.020	0.175	45.650	0.200
45.480	0.450	45.320	0.200	45.620	0.400
45.320	0.150	45.560	0.425	45.480	0.225
45.280	0.200	45.140	0.250	45.380	0.125
45.820	0.250	45.620	0.375	45.660	0.350
45.580	0.275	45.800	0.475	45.460	0.225
45.400	0.475	45.500	0.200	45.640	0.375
45.660	0.475	45.780	0.275	45.390	0.650
45.680	0.275	45.640	0.225	45.290	0.350

For the first 20 samples set up an $\bar{X}$ chart and an R chart. Plot the next 10 samples on these charts to see if the process continues under control both as to average and range.

10

UNIT - III

3 (a) Compare :

- (i) p-chart with $\bar{X}$ and R-chart, and
- (ii) Variable chart with Attribute charts.

(b) Samples of fabric from a textile mill, each 100 m², are selected, and the number of occurrences of foreign matter are recorded. Data for 25 samples is shown in table below. Construct a C-chart for the number of non-conformities. 4+4

Sample	Non-conformities	Sample	Non-conformities
1	5	14	11
2	4	15	9
3	7	16	5
4	6	17	7
5	8	18	6
6	5	19	10
7	6	20	8
8	5	21	9
9	16	22	9
10	10	23	7
11	9	24	5
12	7	25	7
13	8		

OR

3 (a) What are the advantages and disadvantages of control charts for attributes over those for variables ? 8

(b) In a manufacturing process the number of defectives found in the inspection of 20 lots of 100 samples is given below : 6

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

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[P.T.O.

- (i) Determine the control limits of p-chart and state whether the process is in control.
- (ii) Determine the new value of mean fraction defective if some points are out of control. Compute the corresponding control limits and state whether the process is still in control or not.
- (iii) 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 3 times in thousand.

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UNIT - IV

- 4 (a) Discuss Quality Audit in detail.

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- (b) Short note :

(i) ISO 9000

(ii) AOQL

4+4

OR

- 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.

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- (b) Explain the various types of sampling plans which are in practice in industry with their respective acceptance criteria.

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UNIT - V

- 5 Discuss Taguchi's philosophy for quality improvement. Discuss his loss function and its contributions.

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OR

- 5 (a) Discuss the reliability and life testing in detail.

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- (b) Define reliability. Explain procedures that might improve the reliability of a system. Distinguish between a system with components in parallel and another with standby components.

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