

QUALITY CONTROL AND RELIABILITY ENGINEERING (SEMESTER - 6)

CS/B.Tech (AUE-N)/SEM-6/AUE-605/09



1.
Signature of Invigilator

2.
Signature of the Officer-in-Charge

Reg. No.

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Roll No. of the
Candidate

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CS/B.Tech (AUE-N)/SEM-6/AUE-605/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2009

QUALITY CONTROL AND RELIABILITY ENGINEERING (SEMESTER - 6)

Time : 3 Hours]

[Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **36 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
b) For **Groups – B & C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

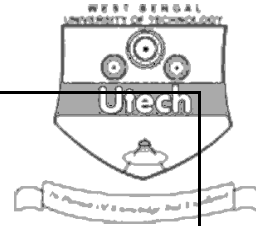
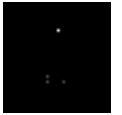
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Marks Obtained

Group – A								Group – B				Group – C				Total Marks	Examiner's Signature
Question Number																	
Marks Obtained																	

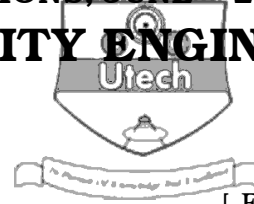
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ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2009
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SEMESTER - 6



Time : 3 Hours]

[Full Marks : 70

Graph sheets are provided on Page Nos. 33 & 35.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

10 × 1 = 10

i) Acceptance sampling by attribute is done by

- | | |
|----------------------------|------------------------------------|
| a) 'Go' and 'No Go' gauges | b) Actual measurement of the items |
| c) Destructive testing | d) None of these. |

ii) If a few points (out of large number) fall out of control limits

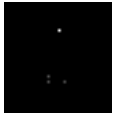
- a) there is assignable cause in the system
- b) there is chance cause in the system
- c) there is positive cost in the machine.

iii) The most common limits on the control charts are

- | | |
|------------------|-------------------|
| a) $\pm 3\sigma$ | b) $\pm 2\sigma$ |
| c) $\pm 4\sigma$ | d) $\pm \sigma$. |

iv) To reduce the cost of inspection

- a) control charts should be followed
- b) acceptance sampling should be used
- c) no inspection should be carried out
- d) none of these.



v) If the reading obtained by inspection are dimensions, hardness or surface roughness, should be plotted in



- a) \bar{x} chart
- b) R chart
- c) \bar{x} and R charts
- d) ordinary graph paper.

vi) Cost of inspection is minimum, if inspection is carried out by

- a) Destructive testing
- b) Non-destructive testing
- c) Acceptance sampling
- d) Sampling by attribute.

vii) MTBF stands for

- a) Mean Time Between Failure
- b) Maximum Time Between Failure
- c) Minimum Time Between Failure
- d) Minimum Time Before Failure.

viii) Failure rate is equal to

- a) $\frac{1}{MTBF}$
- b) MTBF
- c) $\frac{2}{MTBF}$
- d) none of these.

called



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- a) reliability b) quality
- c) maintainability d) performance.

- Textile industries
- Cosmetics industries
- Footwear industries
- Scooter manufacturing industries.

11

(Short Answer Type Questions)

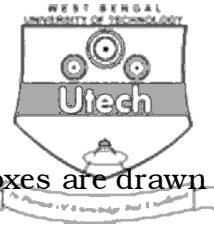
$$3 \propto 5 = 15$$

6. Prove that, $R(T) = e^{-\int_0^T \lambda(t) dt}$ and relate $R(T)$ with T by drawing a graph.

6
GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.



$3 \times 15 = 45$

7. A machine fills boxes with dry cereals. 15 samples of 4 boxes are drawn randomly. The weight of the sample boxes are shown as follows :

Sample No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Wt. of Boxes	10.0	10.3	11.5	11.0	11.3	10.7	11.3	12.3	11.0	11.3	12.5	11.9	12.1	11.9	10.6
	10.2	10.9	10.7	11.1	11.6	11.4	11.4	12.1	13.1	12.1	11.9	12.1	11.1	12.1	11.9
	11.3	10.7	11.4	10.7	11.9	10.7	11.1	12.7	13.1	10.7	11.8	11.6	12.1	13.1	11.7
	12.4	11.7	12.4	11.4	12.1	11.0	10.3	10.7	12.4	11.5	11.3	11.4	11.7	12.0	12.1

Draw the control charts for the sample mean and sample range and determine whether the process is in a state of control. (Take $A_2 = 0.729$, $D_3 = 0$, $D_4 = 2.282$ for $n = 4$).15

8. a) What are the various types of data ? What are the methods of data summarization ? 2 + 5
- b) Discuss the importance of Pareto diagrams in process improvement. An analysis of defects found in a particular type of casting product found during one month period are as follows :

Type of Defect	Frequency
Pin holes	332
Blow holes	265
Cracks	78
Short pouring	58
Surface finish	45
Mismatch	15

Construct a Pareto diagram and discuss the results.

3 + 5

9. a) What is Kaizen concept ? What do you mean by continuous improvement and continual improvement ? 2 + 4
- b) What is Quality Circle ? What are its benefits ? 2 + 4
- c) Write a brief note on 'Quality System'. 3
10. a) What is system reliability ? If the failures of components of a parallel system follow exponential distribution, find out an expression for the system reliability. 5
- b) Consider the seven component system shown in figure. Assume that the time to failure for each component has an exponential distribution. The failure rates are as follows :
- $\lambda_A = 0.0005/h$, $\lambda_B = 0.0005/h$, $\lambda_C = 0.0003/h$, $\lambda_D = 0.0008/h$,
 $\lambda_E = 0.0004/h$, $\lambda_F = 0.006/h$, $\lambda_G = 0.0064/h$.
- Find the reliability of the system after 1000 h. What is the mean time to failure of the system ? 10



Dia.

11. a) What is life-testing ? Briefly write different failure modes by bath-tub curve. 1+ 5
- b) What is hazard rate ? What do you mean by (MTBF) ? 1 + 3
- c) In a life testing of 10 specimens of minimized time to failure of each specimen are given as recorded. Calculate mean failure rate for $T = 900$ hrs. and MTTF for all specimen. 5

Specimen No.	1	2	3	4	5	6	7	8	9	10
Time to failure	805	810	815	820	825	832	842	856	875	900

END