

27 APR 2023

Reg. No.

Question Paper Code

11824

**B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023**

Seventh Semester

**Mechanical Engineering**

(Common to Production Engineering)

**ME8098 - QUALITY CONTROL AND RELIABILITY ENGINEERING**

(Regulations 2017)

(Use of approved Statistical Table is permitted)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

- |  | <i>Marks,<br/>K-Level, CO</i> |
|--|-------------------------------|
| 1. Define SQC.   | 2,K1,CO1                      |
| 2. Mention the need of Control Chart.                            | 2,K1,CO1                      |
| 3. Differentiate P Chart and NP Chart.                           | 2,K2,CO2                      |
| 4. Write the process of out-of-control identification in charts. | 2,K1,CO2                      |
| 5. Define Sampling.  | 2,K1,CO3                      |
| 6. How do you interpret O.C Curves?                              | 2,K1,CO3                      |
| 7. State the need of life testing.                               | 2,K1,CO4                      |
| 8. Illustrate Weibull model.                                     | 2,K2,CO4                      |
| 9. State the use of pareto analysis.                             | 2,K1,CO5                      |
| 10. List the four reliability improvement techniques.            | 2,K1,CO6                      |

**PART – B (5 × 13 = 65 Marks)**

Answer ALL Questions

11. a) (i) What do you mean by Quality Control and how do you interpret process variable to influence the quality. 8,K2,CO1  
(ii) Brief about SQC. 5,K2,CO1
- OR**
- b) State the need of control charts and elaborate its types with appropriate benefits. 13,K2,CO1
12. a) Brief about non confirming and discuss in detail about various control chart for non-confirming. 13,K2,CO2
- OR**
- b) Deliberate in detail various charts used to analyze the state of control and process out of control identification in chart. 13,K2,CO2

*K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create*

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13. a) Differentiate single, double and multiple sampling techniques, based on probability of acceptance level with suitable curves. 13,K2,CO3

**OR**

- b) Define O.C. curves. Brief about its types. Mention the significance of sample size. 13,K2,CO3

14. a) Elaborate the following terms with suitable sketch.

(i) Mean time to failure. 5,K2,CO4

(ii) Hazard rate. 4,K2,CO4

(iii) Failure data analysis. 4,K2,CO4

**OR**

- b) Brief about the following:

(i) Weibull model. 7,K2,CO4

(ii) Reliability of a system. 6,K2,CO4

15. a) What are the reliability improvement techniques? Explain any two in a detailed manner. 13,K2,CO6

**OR**

- b) Brief the following:

(i) Product design. 5,K2,CO6

(ii) Optimization in reliability. 4,K2,CO6

(iii) Stand by redundancy. 4,K2,CO6

**PART - C (1 × 15 = 15 Marks)**

16. a) How will you find out reliability of systems connected in series and parallel combined? Explain with help of neat sketches. 15,K2,CO5

**OR**

- b) A complex electronic system has four vacuum tubes for operation whose MTBF is 10,000 hours. (a) if the system is changed by replacing vacuum tubes with 16 transistors the MTBF increases to 80,000 hours, find the usefulness of the transistors for reliability, (b) If the number of transistors provided are 32, determine its effect on overall reliability of the system. 15,K2,CO5