

1. Preamble

This course provides the essentiality of SQC, sampling and reliability engineering. Study on various types of control charts, six sigma and process capability to help the students understand various quality control techniques. Reliability engineering focuses on the dependability, failure mode analysis, reliability prediction and management of a system

2. Pre-requisite

NIL

3. Course Outcomes

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
C01	Explain the basic concepts in Statistical Process Control	K2
C02	Apply statistical sampling to determine whether to accept or reject a production lot	K2
C03	Predict lifecycle management of a product by applying reliability engineering techniques.	K2
C04	Analyze data to determine the cause of a failure	K2
C05	Estimate the reliability of a component by applying RDB, FMEA and Fault tree analysis.	K2

4. Correlation with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H	H	M	L	H							M	L
CO2	H	H	H	M	L	H							H	M
CO3	H	H	H	M	L	H							L	H
CO4	H	H	H	M	L	H							M	M
CO5	H	H	H	M	L	H							L	H

H- High; M-Medium; L-Low

5. Course content**UNIT I STATISTICAL QUALITY CONTROL**

L-9

Methods and Philosophy of Statistical Process Control - Control Charts for Variables and Attributes – Cumulative Sum and Exponentially Weighted Moving Average Control Charts - Other SPC Techniques – Process - Capability Analysis - Six Sigma Concept.

UNIT II ACCEPTANCE SAMPLING

L-9

Acceptance Sampling Problem - Single Sampling Plans for Attributes – Double Sampling - Multiple Sampling - Sequential Sampling - Military Standards – The Dodge Roming Sampling Plans – Random Sampling.

UNIT III RELIABILITY ENGINEERING

L-9

Definition of Reliability – Performance and Reliability - Reliability Requirements – System Life Cycle – Mean Time Between Failures – Mean Time To Failure – Mortality Curve - Availability – Maintainability.

UNIT IV FAILURE DATA ANALYSIS

L-9

Statistical Failures of Components – Failure Distributions – Bath Tub Curve – Negative Exponential Distribution – Normal Distribution - Log Normal Distribution – Gamma Distribution - Weibull Distribution Life Distribution Measurements – Accelerated Life Tests -Data Requirements for Reliability.

UNIT V RELIABILITY PREDICTION AND MANAGEMENT

L-9

Failure Rate Estimates - Effect of Environment and Stress - Series and Parallel Systems - RDB Analysis – Standby Systems - Complex Systems – Reliability Demonstration Testing- Reliability Growth Testing - Duane Curve - Risk Assessment – FMEA and Fault Tree Analysis.

6. Text Books

1. Khanna O.P, “Statistical Quality Control”, Dhanpat Rai Publications (P) Ltd., 2001.
2. Lewis E.E, “Introduction to Reliability Engineering”, John Wiley and Sons, 1987.

7. References

1. Mohamed Zairi, “Total Quality Management for Engineers”, Woodhead Publishing Limited 1991.
2. Harvid Noori and Russel, “Production and Operations Management – Total Quality and Responsiveness”, McGraw-Hill Inc, 1995.
3. Douglas C. Montgomery, “Introduction to Statistical Quality Control”, 2nd Edition, John Wiley and Sons, 1991.