

ME352: QUALITY CONTROL AND RELIABILITY
CREDITS = 5 (L=3, T=0, P=2)

Course Objective:

To apply quality control, DOE and reliability tools in various industrial applications

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				
L	T	P	C	Theory		Practical		Total Marks
				ESE	CE	ESE	CE	
3	0	2	5	70	30	30	20	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	<p><u>Total Quality Management:</u></p> <p>Concepts of Quality Engineering, TQM- Tools and Techniques, Quality Circles, 5 S Practice, Total Quality Control (TQC), Quality Function Deployment (QFD), Failure Mode and Effect analysis (FMEA), Kaizen, six sigma, Poka-Yoke, 7QC Tools, 7 New Quality Improvement Tools.</p>	07
2	<p><u>Quality Assurance and Acceptance Control:</u></p> <p>Quality Assurance, Acceptance Sampling; - Lot by lot sampling, probability of acceptance in single, double, multiple sampling techniques. OC curves – producer’s Risk and consumer’s Risk. AQL, LTPD, AOQL concepts-standard sampling plans for AQL and LTPD- uses of standard sampling plans.</p>	08
3	<p><u>Experimental Design:</u></p> <p>Basis statistics, hypotheses test, F test, Chi-square test ,one factor at a time, orthogonal design, point and interval estimates, Two factors, Full factorials, Fraction Factorials, Taguchi,s quality Engineering-loss function, orthogonal Arrays, Signal to Noise ratio(S/N).</p>	10

Unit No.	Topics	Teaching Hours
4	<u>Reliability Concepts:</u> Probability Theory: Fundamental laws of probability, Conditional probability and multiplication rules, Random variables; Probability distribution; Discrete and continuous distribution. Reliability engineering fundamentals; Failure data analysis; Failure rate; mortality curve; Concept of burn in period; Useful life and wear out phase of a system; Mean time to failure (MTTF); Mean time between failure, (MTBF) and mean time to repair (MTTR); Reliability in terms of Hazard rate and failure density, maintainability, availability, Hazard models-constant, linearly increasing and weibull models. Bath-tub Curve.	09
5	<u>System Reliability and Fault tree analysis:</u> System reliability-series, parallel and mixed configuration, application to specific Hazard models, methods of solving complex systems, Markov model. Fault tree Analysis- fault tree construction and calculation of reliability, truth table, De Morgans theorem and application to reliability analysis.	10
TOTAL		44

List of References:

1. Dale H. Besterfield, Carol Besterfield-Michna, Glen H. Besterfield and Mary Besterfield-Sacre, "Total Quality Management ", Pearson Educaiton
2. Srinath L. S., "Reliability Engineering", Affiliated East West Press.
3. I. R. Miller, J. E. Freund & R. Johnson, "Probability and statistics for Engineers", Prentice Hall of India
4. B L Hanson & P M Ghare, "Quality Control & Application", Prentice Hall of India
5. M Mahajan, "Statistical Quality Control", Dhanpat Rai & Co ltd.

Course Outcomes (COs):

At the end of this course students will be able to ...

1. Identify the quality issues of a product/process.
2. Evaluate the acceptability of product/service/process.
3. Apply DOE for a given application
4. Analyze field failure data for reliability
5. Determine system reliability from reliability of subsystems and elements.