

B.E Semester: VII

Mechanical Engineering

Subject Name: Quality and Reliability Engineering

A. Course Objective

- To present a problem oriented in depth knowledge of Quality and Reliability Engineering.
- To address the underlying concepts, methods and application of Quality and Reliability Engineering.

B. Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
ME706-D	Quality and Reliability Engineering	4	0	0	4	4	3	70	30	20	0	120

C. Detailed Syllabus

1. Introduction:

Quality – Concept, Different Definitions and Dimensions, Inspection, Quality Control, Quality Assurance and Quality Management, Quality as Winning Strategy, Views of different Quality Gurus.

2. Total Quality Management TQM:

Introduction, Definitions and Principles of Operation, Tools and Techniques, such as, Quality Circles, 5 S Practice, Total Quality Control (TQC), Total Employee Involvement (TEI), Problem Solving Process, Quality Function Deployment (QFD), Failure Mode and Effect analysis (FMEA), Fault Tree Analysis (FTA), Kizen, Poka-Yoke, QC Tools, PDCA Cycle, Quality Improvement Tools, TQM Implementation and Limitations.

3. Introduction to Design of Experiments:

Introduction, Methods, Taguchi approach, Achieving robust design, Steps in experimental design

4. Just –in –Time and Quality Management:

Introduction to JIT production system, KANBAN system, JIT and Quality Production.

5. Introduction to Total Productive Maintenance (TPM):

Introduction, Content, Methods and Advantages

6. Introduction to ISO 9000, ISO 14000 and QS 9000:

Basic Concepts, Scope, Implementation, Benefits, Implantation Barriers

7. Contemporary Trends:

Concurrent Engineering, Lean Manufacturing, Agile Manufacturing, World Class Manufacturing, Cost of Quality (COQ) system, Bench Marking, Business Process Re-engineering, Six Sigma - *Basic Concept, Principle, Methodology, Implementation, Scope, Advantages and Limitation of all as applicable.*

8. Introduction to Probability Theory:

Fundamental laws of probability, Random variables; Probability distribution function; Discrete and continuous distribution; Histogram and Normal distribution curve, Mean, variance and standard deviation of a distribution function. Random samples

9. Reliability Concepts:

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, Conditional probability and multiplication rules.

D. Lesson planning

<u>SR.NO</u>	<u>DATE/WEEK</u>	<u>UNIT NO</u>	<u>%WEIGHTAGE</u>	<u>TOPIC NO</u>
1	1 ST , 2 ND , 3 RD	1, 2	20	1, 2
2	4 TH , 5 TH , 6 TH	3, 4	20	3, 4
3	7 TH , 8 TH , 9 TH	5, 6	20	5, 6
4	10 TH , 11 TH , 12 TH	7, 8	20	7, 8
5	13 TH , 14 TH , 15 TH	9	20	9

E. Instructional Method & Pedagogy

1. At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
3. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4. One/Two internal Pr. / Vivo exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

F. Students Learning Outcomes

- The student can identify different areas of Quality and Reliability Engineering.
- Can find the applications of all the areas in industry.

G. Recommended Study Materials

1. Quality Assurance and Total Quality Management (ISO 9000, QS 9000 ISO 14000) by K C Jain and A K Chitale, Khanna Publishers
2. Statistical Quality Control by M. Mahajan, Dhanpat Rai & Co. (P) Ltd.
3. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India
4. Total Quality Management by Dale H. Besterfield, *Carol Besterfield-Michna, Glen H. Besterfield and Mary Besterfield-Sacre, Pearson Educaiton*
5. Total Quality Management – Dr. S. Kumar, Laxmi Publication Pvt. Ltd.
6. Reliability Engineering by Srinath L. S., Affiliated East West Press.
7. Total Quality Management by K C Arora, S K Kataria & Sons
8. Statistical Quality Control by Eugene L. Grant and Richard S. Leavenworth, McGraw-Hill Publishing Company Ltd.

9. Total Quality Management: Poornima M. Charantimath, Pearson Education (Singapore) Pte. Ltd.
10. Managing for Total Quality: N. Logothetis, Prentice Hall of India Pvt. Ltd.
11. Competitive Manufacturing Management: John M. Nicholas, McGraw Hill
12. Managing Quality: Barrie G. Dole, Blackwell publishing
13. TQM – an integrated approach – Samuel K Ho, Crest publishing House.
14. Probability and statistics for Engineers, by I. R. Miller, J. E. Freund & R. Johnson, Prentice Hall of India