

B.E Semester: VII
Automobile Engineering
Subject Name: Elective-II: Quality & reliability Engineering (AE706C)

Course Objective

- To present a problem oriented in depth knowledge of quality and reliability engineering.
- To address the underlying concepts and methods behind quality control and reliability engineering.

Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVA	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
AE706C	Elective-II: Quality & reliability Engineering	4	0	0	4	4	3	70	30	20	-	120

Detailed Syllabus:

Topic no	Details
1	Introduction: Quality – Concept, Different Definitions and Dimensions, Inspection, Quality Control, Quality Assurance and Quality Management, Quality as Wining 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 - <i>Basic</i> 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.

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	Unit 1	20%	1,2
2	4 TH , 5 TH , 6 TH	Unit 2	20%	3,4
3	7 TH , 8 TH , 9 TH	Unit 3	20%	5,6
4	10 TH , 11 TH , 12 TH	Unit 4	20%	7,8
5	13 TH , 14 TH , 15 TH	Unit 5	20%	9

Instructional Method & Pedagogy

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- 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.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal 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.
- 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.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.

Students Learning Outcomes

- The student can identify different areas of quality and reliability engineering.
- Can find the applications of all the areas in day to day life.

Recommended Demonstrate Materials

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

