B.E Semester: 7 Automobile Engineering
Subject Name: Quality & Reliability Engineering (MA704-N-A)
[Dept. Elect.-4]

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:

Teaching Scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
3	0	0	3	3	3	70	30	20	0	120

C. Detailed Syllabus:

Unit 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 - 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.

Total hours (Theory):48
Total hours (Practical):00
Total hours:48

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1^{st} , 2^{nd} , 3^{rd}	Unit 1,2	20%	1,2
2	4^{th} , 5^{th} , 6^{th}	Unit 3,4	20%	3,4
3	7^{th} , 8^{th} , 9^{th}	Unit 5,6	20%	5,6
4	10^{th}, 11^{th}, 12^{th}	Unit 7,8	20%	7,8
5	13^{th} , 14^{th}, 15^{th}, 16^{th}	Unit 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 Weight age 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 exams may be conducted and total/average/best of the same may be converted toequivalent 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 overallinternal evaluation.

F. Students Learning Outcomes:

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

G. Text Books & Reference Books:

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 – Samunel K Ho, Crest pubslishing House.
14	Probability and statistics for Engineers, by I. R. Miller, J. E. Freund & R. Johnson, Prentice Hall of India