B.E Semester: 6Automobile Engineering
Subject Name: Industrial Safety & Maintainance Engineering (MA605-N-A) [Dept. Elect.-2]

A. Course Objective:

- This subject focuses on applying engineering concepts to the optimization of equipment, procedures, and departmental budgets to achieve better maintainability, reliability, and availability of equipment.
- The subject also focuses on various safety engineering aspects like understanding hazards, quantifying risk, design for Safety, investigating accident, safety education and training

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	2	5	4	3	70	30	20	30	150

C. Detailed Syllabus:

Unit No.	Details
1	**Introduction:** Importance of maintenance, functions of maintenance, type of maintenance, including total productive maintenance and its implementation, organization of maintenance
2	**Wear and service life of equipment:** (i) Methods of assembly and fitting – assembly of keyed joints, splined joints, fixed joints, assembly of ball and roller bearings, repairs and assembly of gears. (ii)Wear of machines- types and reasons of wear, defects due to wear of equipment, corrosion and its prevention. (iii)Recovery and strengthening of machine elements various methods of recovery and increasing service life.
3	**Maintenance of Production Equipment :** Maintenance and repair of shafts, bearings, spindles, couplings and clutches, gears, bed services and link mechanisms.
4	**Restoring The Guide Ways Of Machine Tools:** Test of repaired equipment, fault-tracing sequence in fault tracing, drawing decision tree.
5	**Planning and Scheduling Maintenance Work:** Factors involved in effective planning of maintenance work, Various methods of scheduling work, Categorization of plant/equipment for the purpose of priorities, VAIN analysis.
6	**Preventive Maintenance:** Philosophy of PM, methods & schedules. Maintenance cost & replacement economics, Types of cost, Maintenance cost, Methods of cost comparisons, Factors in equipment Replacement, MAPI methods, Economics, Concept of maintainability..

7	**Safety Engineering.** Background of Industrial safety, Accident Causation, Industrial hazards, Accident investigation, prevention, Safety education, Safety consideration in design of equipment, Legal aspects of Ind. Safety .

Total hours (Theory):48
Total hours (Practical):32
Total hours:80

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1^{st} ,2^{nd} ,3^{rd}	Unit 1	20%	1,2
2	4^{th} .5^{th} ,6^{th}	Unit 2	20%	3
3	7^{th} , 8^{th} ,9^{th}	Unit 3	20%	4
4	10^{th} .11^{th} . 12^{th}	Unit 4	20%	5
5	13^{th} , 14^{th} ,$15^{th,}$,16^{th}	Unit 5	20%	6,7

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.
7	The course includes a laboratory, where students have an opportunity to build an appreciation for theconcept being taught in lectures. Suggested list of experiment is given below

F. List of Practical:

1	Study about maintainability
2	Study about wear and service life of equipment.
3	Study about maintenance and repair of production equipment.
4	Study about restoring of the guide ways of machine tools
5	To study maintenance planning and scheduling.
6	Study about VAIN analysis.
7	Study about preventive maintenance.
8	Study about industrial safety
9	Study about accidents and industrial hazards
10	Study about safety measurement.

11	Study about legal aspect of safety and safety education.

G. Students Learning Outcomes:

1	The student can identify different areas of Industrial Safety& Maintenance Engineering.
2	Can find the applications of all the areas in day to day life.

H. Text Books & Reference Books:

1	Maintenance Engineering and management by R.C. Mishra & K. Pathak, PHI publication
2	Maintenance Engineering and management by K. VenkatRamana, PHI publication
3	Maintenance of Ind. Equipments-by Gellery&Pakelts, MIR publications
4	Ind. Maintenance by H.P. Garg, S. Chand & company
5	Maintenance Engg. Handbook, by Morrow
6	Modern Maintenance Management, by Miller & Blood