



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3162010

Semester – VI

Subject Name: Industrial Maintenance and Safety

Type of course: Open Elective

Prerequisite: Zeal to learn the subject

Rationale: This subject focuses on applying industrial concepts of maintenance to achieve better performance, reliability, and availability of equipment and human factors. The subject also focuses on various safety engineering aspects like understanding hazards, quantifying risk, design for Safety, investigating accident, safety education and training.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	Introduction: Importance of maintenance, functions of maintenance, type of maintenance, including total productive maintenance and its implementation, organization of maintenance, operating life cycle, reliability, Failure data analysis, failure rate curve, hazard models, Maintainability, availability, reliability.	6
2	Maintenance Strategies: Break down maintenance, planned maintenance, preventive maintenance, design out maintenance, planned lubrication, total productive maintenance, zero-break down, preventive inspection of equipment used in emergency.	8
3	Replacement planning and maintain or replace decision, replacement of items that deteriorate with time identical equipment, replacement of items that fail without deterioration, individual and group replacement, replacement in anticipation of failure, Break down maintenance planning.	7
4	Safety in engineering industry: Introduction - definitions - classification of engineering industry - different process in engineering industry. Safety in welding, cutting, finishing, heat treatments, handling and storage, disposal of effluents - health precautions, elimination and prevention of long time exposure to the hazardous fumes, source of fumes, ventilation and fume protection. Care and maintenance of common elements used in material handling equipment like rope chains slings, hooks, clamps, Occupational diseases due to physical and chemical agents.	7
5	Background of Industrial safety, Accident Causation, Industrial hazards, Accident investigation, prevention, Safety education, Safety consideration in design of equipment, Mechanical and electrical hazards types, causes and preventive steps/procedure, Legal	7



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	aspects of Ind. Safety: salient points of Factories act 1948 for health, and safety, Fire prevention and fire fighting equipment and methods.	
6	Recovery, reconditioning and retrofitting: Selection of appropriate criteria and method to recover machine elements through reconditioning and/or retrofitting.	5

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
35	20	20	10	10	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Reliability Maintenance and Safety Engineering, Dr. A. K Gupta, Laxmi publication
2. Maintenance Engineering and Management, Dr Subhash Chandra, S K Kataria
3. Industrial Safety Handbook by William Handley
4. Introduction to Safety Engineering by David S Gloss & Miriam Gayle Wardle
5. Maintenance Engineering and management by R.C. Mishra & K. Pathak, PHI publication
6. Maintenance Engineering and management by K. VenkatRamana, PHI publication
7. Maintenance Engineering Handbook, by Higgins and Morrow
8. Maintenance Engineering by H P Garg

Course Outcomes:

After learning the course the students should be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the principles, functions and practices adapted in industry for the successful management of maintenance activities.	25
CO-2	Understand the different maintenance categories like Preventive maintenance, condition monitoring and repair of machine elements.	25
CO-3	Understand various engineering aspects and salient points of Factories acts for health and safety in industry.	25



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CO-4	become familiar with different kinds of Safety procedures followed in industries and occupational diseases.	25
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List of Experiments:

NA

Major Equipment:

NA

List of Open Source Software/learning website:

www.nptel.ac.in