

COURSE CODE	MAINTENANCE ENGINEERING	L	T	P	C
1152ME113		3	0	0	3

1. Preamble

This course develops the skills of the students in the areas of maintenance engineering. Students gain knowledge on different categories like preventive maintenance, condition monitoring. The repair methods of machines and material handling equipments are explained with illustrations.

2. Prerequisite

Manufacturing Technology

1151ME104

3. Links to other courses

Project Work

4. Course Educational Objectives

Students undergoing this course are expected to:

- Understand the principles, functions and practices of maintenance planning and policies
- Explain the different maintenance categories like Preventive maintenance, condition monitoring and repair of machine elements.

5. Course Outcomes

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Describe the principles, functions and practices of maintenance planning	K2
CO2	Explain various categories of maintenance	K2
CO3	illustrate some of the methods and instruments used for condition monitoring	K2
CO4	Demonstrate the repair methods for basic machine elements	K2
CO5	Explain the repair methods for material handling equipments	K2

(K2 – Remember)

6. Correlation of CO's with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	L		L				L						L	
CO2	L		L				L						L	
CO3	L		L	L		L	L						L	
CO4	L		L	L		L	L						L	
CO5	L		L	L		L	L						L	

H- High; M-Medium; L-Low

7. Course Content

UNIT I PRINCIPLES AND PRACTICES OF MAINTENANCE PLANNING	L-9
Basic Principles of maintenance planning – Objectives and principles of planned maintenance activity – Importance and benefits of sound Maintenance systems – Reliability and machine availability – MTBF, MTTR and MWT – Factors of availability – Maintenance organization – Maintenance economics. Lean management system	
UNIT II MAINTENANCE POLICIES – PREVENTIVE MAINTENANCE	L-9
Maintenance categories – Comparative merits of each category – Preventive maintenance, maintenance schedules, repair cycle - Principles and methods of lubrication – TPM.	
UNIT III CONDITION MONITORING	L-9
Condition Monitoring – Cost comparison with and without CM – On-load testing and off-load testing – Methods and instruments for CM – Temperature sensitive tapes – Pistol thermometers – wear-debris analysis	
UNIT IV – REPAIR METHODS FOR BASIC MACHINE ELEMENTS	L-9
Repair methods for beds, slideways, spindles, gears, lead screws and bearings – Failure analysis – Failures and their development – Logical fault location methods – Sequential fault location.	
UNIT V – REPAIR METHODS FOR MATERIAL HANDLING EQUIPMENT	L-9
Repair methods for Material handling equipment - Equipment records –Job order systems -Use of computers in maintenance.	
	TOTAL: 45 periods

8. Text Books

1. Srivastava S.K., “Industrial Maintenance Management”, - S. Chand and Co., 2002
2. Bhattacharya S.N., “Installation, Servicing and Maintenance”, S. Chand and Co., 1995

9. References:

1. White E.N., “Maintenance Planning”, I Documentation, Gower Press, 1979.
2. Garg M.R., “Industrial Maintenance”, S. Chand & Co., 1987.
3. Higgins L.R., “Maintenance Engineering Hand book”, McGraw Hill, 5th Edition, 2008.
4. Armstrong, “Condition Monitoring”, BSIRSA, 1988.
5. Davies, “Handbook of Condition Monitoring”, Chapman &Hall, 1996.
6. “Advances in Plant Engineering and Management”, Seminar Proceedings - IPE, 1996