

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Diploma Engineering	Branch	Mechatronics Engineering						
Semester	III	Version	1.0.0.0						
Effective from Academic Year	2019-20	Effective for the batch Admitted in	June 2018						
Subject code	1ME2305	Subject Name	PLANT MAINTENANCE AND SAFETY						
Teaching scheme			Examination scheme (Marks)						
(Per week)	Lecture(DT)	Practical(Lab.)	Total	CE	SEE	Total			
	L	TU	P	TW					
Credit	2	0	1	0	3	Theory	40	60	100
Hours	2	0	2	0	4	Practical	30	20	50

Pre-requisites:

Course Learning Outcomes:

The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes:

CO1. To understand need of maintenance

CO2. Recognize troubles in mechanical elements.

CO3. Assemble, dismantle and align mechanisms in sequential order.

CO4. Carry out plant maintenance using tribology, corrosion and preventive maintenance.

CO5. To identify various faults of equipment/machinery.

Course Content

Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 Introduction of maintenance engineering	1.1 Definition and aim of maintenance engineering.	1a. Appreciate the need of maintenance in industry	05	03
	1.2 Primary and secondary functions and responsibility of maintenance department.	1b. Describe functions of maintenance department		
	1.3 Types of maintenance.	1c. Describe service life of equipment		
	1.4 Types and applications of tools used for maintenance. 1.5 Maintenance cost & its relation with replacement economy. 1.6 Service life of equipment.			
UNIT – 2 Fault tracing	2.1 Fault tracing-concept and importance.	2a. Develop decision trees to diagnose faults in equipment.	05	03

2.2 Decision tree-concept,
need and applications.

2.3 Sequence of fault finding activities,
show as decision tree.

2.4 Draw decision tree for problems
in machine tools, hydraulic,
pneumatic, automotive, thermal
and electrical equipments like:

i. Any one machine tool.

ii. Pump

iii. Air compressor.

iv. Internal Combustion engine.

	<p>v. Boiler.</p> <p>vi. Electrical motors.</p> <p>2.5 Types of faults in machine tools and their general causes.</p>			
<p>UNIT – 3 Wear and Corrosion</p>	<p>3.1 Wear- types, causes, effects. 3.2 Wear reduction methods 3.3 Lubricants-types and applications</p> <p>3.4 Lubrication methods –General sketch, working and applications.</p> <p>i. Screw down grease cup.</p> <p>ii. Pressure grease gun.</p> <p>iii. Splash lubrication.</p> <p>iv. Gravity lubrication.</p>	<p>3a. Explain causes, effects and reduction methods of wear</p> <p>3b. Select appropriate lubricants and lubrication method. 3c. Describe reasons of corrosion for given case</p> <p>3d. Explain methods of corrosion prevention</p>	<p>10</p>	<p>05</p>

	<p>v. Wick feed lubrication.</p> <p>vi. Side feed lubrication.</p> <p>vii. Ring lubrication</p> <p>3.5 Definition, principle and factors affecting the corrosion.</p> <p>3.6 Types of corrosion.</p> <p>3.7 Corrosion prevention methods.</p>			
<p>UNIT – 4 Periodic and preventive maintenance</p>	<p>4.1 Periodic inspection-concept and need.</p> <p>4.2 Degreasing, cleaning and repairing schemes.</p> <p>4.3 Overhauling of mechanical components.</p> <p>4.4 Repair complexities and its use.</p> <p>4.5 Definition, need, steps and advantages of preventive maintenance.</p> <p>4.6 Program and schedule of preventive maintenance of mechanical and electrical equipments.</p> <p>4.7 Advantages of Preventive maintenance.</p> <p>4.8 Repair cycle-concept and importance.</p>	<p>4a. Carry out periodic inspection in mechanical systems.</p> <p>4b.Overhaul of mechanical components.</p> <p>4c. Plan preventive maintenance of major mechanical systems.</p>	15	07
<p>UNIT – 5 Recovery, reconditioning and retrofitting</p>	<p>5.1 Definition of recovery, reconditioning and retrofitting.</p> <p>5.2 Methods of recovery and their applications</p> <p>5.3 Selection criteria of recovery methods.</p>	<p>5a. Select appropriate recovery method for machine elements</p> <p>5b. Explain reconditioning and retrofitting process.</p>	10	05

	5.4 Reconditioning - process, features and advantages.			
	5.5 Retrofitting - concept, need and applications.			
UNIT – 6 Installation, erection and commissioning of equipments	6.1 Design and planning of foundation.	6a. Explain foundation and erection of equipment in plant. 6b. Prepare test chart of given equipment	05	03
	6.2 Erection and commissioning of equipment.			
	6.3 Alignment and testing of equipment.			
UNIT – 7 Industrial safety	7.1 Accident - causes, types, results and control.	7a. Describe different types of accidents and hazards.	10	04
	7.2 Mechanical and electrical hazards- types, causes and preventive steps/procedure.	7b. Describe salient points of Factories act 1948.for health, and safety.		
	7.3 Describe salient points of Factories act 1948.for health and safety-, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc.	7c. Describe Fire prevention and firefighting, equipment and methods.		
	7.4 Safety colour codes.			
	7.5 Fire prevention and firefighting, equipment and methods.			

List of Practical

The practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate course learning outcomes.

No.	Unit	Name of Practical
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1	1	Demonstration of tools Study and demonstrate use of various types of tools. (Fix spanners, box spanners, ring spanners, allen keys, types of pliers, screw drivers, bearing puller, etc.)
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Fault Tracing and Decision Tree:

Develop decision tree for location of fault for any two

items from following-

Internal combustion (IC) engine.

Boiler.

Pump.

Machine tool.

Air compressor.

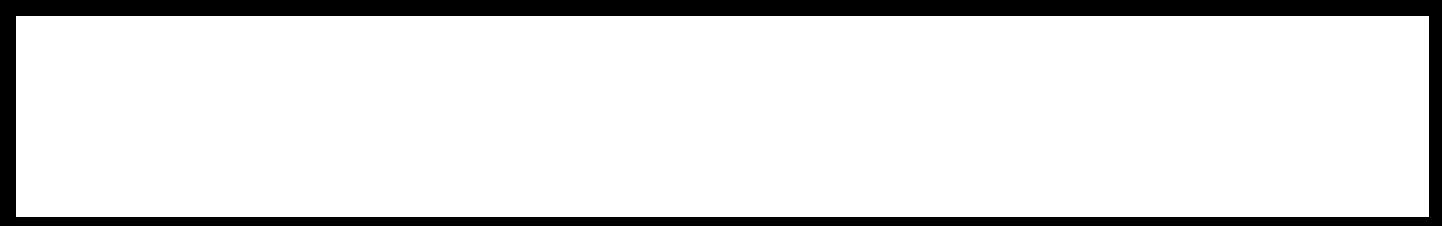
3	3	<p>Measurement of Wear:</p> <hr/> <p>Measure wears of anyone of the following.</p> <hr/> <p>a. Bearing.</p> <hr/> <p>b. Piston –cylinder.</p> <hr/> <p>c. Machine guide ways.</p>
4	3	<p>Identify corrosion: Each student will collect corroded component from field and identify the types of corrosion and possible causes. Student will also suggest prevention methods.</p>
5	4	<p>Preventive Maintenance:</p> <hr/> <p>Prepare a preventive maintenance schedule of any workshop having- air compressors, car washing pumps, tyre changer, lifts, welding machines, and wheel alignment.</p>
6	4 & 5	<p>Maintenance of Mechanical Based Equipment/Device/Machine.</p> <hr/> <p>Maintenance of any two from following. Batch may be divided in to two groups and each group may be given one case.</p>

		<p>Head stock.</p> <hr/> <p>Tail stock.</p> <hr/> <p>Feed box.</p> <hr/> <p>Indexing head.</p> <hr/> <p>Internal combustion (IC) engine.</p> <hr/> <p>Pump.</p> <hr/> <p>(Dismantle of given case, observe rules, follow sequence of dismantling operations, cleaning, inspection, measuring deviations, and recovery methods, testing and assembling).</p>
7	6	<p>Test Chart:</p> <hr/> <p>Prepare test chart of newly installed or repaired machine tool.</p>

8	7	<p data-bbox="440 296 526 327">Safety:</p> <hr data-bbox="427 411 1575 422"/> <p data-bbox="440 430 1192 462">Demonstrate use of fire fighting and safety related equipments</p>
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9	ALL	<p>Mini Project And Presentation:</p> <p>Identify mechanical based any one equipment / device / machine at institute level which requires maintenance.</p> <p>Prepare general sketch.</p> <p>Perform fault tracing and prepare the decision tree.</p> <p>Dismantle. Write the sequence of dismantling. Also describe the steps. List the tools used for this activity.</p> <p>Attend necessary maintenance tasks. Write the tasks performed.</p> <p>Assemble, test and if necessary, modify. Write the steps.</p> <p>Prepare power point presentation. Present the project. This must include photographs / movies of group working on project.</p>
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10	ALL	Industrial Visit:
		Arrange visit to nearby automobile workshop/machine shop.



List of Instruments / Equipment / Trainer Board			
1	Tool kit.		
2	Fire extinguishers.		
3	Lubricants.		
4	Measuring instruments.		
5	Cotton waste, Kerosene.		
List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Maintenance Engineering	H.P.Garg	S. Chand and Company.
2	Maintenance of Machine Tools	Gilbirg& Morrow	
3	Maintenance Engineering Handbook	Higgins & Morrow	DA Information Services
4	Foundation Engineering Handbook	Winterkorn, Hans.	Chapman & Hall London
Link of Learning Web Resource			
1	en.wikipedia.org		

2	webstore.ansi.org/preventive-maintenance
3	www.pmxpert.com