COURSE NAME : MECHANICAL ENGINEERING /PRODUCTION TECHNOLOGY

COURSE CODE : ME/PT

SEMESTER : FIFTH

SUBJECT TITLE : PLANT MAINTENANCE (ELECTIVE-I)

SUBJECT CODE :

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	**TU**	**PR**	**PAPER HRS.**	**TH**	**PR**	**OR**	**TW**	**TOTAL**
03	-	02	03	100	--	---	25@	125

Abbreviations:

TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work.

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

Rationale:

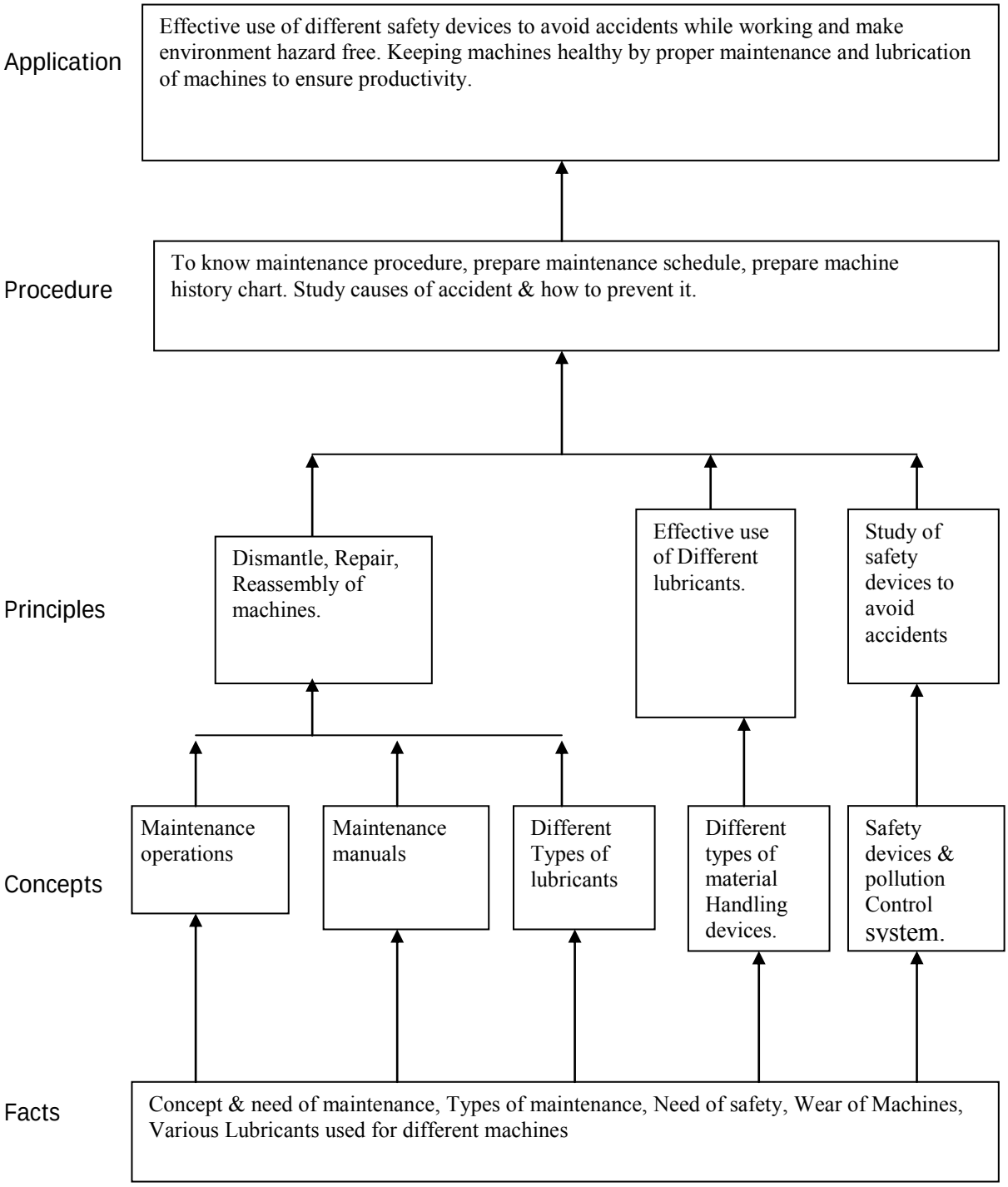
This is a technology subject and offered as an elective subject. The main intention to study this subject is to know concepts, principles, & procedure of different types of maintenance, maintenance tools, safety devices to avoid accidents. The subject also provides the knowledge about wear and lubrication of machines.

Objectives:

Students will be able to:

1. Appreciate the need and use of utilities like water, steam, electricity and air.
2. Select and use proper lubricants..
3. Know the procedure of maintenance.
4. Use of different safety devices in machine to avoid accidents.

Learning Structure:



Theory:

Topic and Content	Hours	Marks
1. **Basic Plant Facilities: 16Marks** **Specific Objectives :** ➢ Understand and use basic facilities in the plant **Content:** 1.1 Industrial Ventilation, Purification of water, Water Distribution System, Water Cooling System **08Marks** 1.2 Electric Power Distribution System, Electric Supply system, Stand by and Emergency Power, Lighting, Insulators and Steam supply system **08Marks**	08	16
2. Mechanical Maintenance: 24Marks **Specific Objectives :** ➢ Understand and decide the use of various types of maintenance **Content:** 2.1 Importance and Types **04Marks** 2.2 Breakdown, Preventive, Scheduled, Procedure of Preventive Maintenance, Accessibility for Maintenance. **08Marks** 2.3 Planning and Scheduling of Maintenance work, Repair Cycle, Maintenance Stages, Spare parts Management (ABC Analysis) **08Marks** 2.4 Maintenance Manuals and Reports, Machine History Chart, Maintenance Tools. **04Marks**	12	24
3. TOTAL PRODUCTIVE MAINTENANCE (TPM): 12Marks **Specific Objectives:** ➢ Know concept of TPM ➢ Know the benefits of TPM **Content:** 3.1 Introduction, Benefits and Features of TPM, Basic systems of TPM **06Marks** 3.2 Pillars of TPM, Maintenance job responsibility allocation in TPM **06Marks**	06	12
4: WEAR AND LUBRICATION: 18Marks **Specific Objectives :** ➢ Know the wear and wear process ➢ Know the importance of lubrication ➢ Select the proper lubricant for various machines **Content:** 4.1 Definition of wear, Primary wear processes - Adhesive, abrasive, corrosive reaction, plastic flow, pitting. **08Marks** 4.2 Observed wear behavior due to primary wear processes. **04Marks** 4.3 Lubricants – Importance, Properties, Types, Selection of lubricants, Lubrication systems – wick, pad, bottle, bath or sump, splash, centralized. **06Marks**	08	18
5. Electrical Maintenance: 14Marks **Specific Objectives :** ➢ Know electrical equipments for maintenance **Content:** 5.1 Equipment needed for electrical maintenance - Ammeter, Voltmeter, Multimeter, tong Tester, Energy Meter, fuses, overload relays, circuit breakers. . **06Marks**	06	14

5.2 Safety measures - Earthing, Precautions against electric shock, Prevention of fire due to electricity. **08Marks**		
6. Accidents and Safety: 16Marks **Specific Objectives :** ➢ Know the causes of accidents ➢ Know about safety precautions **Content:** 6.1 Accidents: Definition, Causes, types, effects. **04Marks** 6.2 First aid, Personal Protective Equipments, Safety Policies, Safety Training, House Keeping. **04Marks** 6.3 Mechanical Controls – Control and Trip Mechanism, lever Controlled Reversal Mechanism, Travel Control by Limit Switches. **04Marks** 6.4 Safety Controls – Fool proofing devices for interlocking a) Parallel Shafts b) Shafts at right angle. **04Marks**	08	16
	48	100

Practical:

Skills to be developed:

Intellectual Skills:

1) Specify the basic facilities requirement for a plant.

2) Select the maintenance procedure for given machine.

3) Identify various measures and methods of safety.

4) Select proper lubricant and tools for maintenance.

5) Understand the modern concept of TPM.

Motor Skills:

1) Use basic facilities in the plant as per requirement.

2) Execute maintenance procedure in the plant.

3) Repair and maintain simple machine and sub systems.

4) Use and operate different hand tools required for repair and maintenance.

Note: The report on industrial visit will form important part of term work of the student. The teacher is expected to provide questionnaire / specific guideline for the industrial visit.

List of Practical:

1) Prepare a report on facilities provided in the institute workshop.

2) Report on industrial visit to observe various facilities such as compressed air, water, steam, electric supply, high voltage electric supply, air conditioning, waste disposal and treatment. (Report on different facilities to be prepared by different groups and compiled under the guidance of teacher).

3) Dismantling and assembly of a) air compressor, b) vane pump / motor / centrifugal pump, c) valves d) electric motors and report on maintenance procedure.

4) Replacing fuses / fuse wires of electrical installation in workshop.

5) Market Survey of lubricants for specifications and applications.

6) Prepare a preventive maintenance schedule of any machine in your college machine shop / lab. and prepare a report.

7) Report on Industrial visit to observe maintenance activities.

8) Removal and replacement of bearings for any machine / equipment in the lab.

Note: For above experiments prepare report and submit as a term work.

Learning Resources:

Sr.No.	Author	Title Of Book	Edition	Publisher
01	H.P. Garg	Industrial Maintenance	Revised Edition (2009)	S. Chand
02	C.R. Dragon	Electrical Technology	First	Dhanpat Rai and Sons
03	G.C. Sen. & A. Bhattacharya	Principles of Machine tools	First	New Central Book Agency
04	P. GopalKrishnan & A.F. Banerji	Maintenance & spare part maintenance	First	Prentice –Hall of India Ltd
05	R.C. Mishra and K. Pathak	Maintenance Engg. And Management	--	Prentice –Hall of India Ltd
06	Sushil Kumar Shrivastava	Maintenance Engg. And Management	Revised Edition 2009	S. Chand
07	Lindecy R. Higgins	Maintenance Engineering Handbook	Fifth	McGraw Hill Publication