

**Course Name** : Electrical Engineering Group

**Course Code:- EE/EP**

**Semester** : Third

**Subject Title** : Elements of Mechanical & Civil Engineering **Subject Code:**

**Teaching and Examination Scheme:**

| Teaching Scheme |    | Exam Scheme & Maximum Marks |    |      |    |    |     |       |
|-----------------|----|-----------------------------|----|------|----|----|-----|-------|
| TH              | PR | PAPER<br>HRS.               | TH | TEST | PR | OR | TW  | TOTAL |
| 01              | 02 | --                          | -- | --   | -- | -- | 25@ | 25    |

**Rationale:**

Diploma in Electrical Engineering passouts, work as Maintenance Engineers in industry. They have to look after maintenance of Mechanical Machines also. Similarly they have to install electrical machinery. For completing these tasks they need knowledge of Mechanical Machinery related to maintenance and Civil Engineering related to foundation work.

**Objectives:**

Student will be able to:

1. Supervise routine maintenance of Machinery such as Boilers, Turbines, Pumps, Steam Turbines
2. Supervise foundation work for installation of machinery and equipment
3. Identify faults, mal functioning of machines and equipment
4. Decide the size and type of foundation for machines

## Learning Structure:

Application

Use knowledge for maintenance and repairs of Mechanical Machines and install machine and equipment by building foundation for installation

Procedure

Maintenance procedures for Mechanical Machines, foundations for installation of Machines and Equipment, troubleshooting and repairs of machines and equipment using maintenance manuals

Principle

Conversion of Heat Energy into Kinetic Energy

Facts

Steam Turbines, Water Turbines, Pumps, Compressors, Bricks, Mortar, Cement, Foundation Bolts, Nuts,



## Contents: Theory

| Chapter | Name of the Topic   | Hours |
|---------|---|-------|
| 01      | <b>Boilers, Steam Turbines, Steam Engines:</b><br>1.1 Construction & working of Cochran & Babcock & Wilcox Boilers.<br>1.2 Construction & working of impulse & reaction turbines.<br>1.3 Construction & working of steam engine<br>1.4 Reasons for Malfunctioning, and remedial measures for boilers and steam turbines | 04    |
| 02      | <b>I.C. Engines:</b><br>2.1 Construction & working of two stroke & four stroke petrol & diesel engines<br>2.2 Reasons for Malfunctioning, and remedial measures for I. C. Engines   | 04    |
| 03      | <b>Air Compressors:</b><br>3.1 Uses of compressed air.<br>3.2 Construction & working of single stage & two stage reciprocating compressor.<br>3.3 Screw compressor & centrifugal compressor- construction, working & applications.<br>3.4 Reasons for Malfunctioning and remedial measures                              | 03    |
| 04      | <b>Pumps:</b><br>4,1 Types of Pumps and their working<br>4.2 Reasons for malfunctioning and remedial measures   | 03    |
| 05      | <b>Foundation for Machines:</b><br>5.1 Need for foundation<br>5.2 Material required for foundation<br>5.3 Foundation Bolts: Types and Sizes<br>5.4 Criteria for Design of foundation  | 02    |
|         | Total   | 16    |

## Practicals:

Skills to be developed:

Intellectual Skills:

- Know working of boilers, steam turbine, I.C. Engines, compressors and pumps
- Diagnose faults/malfunctioning
- Select proper tools and equipment for repairs

**Motor Skills:**

- Disassembling and assembling of machines
- Start and run various machines

**List of Practical:**

1. Trace the flue gas path and water – steam circuit with help of boiler model.
2. Identify the possible location of fault/malfunctioning and decide how to repair them
3. Dismantling & assembly of Petrol/Diesel Engine.
4. Trial on single / multi cylinder petrol/ diesel engine.
5. Observe operation of Air Compressor and identify locations of fault and decide how to repair
6. Observe operation of a Centrifugal Pump and locations of fault and decide how to repair
7. Visit a thermal power station and observe functioning of Steam Turbine
8. Using Maintenance manuals prepare a maintenance schedule for a centrifugal Pump or Compressor

**Learning Resources:**

**Books:**

| Sr. No. | Author              | Title                              | Publication                  |
|---------|---------------------|------------------------------------|------------------------------|
| 01      | P.L. Ballaney       | A Course in Thermal Engineering    | Khanna Publishers            |
| 02      | R. S. Khurmi        | A test book of Thermal Engineering | S. Chand & Co. Ltd.          |
| 03      | R. K. Rajput        | Thermal Engineering                | Laxmi Publication, New Delhi |
| 04      | Patel, Karmchandani | Heat Engine Vol. I & II            | Acharya publication          |
| 05      | P.K. Nag            | Engineering Thermodynamics         | Tata McGraw Hill             |