Course Name : Electrical Engineering Group

Course Code : EE / EP

Semester : Fourth

Subject Title : Elements of Mechanical Engineering

Subject Code : 17413

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	02	50	--	--	25@	75

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:

Electrical engineering is the basic engineering branch. Electric power supply is needed for running of mechanical and the chemical process equipment for which different electric motors are used, so in mech industry, the electrical engineer has to take care of various electrical installations with its maintenance.

The electrical engineer has to look after various aspects related to electrical engineering in respect of mechanical equipment. (Boilers, Steam turbine, steam engines)

There are the equipments that are used for generation of electrical power.

The content on boiler, steam turbine, and stem engine will enable the electrical engineer to adopt appropriate electrical engineering support for the efficient use of these equipments.

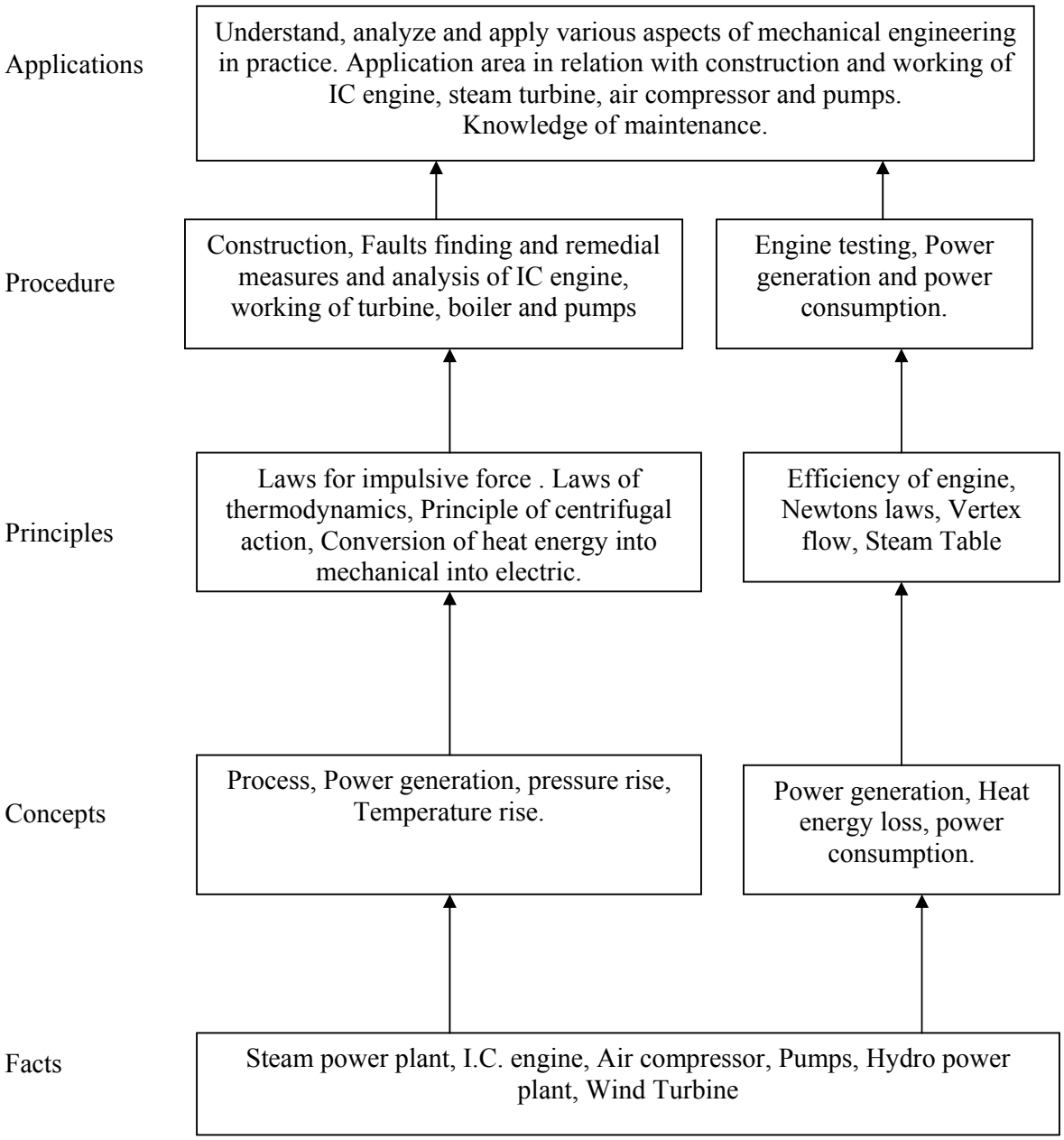
Topics on air compressors and pumps, turbine also provide necessary guide line in respect of electrical engineer. For trouble free working of these equipment with saving ion energy consumption.

General Objectives:

Students should be able to

1. Know the function of different mechanical equipment along with their location.
2. Understand working of high pressure boilers and steam turbine and thermal power plant.
3. Know the operation and control of fuel and steam supply.
4. Enlist sources of waste heat from boiler, IC engine.
5. Describe internal combustion engine.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
Topic 1: Boilers, Steam turbines, Steam engine **Specific Objectives:** ➢ Calculate the properties of two phase system by using steam table ➢ Explain construction & working of boilers ➢ Identify the heat losses & malfunctioning of boilers **Contents:** 1.1 Construction and working of critical and super critical boilers. 1.2 Boiler efficiency 1.3 Boiler Act (for remedial measure). 1.4 Classification of turbines. 1.5 Impulse and reaction turbine. 1.6 Power developed by turbine. 1.7 Different power losses in turbine.	10	16
Topics 2: I.C. Engines **Specific Objectives:** ➢ Calculate performance of engine ➢ Identify the malfunctioning Causes **Contents:** 2.1 Classification of I.C. engines. 2.2 Testing and performance of I. C. engines. ➢ Break power ➢ Indicated power ➢ Frictional power 2.3 Fault finding and remedial action. 2.4 Starting motor of I.C. engine.	06	10
Topic 3: Air Compressor **Specific Objectives:** ➢ Know the working principles of air compressor ➢ Identify Methods of energy saving ➢ Identify the fault & suggest remedies **Contents:** 3.1 Introduction 3.2 Definition : Compression ratio, Compressor capacity, Free air Deliver, swept volume. 3.3 Reciprocating and rotory air compressor, their working and Construction. 3.4 Methods of energy saving in compressor. 3.5 Fault finding and remedial action.	08	12
Topic 4: Pumps **Specific Objectives:** ➢ Selection of pumps for various applications ➢ Know the construction & working of pumps ➢ Identify the trouble shooting of IC engines **Contents:** 4.1 Classification of pumps. 4.2 Type of pumps and their working. 4.3 Power required to run the pump. 4.4 Fault finding and remedial action.	08	12
Total	**32**	**50**

Practical:
Skills to be developed:

Intellectual Skills:

1. Understand vapour process of steam boilers & different mountings & accesories
2. Analyze the performance of pumps& turbines

Motor Skills:

1. Use pressure & temp measuring device
2. Operate I C Engine & know the working of dynometers

List of Practicals:

(1)Write a report on visit to Sugar factory/steam power plant consisting of
(a)Working of boiler (b) Working of turbine (c) Foundation of boiler.

(2) Write a report on visit to Sugar factory/steam power plant to observe
(a) Operation of condenser (b) Operation of cooling tower.

(3) To determine brake power of single cylinder diesel engine by conducting trial on it.

(4) To determine overall efficiency of a centrifugal pump by conducting a trial test on it and observe foundation of pump.

(5) Observe the operation of air compressor for identification of sources of air leakage.

(6) Observe the operation of reciprocating pump and identify types of faults and suggest remedial measures.

Learning Resources:
1. Books:

Sr. No.	Author	Title	Publisher
1	Domkundwar V. M	A Course In Thermal Engg.	Dhanpat Rai & Co.
2	R. K. Bansal	Fluid Mechanics & Hydraulic Machine	Laxmi Publication
3	T. S. Rajan	Basic Mechanical Engg.	New Age International
4	Dr. Kripal Singh	Automobile Engineering	Standard Publishers Distributers
5	R. S. Khurmi	A Text Book Of Thermal Engineering	S Chand & Co. Ltd
6	C. M. Agrwal	Atext Book Of Thermal Engg	Wiley Precise Text Book