ELEMENTS OF ELECTRICAL AND MECHANICAL ENGINEERING

Lectures : 4 Periods/Week Sessional marks : 40
Semester End Exam. : 3 Hours Semester End Exam. marks : 60
Credits : 4

Course objectives:

- The course will present how the power is being transmitted using belt drives with many factors effecting in the process
- Presents the concepts of manufacturing processes and the study of their techniques and usage in the industry.
- To present the concepts of thermal prime movers and their principles and operation.
- To present the applications and working operation of air-compressors in thermal engineering stream

.**Course outcomes**

Student will be able to

- Know how the power is transmitted by using belt dives and also the relation between the ratios of tensions in belts and how the factors affect the maximum power transmission and their solutions.
- Know the principles, application and their techniques of the manufacturing processes in engineering science and also the wielding and soldering processes and their differences & purpose of usage of the processes.
- Know technically how the boilers, steam turbines, gas turbines and internal combustion engines function & their working principles and operation and also the basic variation in their use in thermal power plants and automobiles.
- Learn the operation and the applications of Single – Stage and multi-stage reciprocating air compressors and also of the rotary air compressors and their differences in practical application

Part A: ELECTRICAL ENGINEERING

UNIT – I

Electrical Installation

Alternating current and its advantages**;** Single phase and three phase power supply ; Ratings of different electrical appliances ; Wires /Cables ; Standard wire gauge; Number of strands and current carrying capacity ; Types of wiring systems; Fuses ; MCBs; Earthing – Purpose, Types ; First aid for electric shock

Transformers

Function**;** Principle of operation; Construction details ; Types of transformers

UNIT – II

Electrical Machines

Alternators – Principle, Construction details, Applications Single phase induction motor–Principle of operation, types and applications of three phase induction motor – Principle of operation, types and applications

Lightning Phenomenon

What is lightning ?; Charge formation in cloud – Wilson's theory, Simpson's theory; Different forms taken by lightning; Mechanism of forked lightning ; Protection of structures against lightning using

lightning rods

Part B: MECHANICAL ENGINEERING

UNIT – III

Transmission of motion and Power

Methods of drive; Power transmission elements – Shafting , Belt-drive, Belting, Pulleys ; Velocity ratio of pulleys ; Creep and slip in belt; Tension in a belt; Power transmitted by a belt ; Rope drive; Chain drive; Friction drive; Gear drive; Spur gear ; Power transmitted by gearing

Air Compressors

Introduction; reciprocating compressors – Single stage, multi-stage; Rotary compressors

UNIT – IV

Metal Forming

Metal working Processes – Hot working , Cold working ; Rolling – Principle , Rolling stand arrangement , Roll passes, Break down passes, Roll pass sequences ; Extrusion and other processes – Extrusion principle, hot extrusion , Cold extrusion, Extruding tubes ; Wire drawing ; Bar and tube drawing

Fabrication processes

Classification ; Welding – Classification of welding ; Electric arc welding – Principle of arc, Arc welding equipment, Electrodes, Manual metal arc welding, Submerged arc welding

NOTE

1. ***Part A***

   Two questions of 12 marks each will be given from each unit of Part A out of which one is to be answered. Six questions of one mark each will be given from entire Part A syllabus which is a compulsory question.

2. ***Part B***

Two question of 12 marks each will be given from each unit of Part B out of which one is to answered. Six questions of one mark each will be given from entire Part B syllabus which is compulsory question.

3. *In the Semester End Examination, Part A and Part B should be answered on separate booklets.*

TEXT BOOKS

1. Electrical Installation and estimation by M. Rajalingam , Radiant Publishing House
2. Fundamentals of Electrical and Electronics Engineering by T. Thyagarajan , SCITECH Publications (India) Pvt. Ltd., 2004.
3. An Introduction to High Voltage Engineering by Subir Roy, Prentice-Hall of India , 2006.
4. Elements of Mechnical Engineering by K.P. Roy et.al., Media Promoters & Publishers, 1986.
5. Manufacturing Technology – Foundary, Forming and Welding by P.N.Rao , TataMcGraw- Hill Publishing Company Ltd., 2008.