

2/4 B.Tech - THIRD SEMESTER

EC3T6

Elements of Mechanical Engineering

Credits: 4

Lecture : 4 periods/week

Tutorial: 1 period /week

Internal assessment: 30 marks

Semester end examination: 70 marks

Course Objectives:

- To acquire fundamental knowledge of mechanical engineering
- To Know about the casting, welding and lathe
- To acquire the knowledge about basic manufacturing processes, belt and gear drives for power transmission.
- To explore the working of power plants, refrigeration, air conditioning and IC engines
- To acquire basic knowledge on roads and bridges along with principles of surveying and structures

Learning Outcomes:

- Familiarize students with some of the special casting and molding procedures used in industry.
- Studied different welding techniques and their respective applications.
- Awareness of eco-friendly power generation is provided by inclusion of the topic 'Power transmission', to achieve a broad and in-depth education in the subject of power transmission and control with an emphasis on sustainable development related to power generation.
- Provided knowledge about IC Engines, External combustion Engines, boilers, power plants, power generation.
- Imparted knowledge of Refrigeration and air conditioning systems, which is playing prominent role in the present day industry.
- Acquainted the students regarding materials and their mechanical properties.

UNIT-I

Casting: Introduction, General method in making a Casting, pattern: types, materials and allowances. Moulding materials and equipment, Preparation, properties of moulding sands.

UNIT-II

Welding: Principles of gas welding and arc welding, Soldering and Brazing;

Lathe: Description of basic machine tool- Lathe – operations – turning, threading, taper turning and drilling;

UNIT-III

Power Transmission: Introduction to belt and gears drives, types of gears, Difference between open belts and cross belts, power transmission by belt drives; (theoretical treatment only).

UNIT – IV

Power Plants: Introduction, working principle of hydro electric power plant and steam power plant, Alternate sources of energy – solar, wind and tidal power;

UNIT-V

Refrigeration & Air Conditioning: Definition – COP, Unit of Refrigeration, Applications of refrigeration system, vapour compression refrigeration system, simple layout of summer air conditioning system;

UNIT-VI

IC Engines: Introduction , Main components of IC engines , working of 4-stroke petrol engine and diesel engine , working of 2- stroke petrol engine and diesel engine , difference between petrol and diesel engine , difference between 4- stroke and 2- stroke engines.

UNIT-VII

Simple Stress and Strains: Elasticity and Plasticity – Types of stresses & strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain- Elastic moduli & the relationship between them.

UNIT-VIII

Properties of Materials: Physical properties - Mechanical properties – Electrical properties, Magnetic Properties and Chemical properties.

Learning Resources

Text Books:

1. An Integrated Course in Mechanical Engineering, R.K.Rajput, Biral Publications, 3rd ed., 2003.
2. I.C. Engines, V. GANESAN, Tata McGraw-Hill, 3rd edition, 2007.
3. Strength of Materials, R.K. Rajput, S.Chand & Company, 5th edition, 2012.
4. Thermal Engineering, R.K. Rajput, Lakshmi Publications, 6th edition, 2006.

References:

1. Thermodynamics and Heat Engines, R. Yadav, Central Book Depot, 7th edition, 1999.
2. Strength of Materials, R.K.Bansal, Laxmi Publishers, 4th edition, 2009.
3. Fundamentals of I.C.Engines - P.W. Gill, J.H. Smith & Ziurys- IBH & Oxford, 4th edition, 2007.