ELEMENTS OF MECHANICAL ENGINEERING
(Only for ECE during I B.Tech., II Semester)

Course Code: EC2T3   **Credits: 3**
Lecture: 3 periods/week   **InternalAssessment:30marks**
Tutorial/Interaction Session: 1 period/week   **Semester end examination: 70 marks**

Course Objectives:

1. To introduce basic knowledge about special casting, molding procedures and different welding techniques used in industry.
2. To impart basic knowledge on simple stresses & strains, Properties of materials.
3. To impart basic knowledge on centroids& Moment of Inertia of plane Figures.
4. To impart basic knowledge on basics of thermodynamics and Laws of thermodynamics.
5. To teach the working principle of Internal Combustion Engines.

Course Outcomes:

1. Familiarize students with some of the special casting and molding procedures used in industry and different welding techniques with their respective applications.
2. Acquainted the students regarding simple stress and strains and their material properties.
3. Attain basic knowledge on centroids& Moment of Inertia of plane Figures.
4. Awareness on basics of thermodynamics and Laws of thermodynamics.
5. Imparted knowledge about IC Engines, External combustion Engines.
6. Knowledge of Refrigeration and air conditioning systems, which is playing prominent role in the present day industry.

UNIT-I
Casting: Introduction, General method in making a Casting, pattern: types, materials and allowances. Moulding materials and equipment, Preparation, properties of moulding sands.
Welding: Principles of gas welding and arc welding, Soldering and Brazing.

UNIT-II
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.

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

UNIT-III

Centroids: Introduction, Determination of centroid for plane figures rectangle and Triangle, Centroids of composite plane figures for I section, L section & T section only.

Moment of Inertia of Plane Figures: Moment of Inertia of a plane figure with respect to an axis in its plane – Moment of inertia with respect to an axis perpendicular to the plane of the figure – Parallel axis theorem --- Moment of Inertia of I section, L section & T section only.

UNIT-IV

Basics of Thermodynamics: Introduction and definition of thermodynamics, Dimensions and units, systems, surroundings and universe, Reversibility and Irreversibility, Quasi-static process, Energy, Heat and Work.

Introduction to Law of Thermodynamics: Zeroth Law of Thermodynamics, First law of thermodynamics and Second law of thermodynamics.

UNIT-V

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.

LEARNING RESOURCES

Text books:
1. Fundamentals of Mechanical Engineering / G.S.Sawheny- PHI.
2. An Integrated Course in Mechanical Engineering / R.K.Rajput /Birala Publications.
3. I.C. Engines / V. GANESAN- TMH.
4. Strength of Materials by R.K. Rajput, S.Chand & Company.
5. Thermal Engineering / R.K. Rajput / Lakshmi Publications.

References:
1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot.
2. Strength of Materials by R.K.Bansal, Laxmi Publishers.
3. Engineering Mechanics Statics and dynamics by A.K.Tayal, Umesh Publication, Delhi.
4. Fundamentals of I.C.Engines - P.W. Gill, J.H. Smith & Ziurys- IBH & Oxford pub.

e-learning resources:

http://nptel.ac.in/courses.php

http://jntuk-coeerd.in/