1/4 B.Tech. SECOND SEMESTER

ME2T5 1 BASIC MECHANICAL ENGINEERING Credits: 4

Lecture: 4 periods/week **Internal assessment: 30 marks**
Tutorial: - - **Semester end examination: 70 marks**

Objectives:

The main objective of this subject is to provide knowledge about IC Engines, External combustion Engines, boilers, power plants, power generation, materials and their mechanical properties. It also imparts knowledge of Refrigeration and air conditioning systems, which is playing prominent role in the present day industry. The objective of inclusion of the topic power transmission is 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. Different welding techniques are studied provided with their respective applications. It familiarizes students with some of the special casing and molding procedures used in industry.

Learning outcomes:

At the end of course the student will be able to:

1. Familiarize students with some of the special casting and molding procedures used in industry
2. Studied different welding techniques and their respective applications
3. 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
4. Provided knowledge about IC engines, external combustion engines, boilers, power, power generation.
5. Imparted knowledge of refrigeration and air conditioning systems, which is playing prominent role in the present day industry
6. 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. Sawheny, G.S. Fundamentals of Mechanical Engineering, (2nd edition), Prentice-Hall Of India Pvt. Limited, New Delhi, 2009.
2. Rajput, R.K. An Integrated Course in Mechanical Engineering, (3rd edition), Birla Publications, 2003. Ganesan,V. I.C. Engines, (3rd edition), Tata McGraw-Hill, New Delhi, 2007.

Reference books:

1. Rajput, R.K. Strength of Materials, (5th edition), S. Chand & Company, 2012.
2. Rajput, R.K. Thermal Engineering, (6th edition), Lakshmi Publications, 2006.
3. Yadav, R. Thermodynamics and Heat Engines, (7th edition), Central Book Depot, 1999.
4. Bansal, R.K. Strength of Materials, (4th edition), Laxmi Publishers, 2009.