Fundamentals of Mechanical Engineering

1.1 Course Number: PE202

1.2 Contact Hours: 3-1-0 Credits: 11

1.3 Semester-offered: 2nd Year-Even

1.4 Prerequisite: Engineering thermodynamics, Engineering mathematics, Fluid mechanics

1.5 Syllabus Committee Member: Dr. Vishnu Chandrasekharan Nair, Dr. Tushar Sharma

2. **Objective:**

- To introduce basic concepts of Mechanical Engineering
- To kindle interest in Mechanical Engineering
- To impart fundamental understanding of mechanical systems

3. **Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Engineering Mechanics	Free-body diagrams and equilibrium; trusses and frames, Friction: Description and applications of friction in wedges, thrust bearing (disk friction), journal bearing (Axle friction); Rolling resistance. Center of Gravity and Moment of Inertia: First and second moment of area; Radius of gyration; Parallel axis theorem; Mass moment of inertia.	14
2	Theory of machines	Mechanisms: Types of Motion, Links, Kinematic Pair, Types of Joints, Degree of Freedom, Power transmission, belt, rope, chain and gear drives. Gears and gear trains, Cams and followers, Flywheels, clutches, brakes. Vibration: Elements of a vibrating system, equation of motion, types of vibrations.	14
3	Thermal Engineering	Vapor and gas power cycles, concepts of regeneration and reheat. I.C. Engines: Air-standard Otto, Diesel and dual cycles, working of two stroke and four stroke engines, petrol and diesel engines, fuel systems, injector and carburetor, ignition system, lubrication and cooling systems.	12
		Total	**40**

4. Readings

4.1 Textbook:

4.1.1. I.H. Shames, Engineering Mechanics: Statics and Dynamics, PHI, 2002..

4.1.2. Rattan, S. S. Theory of Machines, Tata McGraw Hill, 2005.

4.1.3. Heywood, J. B. I.C engine fundamentals. McGraw-Hill, 2011.

4.2 Reference books:

4.2.1. Som, S.K., Biswas, G. Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw-Hill Education, 2003.

4.2.2. Thomson, W. Theory of vibration with applications. CrC Press, 2018.

4.2.3. Rathore, M. M. Thermal Engineering, McGraw Hill Education India, 2010.

5 Outcome of the Course: At the end of the course, the students will have exposed to the fundamental aspects of mechanical engineering. The students will have gained idea about basic principles, working and applications of mechanical engineering systems.