

Course No	Title of the Course	Course Structure	Pre-Requisite
FC006	Basics of Mechanical Engineering	L-T-P: 4-0-0	None
COURSE OUTCOMES (COs) After completion of this course, the students are expected to be able to demonstrate the following knowledge, skills and attitudes: <ol style="list-style-type: none"> 1. To know force, its nature and applications. 2. To know the basic principles of civil and mechanical structures. 3. To understand the fundamentals of thermodynamics and fluid mechanics. 4. To know the working principles of IC Engines. 5. To understand the importance of different engineering materials. 6. To understand the different manufacturing processes and machining operations. 7. To know the use of Automation in manufacturing. 			
COURSE CONTENT <p style="text-align: center;"><u>Group A</u></p> <p>Unit I <u>Introduction to Engineering Mechanics:</u> Rigid and Elastic bodies, Force and its type, Law of parallelogram of forces, Triangle law of forces, Polygon law of forces, Lami's theorem, Laws of motion, Moment, Couple, Varignon's theorem, Conditions of equilibrium, Concept of free body diagram, Coulomb's friction, Plane trusses, Analysis of trusses, Numerical problems. (6 Hours)</p> <p>Unit II <u>Introduction to Strength of Materials:</u> Simple stresses and strains, Direct, shear, and volumetric stresses and strains, Hooke's law, Tension test, Elastic constants, Poisson's ratio, Factor of safety, Introduction to beam, Types of beams, Types of loads, Shear force and bending moment diagrams (SFD and BMD) for Simple and Cantilever beams under various loading conditions, Numerical problems. (6 Hours)</p> <p>Unit III <u>Introduction to Manufacturing Engineering:</u> Classification and use of engineering materials, Basic principles and applications of methods of manufacturing such as casting, forming and joining; Working principles and applications of machining operations such as Turning, Thread cutting, Milling, Shaping, Grinding, etc., Use of automation in manufacturing. (6 Hours)</p> <p style="text-align: center;"><u>Group B</u></p> <p>Unit IV <u>Introduction to Thermodynamics:</u> Thermodynamic system, Cycle, Path, Thermodynamic properties, Extensive and intensive properties, Thermodynamic equilibrium, Reversible and irreversible processes, isochoric, Isothermal, Isobaric, Isentropic and Polytropic processes, First law of thermodynamics applied to a cycle and process, Kelvin-Planck and Clausius statements of Second law of thermodynamics, Carnot cycle, Entropy, Clausius inequality, Internal combustion (IC) engines, IC engines terminology, Spark ignition (SI) and Compression ignition (CI) engines, Two and four stroke engines, Air standard cycles such as Otto, Diesel, Dual and Brayton cycles, Numerical problems. (12 Hours)</p> <p>Unit V <u>Introduction to Fluid Mechanics:</u> Properties of a fluid, Density, Specific volume, Specific weight, Specific gravity, Kinetic and Kinematic viscosity, Pascal's law and its applications, Laminar and turbulent flow, Use of continuity equation and Bernoulli's equation, Numerical problems. (6 Hours)</p>			
SUGGESTED READINGS <ol style="list-style-type: none"> 1. Engineering Mechanics- Beer and Johnston, Pearson 2. Strength of Materials- D.K. Singh, CRC Press 3. Engineering Thermodynamics- Nag, McGraw-Hill 4. Fluid Mechanics- Cengel, McGraw-Hill 5. Fundamentals of Manufacturing Engineering- D.K. Singh, CRC Press 			