

Course code: Course Title	Course Structure			Pre-Requisite
CH102: Mechanical Engineering Concepts for Chemical Engineers	L	T	P	NIL
	3	1	0	

Course Objective: To familiarize the students with the concepts of thermodynamics, fluid mechanics, power plants, engineering materials, manufacturing processes and metrology.

S. NO	Course Outcomes (CO)
CO1	Describe the basic concepts of thermodynamics / fluid mechanics and engineering materials
CO2	Describe the principle of first and second law of thermodynamics and laws of fluid mechanics & engineering materials.
CO3	Describe application of TD & FM Laws.
CO4	Apply manufacturing processes for various machining elements & machining processes.
CO5	Analyze thermal power generation and power plants.
CO6	Analyze measuring instruments and gauges.

S. NO	Contents	Contact Hours
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UNIT 1	Introduction: Introduction to Thermodynamics, Concepts of systems, control volume, state, properties, equilibrium, quasi-static process, reversible & irreversible process, cyclic process. Zeroth Law and Temperature, Ideal Gas. Heat and Work.	6
UNIT 2	First Law of Thermodynamics for closed & open systems. Non-Flow Energy Equation. Steady State, Steady Flow Energy Equation. Second Law of Thermodynamics-Kelvin and Plank's Statements, Clausius inequality, Definition of Heat Engines, Heat pumps, Refrigerators. Concept of Energy and availability. Carnot Cycle; Carnot efficiency, Otto, Diesel, Dual cycle and their efficiencies.	6
UNIT 3	Principles of power production, basic introduction about thermal power plant, hydroelectric power plant and nuclear power plant.	6
UNIT 4	Properties & Classification of Fluids, Ideal & real fluids, Newton's law of viscosity, Pressure at a point, Pascal's law, Pressure variation in a static fluid, General description of fluid motion, stream lines, continuity equation, Bernoulli's equation, Steady and unsteady flow.	6
UNIT 5	Introduction to engineering materials for mechanical construction. Composition, mechanical and fabricating characteristics and applications of various types of cast irons, plain carbon and alloy steels, copper, aluminium and their alloys like duralumin, brasses and bronzes cutting tool materials, super alloys thermoplastics, thermosets and composite materials	6
UNIT 6	Introduction to Manufacturing processes for various machine elements. Introduction to Casting & Welding processes. Sheet metal and its operations. Introduction to machining processes – turning, milling, shaping, drilling and boring operations. Fabrication of large and small assemblies – examples nuts and bolts, turbine rotors etc.	6
UNIT 7	Introduction to quality measurement for manufacturing processes; standards of measurements, line standards, end standards, precision measuring instruments and gauges: Vernier calliper, height gauges, micrometre, comparators, dial indicator, and limit gauges.	6
TOTAL		42

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Engineering Thermodynamics; P. K. Nag, Tata McGraw-Hill	2017
2	Fundamentals of Classical Thermodynamics; G. J. Van Wylen, R. E. Santag.	1994

3	Manufacturing Processes; Kalpakjian.	2018
4	Basic Mechanical Engineering; 1/e, Pravin Kumar, Pearson Education, Delhi	2018
5	Introduction to Fluid Mechanics and Fluid Machines, S. K. Som and G. Biswas	2017
6	Fluid Mechanics and Hydraulic Machines, R. K. Bansal	2010
7	Workshop Practices, K. Hazara Chowdhary	2009
8	Workshop Technology, W. A. J. Chapman	972
9	Production Engineering, R. K. Jain, Khanna Publishers	2001