Course Number and Name
BME405&Thermal Engineering &Fluid Mechanics

Credits and Contact Hours
3 & 45

Course Coordinator's Name
Mr.Ravi

Text Books and References

Text Books:
1. Nag P.K, "Engineering Thermodynamics", Tata McGraw Hill, Fourth Edition, 1993.
2. Kothandaraman C.P, "Thermal Engineering", Dhanpat Rai and Co, 2013
3. Kumar K.L. "Fluid Mechanics" Eurasia Publishers, 1990.
Rajput R.K., "Fluid Mechanics and Hydraulic Machines", S. Chand & Co. India, 1998
References:
1. Shames I.H. "Mechanics of Fluids", Kogakusha Publications. Tokyo 1998.
2. Reynolds, "Thermodynamics", McGraw Hill Publications, 1996

Course Description

To understand the concepts of Energy in general and Heat and Work in particular, to understand the fundamentals of quantification and grade of energy, to understand fluid statics and fluid dynamics and to study the applications of mass, momentum and energy equation in fluid flow.

Prerequisites	Co-requisites
Basic Mechanical Engineering	Nil

required, elective, or selected elective (as per Table 5-1)
Required

Course Outcomes (COs)

CO1:To understand a thermodynamic system, closed and open systems, state, equilibrium, process, cycle and system properties, thermo dynamic laws and apply it to solve problems.
CO2:To study and analyze the efficiency of IC engines and compressor and to solve problems.
CO3:To understand the thermodynamics of refrigerators and heat pumps
CO4:To study the fluid flow and the various theorems and concepts associated with that.
CO5:Ability to understand to identify, formulate, and to solve problems of dimensional analysis, pumps and turbines

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	L		M		M		M			M		M
CO2	L				H	H	M	M		M		H
CO3	L	H			H	H	L	L		M		H
CO4	M	H	L		H	H	L	M		M		H
CO5	L	M	M		H		M			M	L	M

List of Topics Covered

UNIT I   BASIC CONCEPTS AND LAWS OF THERMODYNAMICS 9

Systems zeroth law, first law of thermodynamics – concept of internal energy and enthalpy applications of closed and open systems, second law of thermodynamics – concept of entropy –

clausius inequality and principle of increase in irreversible processes.

UNIT II   IC ENGINE AND COMPRESSORS   9

Basic IC engine and gas turbine cycles, compressors – single stage Multi stage, reciprocating, vane gear, roots, compressor(constructional features and applications only).

UNIT III   THERMODYNAMICS OF REFRIGERATORS AND PUMPS   9

Properties of steam – Rankine cycle – one dimensional flow through nozzles and applications to jet and rocket propulsions – basic thermodynamics of refrigerators and heat pumps.

UNIT IV   BASIC CONCEPTS AND FLOW OF FLUIDS   9

Introduction – classification – types of fluids – properties – properties – law of pressure – manometer – mechanical gauges – types of fluid flow – continuity equation – energy equation – Beroulli's theorem – orifice and mouth piece.

UNIT V   DIMENSIONAL AND MODEL ANALYSIS   9

Introduction – dimensional analysis – Rayleigh's method and Bukingham's method – similitude dimensionless numbers – model studies, pump turbines – type of pumps – reciprocating pumps – constructional details – coefficient of discharge – slip – power required – centrifugal pump – working principle – working principle.