

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

1.	Title of the Course	Thermodynamics
2.	Course Number	ME2101
3.	Status of the Course	Core
4.	Structure of Credits	2-1-0-3
5.	Offered To	UG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Mechanical Engineering
8.	To take effect from	July 2018
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	Course Objective: To describe various thermodynamic processes; To state the laws of thermodynamics and describe their significance; To understand the limitations of different energy conversion processes; To introduce concepts of irreversibly, entropy and maximum work; To establish the relation between commonly measurable properties and properties that can not be measured directly; To develop rules for determining non reactive gas mixture properties.	
12.	Course Content: Fundamentals - System, control volume, property, state and process, exact and Inexact differentials; Work - Thermodynamic definition of work, displacement work, path dependence of displacement work; Temperature - Definition of thermal equilibrium, Zeroth law, definition of temperature and temperature scales; Heat - Definition, examples of heat/work interaction in systems; First Law - Cyclic and non-cyclic processes, concept of total energy; Pure substance - Two property rule, properties of water-steam system, definitions of saturated states, P-v-T surface, use of steam tables, saturation tables, superheated tables, identification of states and determination of properties; First law for flow processes - Derivation of general energy equation for a control volume, steady flow processes, unsteady processes; Second law - Kelvin-Planck and Clausius statements, definition of reversible process, Internal and external irreversibilities, Carnot cycle, absolute temperature scale; Entropy - Clausius inequality, definition of entropy, demonstration that entropy is a property, evaluation of entropy change for solids, liquids, and ideal gases undergoing various processes, available and unavailable energy, concept of Irreversibility and lost work; Thermodynamics property relations; Gas mixtures; Chemical reactions.	
13.	Text book(s): 1. Cengel Y A and Boles M A, <i>Thermodynamics:An Engineering Approach</i> , 8th Edition, McGraw Hill (2014). 2. Sonntag R E, Borgnakke C and Van wylene G J, <i>Fundamentals of Thermodynamics</i> , 7th Edition, Wiley (2009).	
14.	Reference(s): 1. Moran M J and Shapiro H N, <i>Fundamental of Engineering Thermodynamics</i> , 7th Edition, John Wiley (2010).	