Course Plan

Name of the Course: ENGINEERING THERMODYNAMICS Code of the course:3ME4-05

Vision and Mission of Institute:

Vision: To become a renowned center of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities.

Mission:

M1: Focus on evaluation of learning outcomes and motivate students to inculcate research aptitude by project based learning.

M2: Identify, based on informed perception of Indian, regional and global needs, areas of focus and provide platform to gain knowledge and solutions.

M3: Offer opportunities for interaction between academia and industry.

M4: Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

Vision and Mission of Department:

Vision: The Mechanical Engineering Department strives to be recognized globally for excellent technical knowledge and to produce quality human resource, who can manage the advance technologies and contribute to society through entrepreneurship and leadership.

Mission:

M1: To impart highest quality technical knowledge to the learners to make them globally competitive mechanical engineers.

M2: To provide the learners ethical guidelines along with excellent academic environment for a long productive career.

M3: To promote industry-institute linkage.

Course Outcomes

CO1: To state the basic concept and law of Engineering Thermodynamics.

CO2: To calculate the properties of substance by using property tables, thermodynamics relationship.

CO3: To illustrate the Thermodynamics Cycles.

S.No.	Lecture No.	Topic to be discussed	Relevant CO	Objective of Unit	Teaching Method	Book referred	From page to
1	1	Basic Concepts and definitions of Thermodynamics:	CO1	To understand the Basic concepts and first law of thermodynamics	Chalk and Talk	P.K Nag	8,9
2	2	System, Surroundings, Property	CO1		Chalk and Talk	P.K Nag	10,11
3	3	Energy, Thermodynamic Equilibrium	CO1		Chalk and Talk	P.K Nag	12,13
4	4	Process,work and modes of work.	CO1		Chalk and Talk	P.K Nag	19,20
5	5	numerical Problems	CO1		Chalk and Talk	P.K Nag	27,28,29
6	6	Zeroth of Thermodynamics, Temperature scale, First law of thermodynamics,	CO1		Chalk and Talk	P.K Nag	33,78,79
7	7	First law analysis of some elementary processes ,Steady Flow energy Euqation	CO1		Chalk and Talk	P.K Nag	98, 99, 100
8	8	numerical Problems	CO1		Chalk and Talk	P.K Nag	64, 65, 112
9	9	Second Law of Thermodynamics: Heat engine,Heat pump and refrigerator,Second law of thermodynamics,	CO1	To understand the second law of thermodynamics and concept of entropy generation and available energy	Chalk and Talk	P.K Nag	132, 133, 135
10	10	Equivalence of the Kelvin-Plank and Clausius statements.Reversible and Irreversible Processes,	CO1		Chalk and Talk	P.K Nag	136, 137
11	11	Carnot engine, Efficiency of a Carnot engine, Carnot principle,thermodynamic temperature scale,	CO1		Chalk and Talk	P.K Nag	146, 149, 150, 151
12	12	numerical Problems	CO1		Chalk and Talk	P.K Nag	158, 159
13	13	Entropy: Entropy,Clausis Inequality, Calculation of Entropy change, Principle of entropy increase	CO1		Chalk and Talk	P.K Nag	177, 178, 180
14	14	Temperature-Entropy diagram, Second law analysis of a control volume.	CO1		Chalk and Talk	P.K Nag	181, 182
15	15	Availability: Available energy, Loss in available energy, Availability , Function, Irreversibility.	CO1		Chalk and Talk	Sonntag	311, 312, 313, 314
16	16	numerical Problems	CO1		Chalk and Talk	Sonntag	334, 335
17	17	Thermodynamic Properties of Fluids: Pure substance, Concept of Phase, Graphical representation of p-v-T data	CO2	To understand the fluids behaviour as pure substance and steam characterstics as change of P ,V and T and Ideal and real Gas equation	Chalk and Talk	P.K Nag	295, 296, 297, 300
18	18	Properties of steam. Steam tables, Mollier chart , numerical Problems	CO2		Chalk and Talk	P.K Nag	304-308
19	19	numerical Problems	CO2		Chalk and Talk	P.K Nag	318, 319, 320
20	20	Ideal Gas and Real Gas: Ideal gas, Real gas, Internal energy, enthalpy and specific heats of an ideal gas,	CO2		Chalk and Talk	P.K Nag	348, 378, 379
21	21	equations of state,Dalton's law of partial pressures,Gibbs Dalton law, Thermodynamic properties of gas mixture	CO2		Chalk and Talk	P.K Nag	374, 375
22	22	numerical Problems	CO2		Chalk and Talk	P.K Nag	382-385
23	23	Thermodynamic Relations: Thermodynamic variables :Independent and dependent, Maxwell's thermodynamic relations,	CO2	To understand thermodynamic variable as depend and independent and derieve mathmatical relation for them. To	Chalk and Talk	P.K Nag	420, 422
24	24	Thermodynamic relations involving entropy, Thermodynamic relations involving enthalpy and internal energy,	CO2		Chalk and Talk	P.K Nag	423, 424, 425
25	25	Joule-Thomson coefficient, Clapeyron equation. numerical Problems	CO2		Chalk and Talk	P.K Nag	429, 432, 453
26	26	Power Cycles: Otto cycle, Efficincies and mean effective presure	CO2		Chalk and Talk	P.K Nag	552
27	27	Diesel cycle, Dual cycle,Efficincies and mean effective presure	CO2		Chalk and Talk	P.K Nag	558

28	28	Brayton cycle and Ericsson cycle.	CO2	relation for them. To understand Gas power cycles	Chalk and Talk	P.K Nag	566
29	29	numerical Problems	CO2		Chalk and Talk	P.K Nag	587, 589
30	30	numerical Problems	CO2		Chalk and Talk	P.K Nag	590, 591
31	31	Vapour power cycle: Rankine cycle	CO3	To understand the vapour power cycle and variable to increase its efficiency	Chalk and Talk	Sonntag	348, 349
32	32	effect of operating conditions on its efficiency,	CO3		Chalk and Talk	Sonntag	350, 352
33	33	properties of ideal working fluid in vapour power cycle	CO3		Chalk and Talk	P.K Nag	484, 486
34	34	numerical Problems	CO3		Chalk and Talk	P.K Nag	536, 537, 538
35	35	Reheat cycle, numerical Problems	CO3		Chalk and Talk	Sonntag	356-358
36	36	regenerative cycle, numerical Problems	CO3		Chalk and Talk	Sonntag	359-361
37	37	bleeding extraction cycle,	CO3		Chalk and Talk	Sonntag	362, 363
38	38	feed water heating co-generation cycle.	CO3		Chalk and Talk	Sonntag	371, 372
39	39	numerical Problems	CO3		Chalk and Talk	P.K Nag	593, 594, 595
40	40	Revision	CO1,CO2, CO3		Chalk and Talk		
	BS-1	To communicate effectivelythe concept of internal combustion engines and try to think beyond curriculum in alternative source of energy					
	BS-2	Brayton cycle-Gas power plant					

Details of BOOKS

Name of Books	Publications
Engineering Thermodynamics	Tata Mc-Graw Hill
Fundamental of Thermodynamics,	John Wiley & Sons, Inc.