

<b>LESSON PLAN</b>	
Name of Faculty	: <b>SH HITESH AGGARWAL</b>
Discipline	: <b>Mechanical Engineering</b>
Semester	: <b>3<sup>rd</sup> Semester</b>
Subject	: <b>THERMODYNAMICS - I</b>
Lesson Plan Duration:	: <b>15 Weeks</b>
Work Load (Lecture/Practical)	: <b>3Hrs. Lecture &amp; 3 Practical</b>

<b>Week</b>	<b>Day</b>	<b>Topic(Including Assignment/Test)</b>	<b>Practical</b>
1	1	Fundamental Concepts Thermodynamic state and system, boundary, surrounding, universe, thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic	Determination of temperature by thermocouple
	2	properties of system – intensive and extensive, thermodynamic equilibrium, quasi – static process, reversible and irreversible processes	
	3	Zeroth law of thermodynamics	
2	4	definition of properties like pressure, volume, temperature, enthalpy and internal energy	Determination of temperature by pyrometer
	5	Laws of Perfect Gases Definition of gases, explanation of perfect gas laws – Boyle's law, Charle's law, Avagadro's law, Regnault's law	
	6	Universal gas constant, Characteristic gas constants and its derivation.	
3	7	Specific heat at constant pressure, specific heat at constant volume of a gas, derivation of an expression for specific heats with characteristics	Determination of temperature by Infrared thermometer
	8	simple numerical problems on gas equation	

	9	Thermodynamic Processes Types of thermodynamic processes	
4	10	isochoric, isobaric, isothermal	Demonstration of mountings and accessories of a boiler.
	11	adiabatic, isentropic, polytropic	
	12	throttling processes, equations representing the processes	
5	13	Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for the above process.	Study the working of Lancashire boiler and Nestler boiler.
	14	1 <sup>st</sup> Class test	
	15	1 <sup>st</sup> sessional test	
6	16	Laws of Thermodynamics Laws of conservation of energy, first law of thermodynamics (Joule's experiment) and its limitations	Study of working of high pressure boiler
	17	Application of first law of thermodynamics to Non- flow systems – Constant volume, Constant pressure, Adiabatic and polytropic processes	
	18	Steady flow energy equation, Application of steady flow energy equation for turbines, pump, boilers, compressors, nozzles, and evaporators.	
7	19	Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement, Classius statement, equivalency of statements	Study of boilers (Through industrial visit)
	20	Perpetual motion Machine of first kind, second kind	

	21	Carnot engine,	
8	22	Introduction of third law of thermodynamics	Study of boilers (Through industrial visit)
	23	concept of irreversibility and concept of entropy.	
	24	Concept of ideal gas, enthalpy and specific heat capacities of an ideal gas, P – V – T surface of an ideal gas	
9	25	triple point, real gases, Vander-Wall's equation	Study of boilers (Through industrial visit)
	26	Formation of steam and related terms, thermodynamic properties of steam, steam tables	
	27	sensible heat, latent heat, internal energy of steam, entropy of water, entropy of steam, T- S diagrams, Mollier diagram (H – S Chart)	
10	28	Expansion of steam, Hyperbolic, reversible adiabatic and throttling processes, determination of quality of steam (dryness fraction)	VIVA
	29	2 <sup>nd</sup> class test	
	30	2 <sup>nd</sup> sessional test	
11	31	Uses of steam, classification of boilers, function of various boiler mounting and accessories	Determination of Dryness fraction of steam using calorimeter.
	32	comparison of fire tube and water tube boilers	
	33	Construction and working of Lancashire boiler, Nestler boiler, Babcock & Wilcox Boiler	

12	34	Introduction to modern boilers.	Determination of Dryness fraction of steam using calorimeter.
	35	Meaning of air standard cycle – its use, condition of reversibility of a cycle	
	36	Description of Carnot cycle, Otto cycle	
13	37	Diesel cycle, simple problems on efficiency for different cycles.	Demonstrate the working of air compressor.
	38	Comparison of Otto, Diesel cycles for same compression ratio, same peak pressure developed and same heat input	
	39	Reasons for highest efficiency of Carnot cycle and all other cycles working between same temperature limits	
14	40	Functions of air compressor – uses of compressed air, type of air compressors	Demonstrate the working of air compressor.
	41	Single stage reciprocating air compressor, its construction and working, representation of processes involved on P – V diagram, calculation of work done	
	42	Multistage compressors – advantages over single stage compressors, use of air cooler, condition of minimum work in two stage compressor (without proof) simple problems Multistage compressors	
15	43	3 <sup>rd</sup> class test	VIVA
	44	Rotary compressors – types, working and construction of centrifugal compressor, axial flow compressor, vane type compressor	
	45	3 <sup>rd</sup> sessional test	