Lesson Plan

Name of the faculty: Sh. Aakash Suran, Lecturer in Mechanical Engg.

Discipline: Mechanical

Semester: 3rd Mechanical A & B

Subject: Thermodynamics - I

Duration: 15 weeks

Work Load (Lecture/ Practical) per week (in hours): Lectuers- 03, Practicals-02

Week	Theory		Practical	
	Lecture day	**Topic (including assignment / test)**	**Practical Day**	**Topic**
1st	1st	Thermodynamic state and system, boundary, surrounding, universe, thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopicand microscopic	1st & 2nd	Determination of temperature by 1.Thermocouple 2.Pyrometer 3.Infrared thermometer
	2nd	properties of system – intensive and extensive, thermodynamic equilibrium, quasi – static process		
	3rd	reversible and irreversible processes, Zeroth law of thermodynamics, definition of properties like pressure, volume, temperature, enthalpy and internal energy.		
2nd	1st	revision		
	2nd	Definition of gases, explanation of perfect gas laws – Boyle's law, Charle's law, Avagadro's law, Regnault's law		
	3rd	Universal gas constant, Characteristic gas constants and its derivation.		
3rd	1st	Specific heat at constant pressure, specific heat at constant volume of a gas, derivation of an expression forspecific heats with characteristics	1st & 2nd	Study the working of Nestler boiler.
	2nd	numerical problems on gas equation		
	3rd	Types of thermodynamic processes – isochoric, isobaric, isothermal, adiabatic, isentropic		
4th	1st	polytropic and throttling processes, equations representing the processes		
	2nd	Derivation of work done, change in internal energy, change in entropy, rate of		

		heat transfer for the above processes		
	3rd	Revision		
5th	1st	Laws of conservation of energy, first law of thermodynamics (Joule's experiment) and its limitations	1st & 2nd	Study of working of high pressure boiler.
	2nd	Application of first law of thermodynamics to Non-flow systems – Constant volume, Constant pressure		
	3rd	Adiabatic and polytropic processes, steady flow energy equation		
6th	1st	Application of steady flow energy equation for turbines, pump, boilers, compressors, nozzles, and evaporators.		
	2nd	Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement		
	3rd	Classius statement, equivalency of statements, Perpetual motion Machine of first kind, second kind		
7th	1st	Carnot engine, Introduction of third law of thermodynamics, concept of irreversibility and concept of entrop	1st & 2nd	Demonstration of mountings and accessories on a boiler.
	2nd	Revision		
	3rd	Revision		
8th	1st	Concept of ideal gas, enthalpy and specific heat capacities of an ideal gas		
	2nd	P – V – T surface of an ideal gas		
	3rd	triple point, real gases, Vander-Wall's equation		
9th	1st	Revision	1st & 2nd	Determination of dryness fraction of steam using calorimeter.
	2nd	Revision		
	3rd	Formation of steam and related terms, thermodynamicproperties of steam, steam tables, sensible heat, latent heat, internal energy of steam,entropy of water, entropy of steam		
10th	1st	T- S diagrams, Mollier diagram (H – S Chart),		
	2nd	Expansion of steam, Hyperbolic, reversible adiabatic and throttling processes, determination of quality of steam(dryness fraction),		

	3rd	Revision		
11th	1st	Revision	1st & 2nd	Demonstrate the working of air compressor.
	2nd	Uses of steam, classification of boilers, function of various boiler mounting and accessories		
	3rd	comparison of fire tube and water tube boilers. Construction and working of Lancashire boiler, Nestler boiler		
12th	1st	Babcock & Wilcox Boiler. Introduction to modern boilers.		
	2nd	Meaning of air standard cycle – its use, condition of reversibility of a cycle		
	3rd	Description of Carnot cycle, Otto cycle, Diesel cycle, simple problems on efficiency for different cycles		
13th	1st	Comparison of Otto, Diesel cycles for same compression ratio, same peak pressure developed and same heat input	1st & 2nd	Industrial visit may be planned to show working of boilers.
	2nd	Reasons for highest efficiencyof Carnot cycle and all other cycles working between same temperature limits		
	3rd	Revision		
14th	1st	Functions of air compressor – uses of compressed air, type of air compressors		
	2nd	Single stage reciprocating air compressor, its construction and working, representation of processes involved on P – V diagram, calculation of work done		
	3rd	Multistage compressors – advantages over single stage compressors, use of air cooler, condition of minimum work in two stage compressor (without proof), simple problems		
15th	1st	Rotary compressors – types, working and construction of centrifugal compressor, axial flow compressor, vane type compressor		
	2nd	Revision		
	3rd	Revision		