

Lesson Plan					
Name of Faculty Member	H.S.Saini				
Discipline	MECHANICAL ENGINEERING				
Semester	3rd				
Subject	THERMODYNAMICS- 1				
Lesson plan duration	16 week ( from September 2022 to January 2023)				
Week	Theory			Practical	
	Lecturer day	Topic ( including assignment/test)		Practical day	Topic
1st	Day 1	Unit -1 Fundamental Concepts Thermodynamic state and system, boundary, surrounding, universe, thermodynamic systems –closed, open, isolated, adiabatic system		Day 1	Determination of temperature by Thermocouple
	Day 2	homogeneous and heterogeneous system, macroscopic and microscopic, properties of system–intensive and extensive, process, reversible and irreversible process			
	Day 3	Zeroth law of thermodynamics ,definition of properties like pressure, volume, temperature, enthalpy and internal energy			
2nd	Day 1	Unit – 2 Laws of Perfect Gases Definition of gases, explanation of perfect gas laws- Boyle's law, Charle's law, Avagadro's law, Regnault's law		Day 1	Determination of temperature by Pyrometer
	Day 2	Universal gas constant, Characteristic gas constants and its derivation, Specific heat at constant pressure, specific heat at			
	Day 3	derivation of an expression for specific heats with characteristics, simple numerical problems on gas equation			
3rd	Day 1	Unit – 3 Thermodynamic Processes Types of thermodynamic processes – isochoric, isobaric, isothermal, adiabatic, isentropic, polytropic and throttling process		Day 1	Determination of temperature by Infrared thermometer
	Day 2	equations representing the processes, Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for			
	Day 3	Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for isobaric and isothermal process			
4th	Day 1	Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for adiabatic process		Day 1	Demonstration of mountings and Accessories on a boiler.
	Day 2	Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for polytropic and isentropic process, throttling process			
	Day 3	Unit – 4 Laws of Thermodynamics Laws of conservation of energy, first law of thermodynamics(Joule's experiment) and its limitations,			
5th	Day 1	Application of first law of thermodynamics to Non- flow systems–Constant volume, Constant pressure, Adiabatic and		Day 1	Study the working of Lancashire boiler and Nestler boiler.
	Day 2	steady flow energy equation,			
	Day 3	Application of steady flow energy equation for turbines, pump, boilers, compressors, nozzles, and evaporators.			
6th	Day 1	Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement		Day 1	Study of working of high pressure boiler
	Day 2	Classius statement, equivalency of statements			
	Day 3	Perpetual motion Machine of first kind, second kind			
7th	Day 1	Carnot engine		Day 1	Study of boilers (Through industrial visit)
	Day 2	Introduction of third law of thermodynamics, concept of irreversibility and concept of entropy			
	Day 3	Unit – 5 Ideal and Real Gases Concept of ideal gas, enthalpy and specific heat capacities of an ideal gas,			

8th	Day 1	P – V – T surface of an ideal gas, triple point	Day 1	Determination of Dryness fraction of steam using calorimeter
	Day 2	Real gases, Vander-Wall's equation		
	Day 3	Unit- 6 Properties of Steam Formation of steam and related terms		
9th	Day 1	Thermodynamic properties of steam, steam tables, sensible heat, latent heat, internal energy of steam	Day 1	Demonstrate the working of air compressor
	Day 2	Entropy of water, entropy of steam, T- S diagrams		
	Day 3	Mollier diagram (H – S Chart), Expansion of steam,		
10th	Day 1	Hyperbolic, reversible adiabatic and throttling processes, determination of quality of steam(dryness fraction)	Day 1	Revision of 2 <sup>nd</sup> practical
		Unit- 7 Steam Generators Uses of steam, classification of boilers ,function of various boiler mounting and accessories		
	Day 3	comparison of fire tube and water tube boilers		
11th	Day 1	Construction and working of Lancashire boiler	Day 1	Demonstrate the working of air compressor
	Day 2	Construction and working of Nestler boiler		
	Day 3	Construction and working of Babcock & Wilcox Boiler		
12th	Day 1	Introduction to modern boilers.		
	Day 2	Unit- 8 Air Standard Cycles		
		Meaning of air standard cycle–its use, condition of reversibility of a cycle		
Day 3	Description of Carnot cycle, Otto cycle			
13th	Day 1	Description of Diesel cycle, simple problems on efficiency of different cycles	Day 1	Study the working of Lancashire boiler and Nestler boiler
	Day 2	Comparison of Otto, Diesel cycles for same compressor same peak pressure developed and same heat input.		
	Day 3	Reasons for highest efficiency of Carnot cycle and all other cycles working between same temperature limits		
14th	Day 1	Unit- 9 Air Compressors Functions of air compressor	Day 1	Study of working of high pressure boiler
	Day 2	Uses of compressed air, type of air compressors		
	Day 3	Single stage reciprocating air compressor, its construction and working		
15th	Day 1	representation of processes involved on P–V diagram, calculation of work done.	Day 1	Determination of Dryness fraction of steam using calorimeter.
	Day 2	Multistage compressors – advantages over single stage compressors, use of air cooler		
	Day 3	condition of minimum work in two stage compressor (without proof), simple problems		
16th	Day 1	Types of Rotary compressors	Day 1	Study of working of high pressure boiler
	Day 2	working and construction of axial flow compressor,		
	Day 3	working and construction of vane type compressor		