LESSON PLAN

Name of faculty: **Vaibhav Kumar Bhatt** Discipline: **Mechanical Engineering**

Semester: **3rd Semester** Subject: **Thermodynamics-1**
Lesson Plan Duration: **15 weeks**

Work load (Lecture/ Practical) per week (in hours): **3 Lecture & 4 Practicals**

Week	Theory		Practicals
	Day Lecture	**Topic(Including Assignment/Test)**	
1	1	**UNIT 1** **Fundamental Concepts:** Thermodynamic stateand system, boundary, surrounding, universe	**Practical-1:** Determination of temperature by thermocouple
	2	Thermodynamic systems – closed, open, isolated, adiabatic	
	3	Homogeneous and heterogeneous, macroscopic and microscopic	
2	4	Properties of system – intensive and extensive,thermodynamic equilibrium, Quasi – static process	**Practical-2:** Determination of temperature by pyrometer
	5	Quasi – static process, Zeroth law of thermodynamics	
	6	Definition of properties like pressure, volume,temperature, enthalpy and internal energy	
3	7	**Laws of Perfect Gases:** Definition of gases, explanation of perfect gas laws – Boyle's law, Charle's law, Avagadro's law, Regnault's law	**Practical-3:** Determination of temperature by Infrared thermometer
	8	Universal gas constant, Characteristic gasconstants and its derivation.	
	9	Specific heat at constant pressure, Specific heatat constant volume of a gas	
4	10	Derivation of an expression for specific heats with characteristics	**Practical-4:** Study the working of Nestler boiler.
	11	Simple numerical problems on gas equation	
	12	**UNIT 2** **Thermodynamic Processes:** Types ofthermodynamic processes	
5	13	Isochoric, isobaric, isothermal, adiabatic, isentropic, polytropic	**Practical-5:** Study of working of high pressure boiler.
	14	Throttling processes, equations representing theprocesses	
	15	Derivation of work done, change in internal energy, change in entropy	
6	16	Rate of heat transferfor the above process. **ASSIGNMENT - 1**	**Practical-6:** Demonstration of mountings and accessories on a boiler.
	17	**1ST SESSIONAL TEST**	
	18	Sessional's doubt session.	
7	19	**UNIT 3- Laws of Thermodynamics:** Laws of conservation of energy, first law of thermodynamics (Joule's experiment) and its limitations, Steady flow energy equation	**Practical-7:** Study of boilers(Through industrial visit)
	20	Application of steady flow energy equation for turbines, pump, boilers, compressors, nozzles, and evaporators.	
	21	Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement, Classius statement	

8	22	Equivalency of statements, Perpetual motion Machine of first kind second kind	**Practical-8:** Repeat Practical 1 & 2
	23	Carnot engine, Introduction of third law of thermodynamics, concept of irreversibility and concept of entropy.	
	24	**UNIT 4** **Steam Generators** Uses of steam, classification of boilers	
9	25	Comparison of fire tube and water tube boilers	**Repeat Practical 8** Repeat Practical 3 & 4
	26	Construction and working of Nestler boiler, Babcock & Wilcox Boiler	
	27	Function of various boiler mounting and accessories	
10	28	Introduction to modern boilers – Benson boiler	**VIVA**
	29	Doubt session. **ASSIGNMENT- 2**	
	30	**2ND SESSIONAL TEST**	
11	31	**Properties of Steam:** Formation of steam and related terms, thermodynamic properties of steam, steam tables	**Practical-9** Determination of Dryness fractionof steam using calorimeter
	32	Sensible heat, latent heat, internal energy of steam, entropy of water, entropy of steam	
	33	T- S diagrams, Mollier diagram (H – S Chart)	
12	34	Expansion of steam, Hyperbolic, reversible adiabatic and throttling processes	**Repeat practical 9**
	35	Determination of quality of steam (dryness fraction)	
	36	**UNIT V** **Ideal and Real Gases:** Concept of ideal gas, enthalpy and specific heat capacities of an ideal gas	
13	37	P – V – T surface of an ideal gas, triple point, real gases, Vander- Wall's equation	**Practical-10** Demonstrate the working of air compressor.
	38	P – V – T surface of an ideal gas, triple point, real gases, Vander- Wall's equation	
	39	**Air Compressors**: Functions of air compressor – uses of compressed air, type of air compressors	
14	40	Type of air compressors	**Repeat practical no 10**
	41	Doubt session**. ASSIGNMENT - 3**	
	42	**3RD SESSIONAL TEST**	
15	43	Sessional's doubt session.	**VIVA**
	44	Revision	
	45	Revision	