| LESSON PLAN | |
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| Name of Faculty | : **Guest Faculty** |
| Discipline | : **Mechanical Engineering** |
| Semester | : **3rd Semester** |
| Subject | : **THERMODYNAMICS - I** |
| Lesson Plan Duration: | : **15 Weeks** |
| Work Load (Lecture/Practical) | : **3Hrs. Lecture & 3 Practical** |

| Week | Day | Topic(Including Assignment/Test) | Practical |
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| 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 | |

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| | 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 | 1st Class test | |
| | 15 | 1st 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 | |

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| | 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 | 2nd class test | |
| | 30 | 2nd 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 | |

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| 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 | 3rd class test | VIVA |
| | 44 | Rotary compressors – types, working and construction of centrifugal compressor, axial flow compressor, vane type compressor | |
| | 45 | **3rd sessional test** | |