**LESSON PLAN FOR THERMAL ENGINEERING-1**

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| **ACADEMIC YEAR: 2024-25** |
| **Mechanical Engineering**  | **3RD semester**  | **Er. Kalia Sethi** |
| **THERMAL ENGINEERING-1** | 04/week | Semester : 3RD  |
| No. of weeks :15 |
| **Week**  | **Class day** | **Theory topics**  |
| 1 | 1st | Introduction, Course outcomes, Reference books for subject. |
| 2nd | Thermodynamic system and types of thermodynamic system. |
|  3rd | Thermodynamic properties and classification of properties |
| 4th | Thermodynamic process,path, cycle,state. |
| 2 | 1st | Point function and path function and their comparision. |
| 2nd | Thermodynamic equilibrium ,types and their examples. |
| 3rd | Quasistatic process and its importance. |
|  4th | Energy, source of energy and energy conservation. |
| 3 | 1st | Heat and work as energy. |
| 2nd | Comparision between heat and work , mechanical equivalent of heat |
| 3rd | Work and heat transfer, displacement work. |
| 4th | Revision of thermodynamic concepts assignments of chapter-1. |
| 4 | 1st | Brief introduction on laws of thermodynamics. |
| 2nd | Zeroth law of thermodynamics and its importance in thermal equilibrium. |
| 3rd | First law of thermodynamics for a closed system undergoing a cycle. |
|  4th | Internal energy as a system properties. |
| 5 | 1st | Limitations of first law of thermodynamics. |
| 2nd | Steady flow energy equation. Application of first law of thermodynamic to turbine , compressor,nozzle and diffuser. |
| 3rd | Problem solving on 1st law thermodynamic. |
| 4th | Second law thermodynamics, statements and application to heat engine, heat pump and refrigerator. |
| 6 | 1st | C.O.P and efficiency comparision of heat engine, heat pump and refrigerator. |
| 2nd | Introduction to concept of entropy. |
| 3rd | Problem solving on efficiency and COP. |
| 4th | Overall discussion of laws of thermodynamics and assignment work. |
| 7 | 1st | Introduction to perfect gas. Comparision of real gasses to perfect gas. |
| 2nd | Boyle’s law, Charle’s law ,Guy-lussac law. |
| 3rd | Avogaadro’s law,Dalton’s law f partial pressure. |
| 4th | General gas equation , gas constant, universal gas constant and their values.  |
| 8 | 1st | Specific heats of gas. Cp,Cv and their relationships. |
| 2nd | Enthalpy of a gas and workdone calculation for a non-flow process. |
| 3rd | Application of 1st law to different thermodynamic processes . |
| 4th | Application of 1st law to different thermodynamic processes . |
| 9 | 1st | Problem solving on non-flow processes. |
| 2nd | Free expansion,examples of free expansion and throttling process. |
| 3rd | Overall discussions on processes of perfect gas |
| 4th | Introduction to engine and its types. |
| 10 | 1st | Internal combustion engine and its application. |
| 2nd | Terminologies of I.C engine. |
| 3rd | Working principle of 2-S and 4-S S.I engine. |
|  4th | Working principle of 2-S and 4-S C.I engine. |
| 11 | 1st | Comparision of two stroke and four stroke engine.Comparision of C.I and S.I engine. |
| 2nd | Overall discussions on I.C engine and assignment. |
| 3rd |  Introduction to air standard cycle and assumptions of air standard cycle. |
|  4th | Carnot cycle and its drawback |
| 12 | 1st | Problem solving on carnot cycle workdone and efficiency. |
| 2nd | Otto cycle workdone and efficiency. |
| 3rd | Problem solving on otto cycle. |
| 4th | Calculation of Diesel cycle workdone and efficiency. |
| 13 | 1st | Problem solving on Diesel cycle workdone and efficiency. |
| 2nd | Calculation of dual combustion cycle workdone and efficiency. |
| 3rd | Problem solving on dual combustion cycle workdone and efficiency. |
|  4th | Workdone and efficiency comparision of Otto,Diesel and Dual combustion cycle. |
| 14 | 1st | Overall discussion on gas power cycle. Assignment work.  |
| 2nd | Fuel and types of fuel. |
| 3rd | Application of different types of fuel. |
| 4th | Calorific and heating values of fuel. |
| 15 | 1st | Octane number, cetane number and their comparision. |
| 2nd | Overall discussion. |
| 3rd | Solving semester questions of previous year.  |
| 4th | Model question paper practice. |

**TOTAL PERIODS: 60**

**NO. OF WEEKS : 15**