**UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING**

**LESSON PLAN**

| **Discipline: Mechanical** | **Semester: 3RD** | **Name of the Teaching faculty: MONALISHA SWAIN** |
|---|---|---|
| **Subject: Thermal Engineering-I (Th-4)** | **No of Days/ Week class alloted: 4** | **Semester from Date: 15. 09 . 2022 To Date: 22.12.2022**<br>**No of weeks: 15** |
| Week | Class | Topics |
| 1st | 1st | Introduction |
| | 2nd | **1. Thermodynamic concept & Terminology**<br>1.1 Thermodynamic Systems (closed, open, isolated) 1.2 Thermodynamic properties of a system (pressure, volume, temperature, entropy, enthalpy, Internal energy and units of measurement). 1.3 Intensive and extensive properties. |
| | 3rd | 1.4 Define thermodynamic processes, path, cycle , state, path function, point function. |
| | 4th | 1.5 Thermodynamic Equilibrium. 1.6 Quasi-static Process. |
| 2nd | 1st | 1. 7 Conceptual explanation of energy and its sources 1.8 Work , heat and comparison between the two. |
| | 2nd | 1.9 Mechanical Equivalent of Heat. 1.10Work transfer, Displacement work |
| | 3rd | **3. Properties Processes of perfect gas**<br>3.1 Laws of perfect gas: Boyle's law, Charle's law, Avogadro's law, |
| | 4th | General gas equation, characteristic gas constant<br>With numericals |
| 3rd | 1st | Universal gas constant. 3.2 Explain specific heat of gas (Cp and Cv) 3.3 Relation between Cp & Cv. 3.4 Enthalpy of a gas<br>With numericals |
| | 2nd | Dalton's law of partial pressure, Guy lussac law |
| | 3rd | **2. Laws of Thermodynamics**<br>2.1 State & explain Zeroth law of thermodynamics. 2.2 State & explain First law of thermodynamics |
| | 4th | 3.5 Work done during a non- flow process. 3.6 Application of first law of thermodynamics to various non flow process (Isothermal, Isobaric,) |
| 4th | 1st | Application of first law of thermodynamics to various non flow process(Isentropic and polytrophic process) |
| | 2nd | Application of first law of thermodynamics to various non flow process(polytrophic process) |
| | 3rd | Numerical problems on above processes |
| | 4th | 3.7 Free expansion |
| 5th | 1st | 3.7 Throttling process |
| | 2nd | **2. Laws of Thermodynamics** |

| | | |
|---|---|---|
| | | 2.3 Limitations of First law of thermodynamics |
| | 3rd | 2.4Application of First law of Thermodynamics (steady flow energy equation and its application to turbine and compressor) |
| | 4th | 2.4Application of First law of Thermodynamics (steady flow energy equation and its application to turbine and compressor) |
| 6th | 1st | Problems on SFEE |
| | 2nd | Problems on SFEE |
| | 3rd | 2.4 Second law of thermodynamics (Claucius& Kelvin Plank statements). |
| | 4th | 2.4 Second law of thermodynamics (Claucius& Kelvin Plank statements). |
| 7th | 1st | Application of second law in heat engine,its efficiency with numericals |
| | 2nd | Application of second law in heat engine,its efficiency with numericals |
| | 3rd | Application of second law in heat pump,itsefficiency,COP with numericals |
| | 4th | Application of second law in heat pump,itsefficiency,COP with numericals |
| 8th | 1st | Application of second law in refrigerator,itsefficiency,COP with numericals, |
| | 2nd | Application of second law in refrigerator,itsefficiency,COP with numericals, |
| | 3rd | Revision |
| | 4th | Internal assessment |
| 9th | 1st | Internal assessment |
| | 2nd | **4. Internal combustion engine**<br>4.1 Explain & classify I.C engine. |
| | 3rd | 4.2 Terminology of I.C Engine such as bore, dead centers, stroke volume, piston speed &RPM |
| | 4th | 4.2 Terminology of I.C Engine such as bore, dead centers, stroke volume, piston speed &RPM |
| 10th | 1st | 4.3 Explain the working principle of 2-stroke & 4- stroke engine C.I & S.I engine |
| | 2nd | 4.3 Explain the working principle of 2-stroke & 4- stroke engine C.I & S.I engine |
| | 3rd | 4.3 Explain the working principle of 2-stroke & 4- stroke engine C.I & S.I engine |
| | 4th | 4.4 Differentiate between 2-stroke & 4- stroke engine C.I & S.I engine. |
| 11th | 1st | **5. Gas Power Cycle**<br>5.1 Carnot cycle |
| | 2nd | 5.1 Carnot cycle |
| | 3rd | 5.1 Carnot cycle with numericals |
| | 4th | 5.2 Otto cycle |
| 12th | 1st | 5.2 Otto cycle |
| | 2nd | 5.2 Otto cycle with numericals |

| | | |
|---|---|---|
| | 3rd | 5.3 Diesel cycle |
| | 4th | 5.3 Diesel cycle |
| 13th | 1st | 5.3 Diesel cycle with numericals |
| | 2nd | 5.4 Dual cycle |
| | 3rd | 5.4 Dual cycle. |
| | 4th | 5.4 Dual cycle with numericals |
| 14th | 1st | Comparison of all cycles |
| | 2nd | **6. Fuels and Combustion**<br>6.1 Define Fuel. 6.2 Types of fuel. |
| | 3rd | 6.3 Application of different types of fuel. |
| | 4th | 6.4 Heating values of fuel. |
| 15th | 1st | 6.5 Quality of I.C engine fuels Octane number, Cetane number. |
| | 2nd | 6.5 Quality of I.C engine fuels Octane number, Cetane number. |
| | 3rd | Previous year question discussion |
| | 4th | Previous year question discussion |