G. S. Mandal's

MARATHWADA INSTITUTE OF TECHNOLOGY, AURANGABAD

# DEPARTMENT OF MECHANICAL ENGINEERING

**Laboratory Name and Location: Thermal Engineering**

**Lab In-charge: Mrs. Dheepa Ravikumar (Asst. Professor)**

**Lab Area: 90 $m^2$** **Total Investment (INR): 3,35,000/-**

## List of Major Equipments:

| Sr. No. | Name & Specifications of the Equipment | Photograph of the Equipment |
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| 1. | **Bomb Calorimeter**<br>Stainless steel bomb: 300 ml capacity<br>Jacket: 3000 cc capacity<br>Motorized stirrer<br>Digital Thermometer. |  |
| 2. | **Cloud and Pour point apparatus**<br>Low temperature properties of oils whose cloud and pour point is in between -38˚C to 20˚ C are evaluated. |  |

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| 3 | **Flash and fire point apparatus**<br>For finding flash and fire points of petroleum products having flash points below 79˚C.<br>220V, Single phase, AC supply |  |
| 4 | **Redwood Viscometer – No 1**<br>Jet bore diameter = 1.62mm, Jet height = 10mm<br>Commonly used for finding viscosity of thin lubricating oils |  |
| 5 | **Separating and throttling calorimeter**<br>Steam Capacity - 6 Kg/hr from feedwater at $30^0$ C<br>Maximum steam Capacity: 10 Kg/hr from feed water at $100^0$ C<br>Steam Pressure: 4 Kg/$Cm^2$.<br>Steam temperature: $110^0$ C |  |

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| 6 | **Surface Condenser**<br>Single pass horizontal condenser shell with cooling tubes arrangement, baby boiler (220 V, 3 phase supply) and digital temperature indicator. |  |

**Significance of course**: The course imparts the facts, concepts, working principles, construction and performance of different equipment in thermal power plant to develop confidence in becoming successful mechanical engineer.

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| 1.Determination of calorific value by Bomb calorimeter<br>Aim and Objective-To study about construction, working of Bomb calorimeter and to determine calorific value of liquid/solid fuel sample.<br>Outcome-Able to determine calorific value of solid or liquid fuel using Bomb Calorimeter. | CO2,CO4 |
| 2.Measurement of dryness fraction of steam using separating & throttling calorimeter<br>Aim and Objective-To study about construction, working of separating & throttling calorimeter and to determine the dryness fraction of steam.<br>Outcome- Able to determine the dryness fraction of steam using separating & throttling calorimeter. | CO2.CO4 |
| 3. Trial on boiler<br>Aim and Objective- To study about construction, working, accessories of boiler and to determine thermal efficiency of boiler.<br>Outcome- Able to determine thermal efficiency of boiler. | CO2,CO4 |
| 4.Trial on convergent/convergent-divergent type nozzle<br>Aim and Objective-To study about construction, working of air blower & nozzle and to investigate the pressure distribution in convergent -divergent nozzles when working under variety of overall pressure ratios.<br>Outcome- Able to investigate the pressure distribution in convergent-divergent nozzle when working under variety of overall pressure ratios. | CO2,CO4 |
| 5.Performance evaluation of steam turbine (Reaction / Impulse)<br>Aim and Objective- To study about construction, working of Steam turbine and to calculate steam turbine efficiency.<br>Outcome- Able to calculate efficiency of steam turbine. | CO2,CO4 |
| 6.Performance evaluation of surface condenser.<br>Aim and Objective-To study about construction, working of surface condenser and to calculate its effectiveness.<br>Outcome- Able to calculate effectiveness of surface condenser. | CO2,CO4 |
| 7. Flue gas analysis using emission measuring instruments<br>Aim and Objective-To perform flue gas analysis and to determine the amount of HC, CO, CO2, O2, NOx present in flue gas. | CO2,CO4 |

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| Outcome- Able to perform flue gas analysis by determining volumetric percentage of HC, CO, CO2, O2, NOx present in flue gas. | |
| 8. Study & trial on single stage/two-stage reciprocating air compressor<br>Aim and Objective- To study about construction, working of reciprocating compressor and to calculate its volumetric, isothermal &overall efficiency.<br>Outcome- Able to calculate volumetric, isothermal & overall efficiency of reciprocating compressor. | CO6 |
| 9. Trial on centrifugal blower<br>Aim and Objective- To study about construction, working of Centrifugal blower and calculate its efficiency.<br>Outcome- Able to calculate efficiency of Centrifugal blower. | CO2,CO4 |