



THERMODYNAMICS LABORATORY

**THERMODYNAMICS IS A
 BRANCH OF PHYSICS
 THAT DEALS WITH HEAT,
 WORK, AND
 TEMPERATURE, AND
 THEIR RELATION TO
 ENERGY, RADIATION,
 AND PHYSICAL
 PROPERTIES OF MATTER.**

COURSE OBJECTIVES

- Identify and use units and notations in Thermodynamics.
- Explain the concepts of entropy, enthalpy, reversibility and irreversibility.
- Apply the first and second laws of Thermodynamics to various gas processes and cycles.
- To get conversant with properties of steam, dryness fraction measurement, vapor processes and Thermodynamic vapor cycles, performance estimation.
- To get conversant with Psychrometric Charts, Psychrometric processes, human comfort conditions.

COURSE OUTCOMES

- Apply various laws of thermodynamics to various systems and processes
- Apply the concept of Entropy, calculate heat, work and other important thermodynamic properties for various ideal gas processes
- Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
- Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.
- Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
- Use Psychrometric charts and estimate various essential properties related to Psychrometry and its processes.

THERMODYNAMICS APPLICATION AREAS

DESIGN AND ANALYSIS OF
AUTOMOTIVE ENGINES
ROCKETS, JET ENGINES,
AND CONVENTIONAL OR
NUCLEAR POWER PLANTS,
SOLAR COLLECTORS, AND
THE DESIGN OF VEHICLES
FROM ORDINARY CARS TO
AIRPLANES



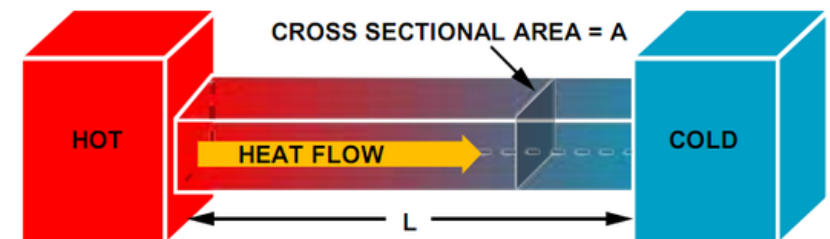
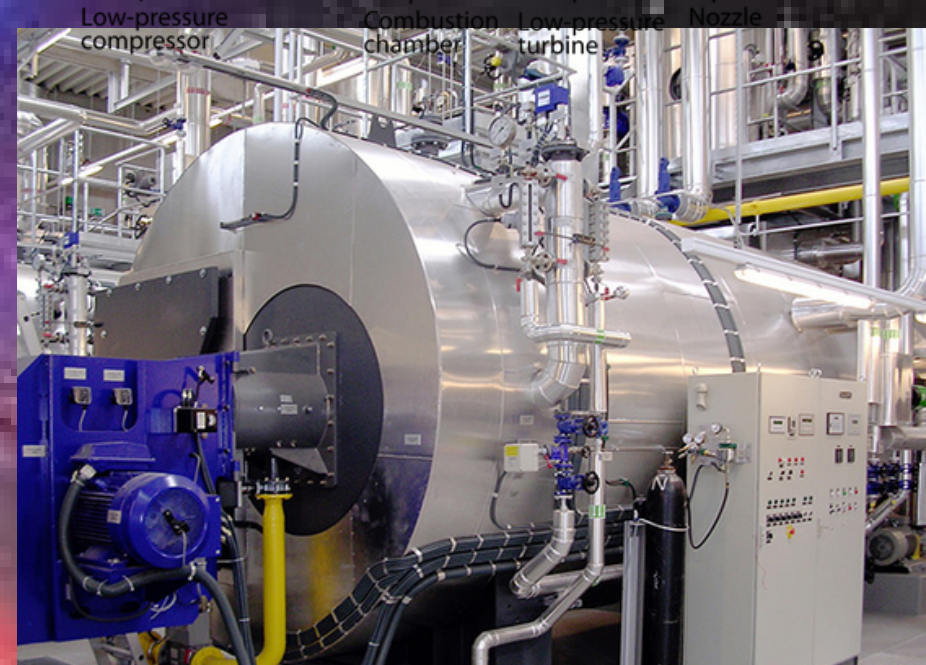
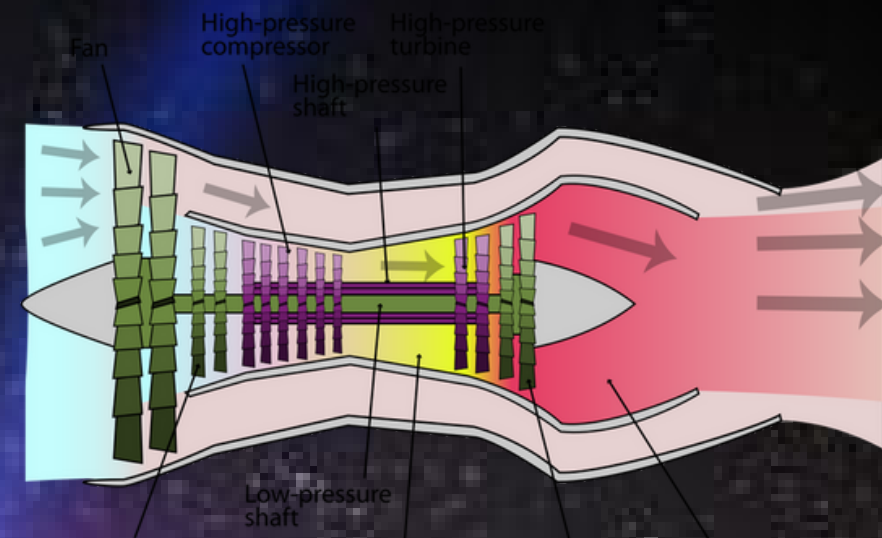
PREREQUISITITES

**CHEMISTRY,
PHYSICS,
AND
CALCULUS**



THERMODYNAMICS

- Validation of First law of thermodynamics
- Determination of C_p and C_v for Ideal gas
- Performance estimation of Air standard cycle
- Determination of dryness fraction of steam
- COP of Simple Vapor Compression Cycle
- Performance estimation of VCC
- Trial on boiler to determine boiler efficiency, equivalent evaporation and Energy Balance



THERMODYNAMICS LAB TESTING FACILITIES

Separating & Throttling Calorimeter



Technical Specification

- SEPARATING CHAMBER : COMPATIBLE CAPACITY MADE OF STAINLESS STEEL INSULATED WITH CERAMIC WOOL WITH OUTLET TAP WATER LEVEL INDICATOR.
- OPERATING PRESSURE : 2.5 BAR
- THROTTLING CHAMBER : COMPATIBLE CAPACITY PROVIDED WITH GAUGE TO MEASURE INLET PRESSURE BEFORE THROTTLING
- SAFETY VALVE PROVIDED AT TOP
- HEAT EXCHANGER : FOR CONDENSING STEAM AFTER THROTTLING CHAMBER
- STEAM PRESSURE : PRESSURE GAUGE
- TEMPERATURE SENSOR : ALCOHOL THERMOMETER FOR MEASURING THE TEMPERATURE OF SUPERHEATED STEAM

Junker's Gas Calorimeter

Technical Specification

- STAINLESS STEEL CALORIMETER
- BURNER WITH NOZZLES)
- TRIPOD STAND, A GAS FLOW METER (CAT. NO. IRI 08)
- PRESSURE GOVERNOR
- REQUISITE TUBING & MEASURING JARS AS WELL AS THERMOMETERS (0.1OC GRADUATION) FOR READING INLET & OUTLET WATER TEMPERATURES





Technical Specification

MEASUREMENT VARIABLES PROPELLANTS	: HEAT OF COMBUSTION, GROSS CALORIFIC VALUE OF SOLID, LIQUID FUELS AND
OXYGEN OPERATING PRESSURE MAX	:40 BAR
MEASUREMENT UNITS	: J/KG
TEMPERATURE RESOLUTION	: 0.001°C
COMBUSTION BOMB:	ACID RESISTANT STABILIZED STAINLESS STEEL
RESOLUTION:	0.001 KCAL/GM
RELATIVE STANDARD DEVIATION:	0.1%
MEASUREMENT RANGE:	UP TO 40,000 J/GM
CRUCIBLE TYPE:	CORROSION RESISTANT ALLOY

Orsat Apparatus



Technical Specification

AUTOMATION GRADE	: MANUAL
TYPE	: CHEMICAL ANALYSIS
MATERIAL	: BOROSILICATE GLASS & WOODEN
NO OF GASES ANALYZED	03 : CO ₂ , O ₂ AND CO
CAPACITY	: 10-2000 ML