

## **THERMODYNAMICS FOR AERONAUTICAL ENGINEERING**

### DETAILED SYLLABUS

#### **OBJECTIVES**

1. Understanding the basic thermodynamics and various cycles (air standard)
2. This course will provide an understanding of the basic principles of thermodynamics which enables understanding of major fields of Aeronautical engineering system

#### **UNIT- I BASIC CONCEPTS AND LAWS OF THERMODYNAMICS**

Basic concepts-Definitions: system - boundary, surrounding, working fluid and state of a system- thermodynamic systems – closed, open and isolated systems with examples  
Properties of system- Intensive and Extensive properties with examples.-Definitions for properties like Enthalpy (H), Entropy(s) Internal energy (U)- Specific heat at constant pressure( $C_p$ ), specific heat at constant volume ( $C_v$ ) for a gas-Relation between  $C_p$  &  $C_v$  , characteristic gas equation, Universal gas constant, Definitions for quasi-static work flow-Law of thermodynamics-Zeroth, first & second laws of thermodynamics- simple problems on conversion of Heat into Work and vice versa.-Steady flow energy equation (without proof)

#### **UNIT- II THERMODYNAMIC PROCESSES**

Thermodynamic processes- Explain with P-V and T-S diagram the Constant pressure, Constant volume, Isothermal, Isentropic, Polytrophic, Free expansion and throttling processes & equations representing the processes- Derivation for work done for the above processes Calculation of change in internal energy, heat supplied or rejected, change in Entropy for the above processes. Simple problems on the above processes.

#### **UNIT- III THERMODYNAMIC CYCLES**

Thermodynamic cycles – reversible and irreversible cycles conditions for reversibility of a cycle-Explanation of Carnot cycle with P.V. and T-S diagrams, Air standard Efficiency Problems on Carnot cycle-Explanation of Otto cycle with P.V. and T-S diagrams, Air standard Efficiency - Simple problems on Otto cycle

#### **UNIT- IV AERO ENGINES AND ITS PERFORMANCE**

Aero engine -definition-classification- Terminology of engine - Working principle of Aero engines. Formulae for Brake power, Indicated power Mechanical efficiency, Indicated thermal efficiency, Brake thermal efficiency, Air standard efficiency, Relative efficiency, Volumetric efficiency

Diploma, Anna University-UG, PG., HSC & SSLC

*Notes*  
*Syllabus*  
*Question Papers*  
*Results and Many more...*

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#### **UNIT- V ELEMENTS OF HEAT TRANSFER**

Introduction -Methods of heat transfer-- Conduction, convection and radiation Newton's law of cooling- Stefan-Boltzmann law -Heat transfer by conduction through slab and composite wall- Heat transfer by Radiation: -Thermal Radiation, Absorptivity, Transmissivity, Reflectivity, Emissivity, black and gray bodies

#### **UNIT- VI GAS TURBINE AND JET PROPULSION SYSTEMS**

Gas turbines- classification of gas turbines-Closed cycle gas turbine-Schematic diagram explanation- Open cycle gas turbine-schematic diagram-explanation-Comparison of open cycle and closed cycle gas turbines.-. Explanation of BRAYTON cycle with P.V. and T-S diagrams.