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AE8302 ELEMENTS OF AERONAUTICAL ENGINEERING

DETAILED SYLLABUS

OBJECTIVES:

- Understand the Historical evaluation of Airplanes
- Study the different component systems and functions
- Understand the basic properties and principles behind the flight
- Study the different structures & construction
- Study the various types of power plants used in aircrafts

UNIT I HISTORY OF FLIGHT

Balloon flight-ornithopters-Early Airplanes by Wright Brothers, biplanes and monoplanes, Developments in aerodynamics, materials, structures and propulsion over the years.

UNIT II AIRCRAFT CONFIGURATIONS AND ITS CONTROLS

Different types of flight vehicles, classifications -Components of an airplane and their functions Conventional control, powered control- Basic instruments for flying -Typical systems for control actuation.

UNIT III BASICS OF AERODYNAMICS

Physical Properties and structures of the Atmosphere, Temperature, pressure and altitude relationships, Newton's Law of Motions applied to Aeronautics-Evolution of lift, drag and moment. Aerofoils, Mach number, Maneuvers.

UNIT IV BASICS OF PROPULSION

Basic ideas about piston, turboprop and jet engines – use of propeller and jets for thrust production- Comparative merits, Principle of operation of rocket, types of rocket and typical applications, Exploration into space.

UNIT V BASICS OF AIRCRAFT STRUCTURES

General types of construction, Monocoque, semi-monocoque and geodesic constructions, typical wing and fuselage structure. Metallic and non-metallic materials. Use of Aluminium alloy, titanium, stainless steel and composite materials. Stresses and Strains-Hooke's law- stress-strain diagrams elastic Constants-Factor of Safety.

TEXT BOOKS

1. Anderson, J.D., Introduction to Flight, McGraw-Hill; 8th edition, 2015
2. Stephen. A. Brandt, Introduction to aeronautics: A design perspective, 2nd edition, AIAA Education Series, 2004.

REFERENCE

1. Kermode, A.C. Flight without Formulae, Pearson Education; Eleven edition, 2011