

PAE3I104 ELEMENTS OF AERONAUTICS

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 BASICS OF FLIGHT MECHANICS

Physical properties and structure 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 III AIRCRAFT CONFIGURATIONS

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 IV AIRPLANE STRUCTURES AND MATERIALS

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.

UNIT V POWER PLANTS

Basic ideas about piston, turboprop and jet engines - use of propeller and jets for thrust production - comparative merits, principles of operation of rocket, types of rockets and typical applications, exploration into space.

TEXT BOOKS:

1. Anderson, J.D., "Introduction to Flight", McGraw-Hill, 1995.
2. Stephen. A. Brandt, "Introduction to Aeronautics: A design perspective" American Institute of Aeronautics & Astronautics, 1997

REFERENCES:

1. Kermode, A.C., "Mechanics of Flight", Himalayan Book, 1997