

DETAILED SYLLABUS

OBJECTIVE:

- To make the student understand the choice of the selection of design parameters, Fixing the geometry and to investigate the performance and stability characteristics of airplanes.

UNIT I INTRODUCTION

State of art in airplane design, Purpose and scope of airplane design, Classification of airplanes based on purpose and configuration. Factors affecting configuration, Merits of different plane layouts. Stages in Airplane design. Designing for manufacturability, Maintenance, Operational costs, Interactive designs.

UNIT II PRELIMINARY DESIGN PROCEDURE

Data collection and 3-view drawings, their purpose, weight estimation, Weight equation method – Development & procedures for evaluation of component weights. Weight fractions for various segments of mission. Choice of wind loading and thrust. Loading.

UNIT III POWER PLANT SELECTION

Choices available, comparative merits, Location of power plants, Functions dictating the locations.

UNIT IV DESIGN OF WING, FUSELAGE AND EMPHANAGE

Selection of aerofoil. Selection of Wing parameters, selection of sweep, Effect of Aspect ratio, Wing Design and Airworthiness requirements, V-n diagram, loads, Structural features. Elements of fuselage design, Loads on fuselage, Fuselage Design. Fuselage and tail sizing. Determination of tail surface areas, Tail design, Structural features, check for nose wheel lift off.

UNIT V DESIGN OF LANDING GEAR AND CONTROL SURFACE

Landing Gear Design, Loads on landing gear, Preliminary landing gear design. Elements of Computer Aided and Design, Special consideration in configuration lay-out, Performance estimation. Stability aspects on the design of control surface.

TEXT BOOKS:

1. Raymer, D.P. Aircraft conceptual Design, AIAA series, 5th edition, 2012.
2. Torenbeck, E. Synthesis of Subsonic Airplane Design, Delft University Press, U.K. 1986.

REFERENCE:

1. Kuechemann, D, "The Aerodynamic Design of Aircraft, American Institute of Aeronautics publishers, 2012