AEPC2002 ELEMENTS OF AIRCRAFT ENGINEERING & DESIGN (3-0-0)

Course Objectives: "This course aims to introduce students to the fundamental principles of aircraft engineering and design so that students will understand the key elements of aircraft structures, aerodynamics, propulsion, and systems integration, enabling them to participate in the design and analysis of various aircraft components and configurations."

Module I: History and aircraft configurations07 Hours

Early development of Airplanes, biplanes and monoplanes, Developments in materials, structures and propulsion over the years, types of flight vehicles, classifications-Components of an airplane and their functions.

Module II: Basics Of Flight07 Hours

Structures of the Atmosphere - Temperature, pressure and altitude relationships, Evolution of Aerodynamics forces and moments-center of pressure - aerodynamic center – pressure coefficients, Aerofoils and its nomenclature, speed of sound, Mach number, concepts of aircraft stability and control.

Module III: Basics Of Aircraft Structures And Design 07 Hours

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- V-n diagram and load factor. Phases of conceptual design of an aircraft.

Module IV: Basics Of Propulsion 07 Hours

Introduction to aircraft power plants – classification – principle of operation, Characteristics of piston, turboprop, turbofan and turbo shaft engines, use of propeller and jets for thrust production-Comparative merits and demerits, Principle of operation of rocket, types of rocket and typical applications.

Module V: Aircraft Control, Communication & Navigation Systems 08 Hours

Conventional control, powered control- Basic instruments for flying-Typical systems for control actuation & Modern control systems.

Need for communication system on aircraft, working principle of communication system. Basics of navigation system, Principle of operation of radar.

At the end of the course, students will be able to:

CO's	Course Outcomes
CO-1	Explain the various types of aircraft configurations, structures and materials.
CO-2	Explain the basic principles of flight

CO-3	Discuss the aircraft structures
CO-4	Discuss the basics aircraft propulsion and stability
CO-5	Describe various aircraft systems

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 Books:

1. Kermode, A.C. Flight without Formulae, Pearson Education; Eleven edition, 2011
2. Introduction to Radar Systems by Skolnik Tata McGraw-Hill Education, 2003
3. Aircraft Communications and Navigation Systems: Principles, Operation and Maintenanceby -Mike Tooley and David Wyatt Publisher- Elsevier, First Edition 2007
4. Intractive aerospace engineering and design – Deva Newman, McGraw-Hill -2002