Course code	Course Name	L-T-P-Credits	Year of Introduction
AO201	AIRCRAFT BASICS AND CONTROLS	2-1-0-3	2016

Prerequisite: Nil

Course Objectives

- To introduce the concepts of flying, International Standard Atmosphere, Structural aspects of Airplanes, systems, instruments and power plants used in airplanes.

Syllabus

Developments in Aerodynamics, Materials, Structures and Propulsion. Physical properties and structure of the atmosphere, temperature, pressure and altitude relationships. General types of construction – aerofoil – aircraft components – control – aircraft engines – rockets - helicopcter

Expected Outcome

The students will be able to

i. Know the basics of aircraft.
ii. Identify suitable materials and Power plants for aircraft.
iii. Perform basic calculations of lift, drag and moment.

Text Books:

1. Anderson, J.D., "Introduction to Flight", McGraw-Hill, 1995.
2. A.C. Kermode, Flight without Formulae

References:

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

2. Rotocraft Flying Hand Book- FAA H-8083-21, FAA, U.S DEPARTMENT OF TRANSPORTATION.
3. Aviation Maintenance Technician Hand Book-Power plant – Volume – I &II , FAA, Shroff Publications, New Delhi.

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	History of Flights - Balloon flight	1	15%
	Ornithopters	1	
	Early airplanes by wright brothers, biplanes and monoplanes	2	
	Developments in aerodynamics, materials, structures and propulsion over the years	2	
II	Physical properties and structure of the atmosphere, temperature, pressure and altitude relationships	2	15%
	Newton's law of motions applied to aeronautics - evolution of lift, drag and moment	2	
	Aerofoils, mach number, maneuvers. aerodynamic forces on aircraft	2	

	Classification of NACA Aerofoils, aspect ratio, wing loading, centre of pressure and aerodynamic centre - aerofoil characteristics- lift, drag curves.	2	
FIRST INTERNAL EXAM			
III	Different types of flight vehicles, classifications.	1	15%
	Components of an airplane and their functions.	1	
	Wing and Landing gear configurations.	2	
	Conventional control, powered control, basic instruments for flying - typical systems for control actuation.	3	
IV	General types of construction, Truss, monocoque & semi-monocoque	3	15%
	Typical wing structure	2	
	metallic and non-metallic materials	1	
	Use of aluminum alloy, titanium, stainless-steel and composite materials.	1	
SECOND INTERNAL EXAM			
V	Basic ideas about piston, turboprop and jet engines	1	20%
	use of propeller and jets for thrust production -comparative merits,	2	
	Propeller - Operating Principle , Propeller classifications, Forces acting on a propeller	2	
	Principles of operation of rocket, types of rockets.	2	
VI	Basic Helicopter Aerodynamics	2	20%
	Basic Helicopter Components and their functions.	2	
	Types of rotor heads. Control mechanisms	2	
	Hovering and Autorotation	1	
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100, Exam Duration:3 hours

The question paper shall consist of three parts

Part A

4 questions uniformly covering modules I and II. Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

4 questions uniformly covering modules III and IV. Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

6 questions uniformly covering modules V and VI. Each question carries 10 marks

Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed.