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Course code	Course Name	L-T-P-Credits	Year of Introduction
AO363	AIRCRAFT MODELLING FUNDAMENTALS	3-0-0-3	2016

Prerequisite : Nil

Course Objectives

- To introduce the concepts of flying, International standard atmosphere, structural aspects of airplanes, brief description of systems, instruments and power plants used in airplanes.

Syllabus

Basics of Aeronautics - Concepts of flight- Overview of Flight Control Surfaces- Materials used in Aero Modelling – -Construction Techniques in Aero Modelling -Actuators and Servos –Control surface actuation techniques –Servo motors – construction – working – Radio Control – Electronic Speed Control – Testing, Safety Practices in RC Modelling.

Expected Outcome

The students will be able to

i. Identify the components of Flight
ii. Identify suitable materials and Power plants for Aircraft.
iii. Perform basic calculation on Mechanics using Newton law for lift, drag and moment.

Text Books:

1. Adrian Vale , Radio Control Model Aircraft , Traplet Publication Ltd.
2. David Boddington, Building & Flying R/C Model Aircraft (3rd Edition), Nexus Special Interests
3. Peter Miller , Designing Model Aircraft, Traplet Publication Ltd.

References:

1. Alasdair Sutherland, Basic Aeronautics for Modellers, Traplet Publication Ltd.
2. Duncan Hutson, Scale Construction, Traplet Publication Ltd.
3. Oliver WennMacher, Electric Flight Gearboxes, Traplet Publication Ltd.
4. Vic Smead, Basic of Aeromodelling, Nexus Special Interests.

Course Plan

Module	Contents	Hours	End Sem. Exam Marks
I	Basics of Aeronautics - Parts of Aircrafts - Fuselage, Wings, Radio Control, ESC, Receiver, Servo motors, servo controlling	1	15%
	Concepts of flight - Powered Aircraft & Gliders	1	
	Aircraft Lift & Aircraft Drag	2	
	Types of flying Models - Free Flight, Powered Flight, Control Line and Radio Controlling Flying – Pilot Visibility.	2	
	Overview of Flight Control Surfaces - Four Basic forces of flight	1	15%
	Basic Terminologies – Concept of Maneuvering - Power sources in Aero modelling - Aircraft Thrust -Aircraft Motion	3	

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II	IC Engines – Glow plug Engines – Motors – Brushed – Brushless motors	2	
	Electronic speed controllers – Ducted fan motors – propellers	4	
FIRST INTERNAL EXAM			
III	Materials used in Aero Modelling – Balsa woods – bamboo sticks	2	15%
	Thermoplastics – Polystyrene and Thermocol - Composite (glass and carbon fiber reinforced)	1	
	Japanese tissue, bamboo paper and silk as covering materials – properties – significance and advantages	3	
	Adhesives types and usage methods.	1	
IV	Construction Techniques in Aero Modelling	1	15%
	Side-frame type Fuselage - Bulkhead-stringer Fuselage - Shaping of Wing Ribs	2	
	Anti-Warp Type Wing - Covering of Wing by Tissue	2	
	Covering of Wing by Plastic Sheet - Use of Plastics and Thermocol - Assembling of Model.	2	
SECOND INTERNAL EXAM			
V	Actuators and Servos – Magnetic Actuators – Servo Motors – Micro Servos	1	20%
	Landing gear mechanism	1	
	Control surface actuation techniques – concepts – principles and working.	1	
	Servo motors – construction – working – types – loading and operation techniques.	2	
VI	Radio Control – Transmitters – Receivers	2	20%
	Electronic Speed Control – Batteries	1	
	Binding the Receiver to the Transmitter – Testing	1	
	Safety Practices in RC Modelling.	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.