

UNMANNED AIR VEHICLES

PE - I									
Course Code	Category	Hours / Week			Credits	Maximum Marks			
AAEB32	Elective	L	T	P	C	CIA	SEE	Total	
		3	-	-	3	30	70	100	
Contact Classes: 45		Tutorial Classes: Nil		Practical Classes: Nil		Total Classes: 45			
I. COURSE OVERVIEW:									
<p>The course focuses on fundamentals related to powered, aerial vehicle systems that does not carry a human operator, including the terminology related to unmanned air vehicles (UAV), subsystems, basic design phases, aerodynamics, and also provides insight into different types of airframes and power- plants. It imparts knowledge about navigation, communications, control, and stability of UAVs. The course is aimed to obtain the knowledge also in commercial, private, public, and educational interest in UAS applications.</p>									
II. OBJECTIVES:									
The course should enable the students to:									
<ul style="list-style-type: none"> I The major subsystems and the fundamental design phases of Unmanned Air Vehicle Systems (UAS). II The basic drags and airframe configurations of Unmanned Air Vehicles (UAVs). III The various communication media and navigation systems of UAVs. IV The different techniques used to achieve the control and stability of UAVs. 									
III. COURSE OUTCOMES:									
After successful completion of the course, students should be able to:									
CO 1	Demonstrate the knowledge of major sub-systems and basic design concepts for the development of unmanned air vehicle systems.						Understand		
CO 2	Illustrate the different types of airframe configurations available for unmanned air vehicle systems.						Understand		
CO 3	Analyze the attributes, performance, design issues, and compromises of different types of aircraft for UAV systems to select suitable aircraft.						Analyze		
CO 4	Select a suitable power-plant based on power generation systems for the given mission requirement.						Apply		
CO 5	Identify the appropriate communication and navigation systems for the UAVs as per the role requirements.						Apply		
CO 6	Categorize the different techniques used to achieve the control and stability of UAV systems.						Analyze		
IV. SYLLABUS:									
MODULE-I	INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS						Classes: 10		
The systemic basis of UAS-system composition; Conceptual phase; Preliminary design; Selection of the system; Some applications of UAS.									
MODULE-II	AERODYNAMICS AND AIRFRAME CONFIGURATIONS						Classes: 10		
Lift-induced Drag; Parasitic Drag; Rotary-wing aerodynamics; Response to air turbulence; Airframe configurations scale effects; Packaging density ; Aerodynamics; Structures and mechanisms; Selection of power-plants; Modular construction; Ancillary equipment.									
MODULE-III	CHARACTERISTICS OF AIRCRAFT TYPES						Classes: 09		
Long-endurance, long-range role aircraft; Medium-range, tactical aircraft; Close-range / battlefield aircraft;									

MUAV types; MAV and NAV types; UCAV; Novel hybrid aircraft configurations; Research UAV.		
MODULE-IV	COMMUNICATIONS NAVIGATION	Classes: 08
Communication media; Radio communication; Mid-air collision (MAC) avoidance; communications data rate and bandwidth usage; Antenna Types NAVSTAR Global Positioning System (GPS) - TACAN - LORAN C - Inertial Navigation - Radio Tracking - Way-point Navigation.		
MODULE-V	CONTROL AND STABILITY	Classes: 08
HTOL Aircraft - Helicopters - OTE/OTE/SPH - Convertible Rotor Aircraft - Payload Control -Sensors –culmon filter- Autonomy.		
Text Books:		
1. Reg Austin., Unmanned Aircraft Systems, John Wiley and Sons., 2010.		
Reference Books:		
1. Milman & Halkias, “Integrated Electronics”, McGraw Hill, 1999.		
2. Malvino & Leach, “Digital Principles & Applications”, McGraw Hill, 1986.		
3. Collinson R.P.G, “Introduction to Avionics”, Chapman and Hall, India, 1996.		
4. Bernad Etkin, “Dynamic of flight stability and control”, John Wiley, 1972.		
Web References:		
1. www.tc.gc.ca/eng/civilaviation/publications/page-6557.html		
2. www.dhl.com/en/about_us/logistics_insights/dhl_trend_research/		
3. www.books.google.co.in/books?id=guGVDQAAQBAJ&pg=PT3&lpg=PT3&dq		
E-Text Books:		
www.ebookstrust.com/9048197066/Ebooks%20Textbooks%20Handbook%20Of%20Unmanned .		