

AVIONICS AND INSTRUMENTATION

PE-V								
Course Code	Category	Hours /Week			Credits	MaximumMarks		
AAEB45	Elective	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
ContactClasses:45		TutorialClasses:Nil			PracticalClasses:Nil		Total Classes:45	
<p>OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> I. The fundamental principles of sensors, radars, radio communication and navigation systems and their application. II. Concept of microelectronic devices along with their evolution and applications, with the emphasis on digital data buses. III. Learn the advances in modern avionics systems, and their application in military and civil aircrafts. <p>COURSE OUTCOMES:</p> <p>CO 1 List various electronic instrument systems and avionics systems integration for the design of modern aircraft.</p> <p>CO 2 Illustrate the fundamental principles of various types of sensors to monitor the parameters in an aircraft.</p> <p>CO 3 Illustrate the working principles of various flight instruments in flight deck for monitoring status of the flight in one integrated display.</p> <p>CO 4 Explain the basic principle and various types of navigation systems to provide accurate position of a moving aircraft relative to earth.</p> <p>CO 5 Explain the concept of various navigational aids that guide the pilot to land the aircraft safely on a runway.</p> <p>CO 6 Demonstrate the major methods of countering detection and impairing the effectiveness of an enemy's fire control solution</p> <p>CO 7 Identify Hardware MODULEs, working principle, Environmental effects and applications of Airborne Radar for detect the enemy aircraft.</p> <p>CO 8 Explain the optical attitude measuring instruments for monitored throughout its on-orbit operation</p> <p>CO 9 Illustrate the radiation characteristics of micro strip antennas using electric field distribution on aircraft and missiles</p>								
MODULE-I		AVIONICSTECHNOLOGY					Classes:10	
Evolution of electronics; The nature of microelectronic devices, processors, memory devices; Introduction to avionics, systems integration, need-data bussystems, MILSTD1553 bussystem, ARINC429/ARINC629 bussystems, optical databussystems; Integrated modular avionics architectures, commercial off the shelf systems; Avionics packaging.								
MODULE-II		AIRCRAFTINSTRUMENTATION- SENSORSANDDISPLAYS					Classes:10	
Air data sensors, magnetic sensing, inertial sensing, and radar sensors. The electromechanical instrumented flight deck, early flight deck instruments, attitude direction indicator, horizontal situation indicator, altimeter, air speed indicator; Advanced flight deck display system architectures, display systems, display media, future Flight deck displays.								

MODULE-III	COMMUNICATIONANDNAVIGATIONAIDS	Classes:09
<p>Radio frequency spectrum, communication systems, HF, VHF, satellite communications; ATC transponder,traffic collision avoidance system; Navigational aids; Automatic direction finding, VHF Omni range, distancemeasuringequipment;TACAN,VORTAC;Satellite navigationsystems, theGPS.</p> <p>Basicnavigation,radio,inertialnavigations,satellitenavigation;GPS,differentialGPS,widereaaugmentation systems, local area augmentation system, and GPS overlay program; Integrated navigation,sensorusage;Flight managementsystem(FMS);FMScontroland displayMODULE;Lateral navigation.</p>		
MODULE-IV	MILITARYAIRCRAFTADAPTATION	Classes:08
<p>Avionicsandmissionsysteminterface,navigationandflightmanagement;Navigationaids,flightdeckdisplays, communications, aircraft systems; Applications, personnel, material and vehicle transport, air-to-airrefueling, maritime patrol, airborne early warning, ground surveillance; Electronic warfare,the EW spectrum, electronic supportmeasures,electronic countermeasures, electro-optics andtheinfra-red.</p>		
MODULE-V	AIRBORNE RADAR, ASTRIONICS - AVIONICS FORSPACECRAFT	Classes:08
<p>Propagation of Radarwaves, functional element sofradar,antenna-transmitter;Typesofradar-pulseDoppler, Civil aviation applications, military applications; Attitude determination and control of spacecraft, magnetometers, sun sensors, startrackers, earth andhorizon sensors;Command andtelemetry</p>		
TextBooks:		
<ol style="list-style-type: none"> 1. Moir,I.andSeabridge,A.,Civil AvionicsSystems,AIAAEducationSeries,AIAA,2002. 2. Collinson,R.P.G.,IntroductiontoAvionicsSystems,Springer,2ndEdition, 2003. 		
ReferenceBooks:		
<ol style="list-style-type: none"> 1. Helfrick,A.,PrinciplesofAvionics,AvionicsCommunicationsInc.Leesburg,2000. 2. Henderson,M.F.,AircraftInstruments&AvionicsforA&PTechnicians,JeppesenSandersonTrainingProducts, 1993. 		
WebReferences:		
<ol style="list-style-type: none"> 1. https://soaneemrana.org/onewebmedia/INTRODUCTION%20TO%20SPACE%20DYNAMICS1 2. https://nptel.ac.in/courses/101105030/ 		
E-TextBooks:		
<ol style="list-style-type: none"> 1. https://store.doverpublications.com/0486651134.html 2. https://www.worldcat.org/title/introduction-to-space-dynamics/oclc/867680515 		