

COURSE CODE	COURSE TITLE	L	T	P	C
1151AE214	AIRCRAFT SYSTEMS AND INSTRUMENTS	1	0	2	2

Course Category:

Programme core

a. Preamble:

The course deals with the basic principles and working of various aircraft systems and instruments. The course aims at enhancing the knowledge of students in aircraft system's handling procedures, maintenance practices and technical aspects of various systems.

b. Prerequisite Courses:

- Introduction to Aerospace Engineering

c. Related Courses:

- Avionics
- Aircraft general engineering and system maintenance

d. Course Educational Objectives:

- To inculcate the basic knowledge and understanding of various aircraft systems, instruments and their applications.
- To introduce the safety precautions and methodology of handling aircraft system

e. Course Outcomes:

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Summarize the operations of Hydraulic, Pneumatic and Landing gear systems	K2
CO2	Describe the working principles of control systems in an aircraft	K2
CO3	Illustrate and demonstrate the concepts of starting, ignition, fuel and lubricating systems of typical aircraft power plants and.	K3
CO4	Discuss the ideas of air cycle systems along with fire protection, deicing and anti-icing systems.	K2
CO5	Explain the technical aspects of aircraft instruments and their working principle	K2

f. Correlation of COs with POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M			L						
CO2	H	H	M			L						
CO3	H	H				L						

CO4	H	M	M			L						
CO5	H	H				L						

H- High; M-Medium; L-Low

g. Course Contents:

UNIT I -AIRPLANE CONTROL SYSTEMS L 3

Conventional Systems - fully powered flight controls - Power actuated systems – Auto pilot system - fly by wire systems - Digital Fly by wire system

UNIT II -AIRCRAFT PROTECTION SYSTEMS L 3

Fire protection system, Deicing and anti-icing systems - Working principles -Components - Advantages –Applications.

UNIT III -ENGINE SYSTEMS L 3

Lubricating systems for piston and jet engines, starting procedures for reciprocating and gas turbine engine aircrafts, Ignition system - components– working principle.

UNIT IV -HUMAN COMFORT SYSTEMS L 3

Basic Air cycle systems - Vapor compression and absorption cycle systems, Cabin air pressure system, and Evaporative vapor cycle systems - Evaporative air cycle systems.

UNIT V -AIRCRAFT INSTRUMENTS L 3

Flight Instruments and Navigation Instruments – Air speed Indicators: TAS, EAS, IAS, CAS, Vertical speed indicator- Mach Meters –Variometers- Altimeters - Principles and operation - Study of various types of engine instruments - Tachometers - Temperature gauges - Pressure gauges - Operation and Principles- Gyroscope – Accelerometers, ILS.

Total hours: 15+ 15 = 30

LIST OF EXPERIMENTS:

1. Aircraft “Jacking Up” procedure
2. Aircraft “Levelling” procedure
3. Control System “Rigging check” procedure
4. Aircraft “Symmetry Check” procedure
5. Fuel systems for Gas turbine engine and Jet engine – An overview.
6. Study on the methods of Aircraft braking systems and “Brake Torque Load Test” on wheel brake unit.
7. Study on hydraulic systems and Pneumatic systems - maintenance and rectification of snags.
8. Study of Landing gear systems, classification and their components

h. Learning Resources

i. Text Books:

1. McKinley, J.L., and Bent, R.D., “Aircraft Maintenance & Repair”, McGraw-Hill, 2013.
2. “General Hand Books of Airframe and Power Plant Mechanics”, U.S. Dept. of Transportation, Federal Aviation Administration, The English Book Store, New Delhi 1995

ii. References:

1. “Airframe and Power Plant Mechanics: Power plant Handbook” by Federal Aviation Administration, Aircraft Technical Book Company, 2012.
2. Mekinley, J.L. and Bent, R.D., “Aircraft Power Plants”, McGraw-Hill, 1993.
3. Pallet, E.H.J., “Aircraft Instruments & Principles”, Pitman & Co., 1993.
4. Treager, S., “Gas Turbine Technology”, McGraw-Hill, 1997