

GLOBAL ELECTIVE		
BASICS OF AEROSPACE ENGINEERING		
Course Code: 16G5B13		CIE Marks: 100
Credits: L:T:P:S: 4:0:0:0		SEE Marks: 100
Hours : 42		SEE Duration: 3Hrs

Course Learning Objectives:

To enable the students to:

1	Understand the history and basic principles of aviation
2	Demonstrate and explain foundation of flight, aircraft structures, material, aircraft propulsion
3	Comprehend the importance of all the systems and subsystems incorporated on a air vehicle
4	Appraise the significance of all the subsystems in achieving a successful flight

Unit-I

Introduction to Aircraft : History of aviation, International Standard atmosphere, Atmosphere and its properties, Temperature, pressure and altitude relationships, Classification of aircrafts, Anatomy of an aircraft & Helicopters, Basic components and their functions, Introduction to Unconventional and Autonomous Air vehicles.	08 Hrs
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Unit – II

Basics of Aerodynamics : Bernoulli's theorem, Aerodynamic forces and moments on an Airfoil, Lift and drag, Types of drag, Centre of pressure and its significance, Aerodynamic centre, Aerodynamic Coefficients, Wing Planform Geometry, Airfoil nomenclature, Basic characteristics of airfoils, NACA nomenclature, Simple problems on lift and drag.	10 Hrs
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Unit -III

Aircraft Propulsion : Introduction, Classification of powerplants, Piston Engine: Types of reciprocating engines, Principle of operation of turbojet, turboprop and turbofan engines, Introduction to ramjets and scramjets, Comparative merits and demerits of different types Engines.	08 Hrs
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Unit -IV

Introduction to Space Flight : History of space flight, Evolution of Indian Space Technology, The upper atmosphere, Introduction to basic orbital mechanics, some basic concepts, Kepler's Laws of planetary motion, Orbit equation, Space vehicle trajectories.	08 Hrs
Rocket Propulsion : Principles of operation of rocket engines, Classification of Rockets, Types of rockets.	

Unit -V

Aerospace Structures and Materials : Introduction, General types of construction, Monocoque, Semi-Monocoque and Geodesic structures, Typical wing and fuselage structure; Metallic and non-metallic materials for aircraft application. Use of aluminum alloy, titanium, stainless steel and composite materials, Low temperature and high temperature materials.	08Hrs
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Course Outcomes:

At the end of this course the student will be able to :

1	Appreciate and apply the basic principles of aviation
2	Apply the concepts of fundamentals of flight, basics of aircraft structures, aircraft propulsion and aircraft materials during the development of an aircraft
3	Comprehend the complexities involved during development of flight vehicles.
4	Evaluate and criticize the design strategy involved in the development of airplanes

Reference Books

1	John D. Anderson, "Introduction to Flight", McGraw-Hill Education, 2011. ISBN 9780071086059.
2	Sutton G.P., "Rocket Propulsion Elements", John Wiley, New York, 8th Ed., 2011; ISBN:1118174208, 9781118174203.
3	Yahya, S.M."Fundamentals of Compressible Flow-5th Edition", New Age International, 2016,ISBN: 8122440223
4	Aircraft structural Analysis, T.H.G Megson, Butterworth-Heinemann Publications, 2007. ISBN: 978-1-85617-932-4

SCHEME OF EVALUATION

Continuous Internal Evaluation (CIE) (Theory – 100 Marks)	
Evaluation method	Course with Assignment
Quiz -1	10
Test -1	30
Quiz -2	10
Quiz -3	10
Test -2	30
Assignment	10
Total	100

Semester End Evaluation Theory (100)	
Part- –A	
Objective type questions	20
Part –B	

There should be five questions from five units. Each question should be for maximum of 16 Marks.	80
The UNIT-1, UNIT-4 and UNIT-5 should not have any choice.	
The UNIT-2 and UNIT-3 should have an internal choice. Both the questions should be of the same complexity in terms of COs and Bloom's taxonomy level.	
Total	100

	What		To whom	Frequency of conduction	Max Marks	Evidence	Contribution to Course Outcome		
	Direct Assessment Methods	CIE	Quiz	Students	Three	30	Answer Scripts	80 %	100 %
Test			Two		60/50				
Assignment/Self-study			2 phases		10/20	Reports / Record Books			
SEE		Semester End Examination	End of every semester Consisting of Part-A and Part-B		100	Answer Scripts	20 %		
Indirect Assessment	Course End Survey		Students	End of course		Questionnaire Based on COs	10%		

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	1	3	2	2				1
CO2	2	2	2	3	2	1	1	1				1
CO3	1		3	3								1
CO4	2	2	3	3		2	2	2				1

High-3 : Medium-2 : Low-1