

SEMESTER 5**AIRCRAFT STRUCTURES –II**

Course Code	PCAOT502	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:1:0:0	ESE Marks	60
Credits	4	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	ENGINEERING MECHANICS, AIRCRAFT STRUCTURES-I	Course Type	Theory

Course Objectives:

1. To analyse the stress and strain in major aircraft structural components such as aircraft wings and fuselage

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	BENDING OF THICK & THIN-WALLED BEAMS: Symmetrical and unsymmetrical bending in symmetrical (skew load) and unsymmetrical cross-section - Bending stresses in thick & thin-walled beams using generalized k- method - Principal axis and Neutral axis methods.	11
2	SHEAR FLOW IN OPEN SECTION: Thin-walled beams- Concept of shear flow. Shear flow distribution in symmetrical and unsymmetrical thin-walled sections. Shear center and its determination– structural idealization – shear flow variation in idealized sections, with wall effective and ineffective in bending - Applications of shear flow calculations	11
3	SHEAR FLOW IN CLOSED SECTION: Bredt - Batho theory – shear center of closed section (Thin-walled, idealized sections) – single cell and multi cell tubes subject to torsion – shear flow distribution in thin walled single & multi cell structures subject to combined bending and torsion with walls effective and ineffective in bending.	11
4	THIN PLATES: Introduction to buckling of plates. Rectangular sheets under compression. Buckling stress of thin-walled section. Crippling stresses by Needham's and Gerard's methods, sheet stiffener panels- Effective skin width. STRESS ANALYSIS OF AIRCRAFT COMPONENTS: Loads on an aircraft-classification - V-n diagram. shear force and bending moment distribution over the aircraft wing and fuselage. Tension field web beams (Wagner's). Shear resistant web beams.	11

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
2 Questions from each module. - Total of 8 Questions, each carrying 3 marks (8x3 =24 marks)	- Each question carries 9 marks. - Two questions will be given from each module, out of which 1 question should be answered. - Each question can have a maximum of 3 sub divisions. (4x9 = 36 marks)	60

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Analyze bending stress in symmetrical & Unsymmetrical sections	K4
CO2	Analyze the shear flow in open section beams and Torsion of non-circular prismatic beams	K4
CO3	Analyze the shear flow in closed section beams.	K4
CO4	Analyze the buckling behavior of plates, columns under various loads and also analyse aircraft wing and fuselage.	K4

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

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

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	"Aircraft Structures",	Peery, D.J., and Azar, J.J.,	McGraw – Hill, N.Y.,	2013
2	“Airframe structural Design”	Michael Chun-Yung Niu,	Conmilit Press Ltd,	1998
3	"Theory and Analysis of Flight Structures".	Rivello, R.M.	McGraw Hill,	1993.
4	"Fundamentals of Aircraft Structural Analysis".	Howard D Curtis,	WCB- McGraw Hill,	1997

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	"Analysis and Design of Flight Vehicles Structures",	Bruhn. E.H.,	Tri- state off-set Company, USA,	1985.
2	"Aircraft Structures for Engineering Students",	Megson T M G ,	Elsevier Ltd,	2012

Video Links (NPTEL, SWAYAM...)	
Module No.	Link ID
1	https://archive.nptel.ac.in/courses/112/101/112101004/