Course code	Course Name	L-T-P - Credits	Year of Introduction
AO303	AIRCRAFT STRUCTURES - II	3-0-0-3	2016

Prerequisite: AO204 Aircraft Structures -I

Course Objectives

- To provide various methods for analysis of aircraft wings and fuselage.
- To provide the behavior of major aircraft structural components.

Syllabus

Bending of symmetric and unsymmetric beams -Thin walled beams - Bredt - Batho theory, - Bending of thin plates – Loads on an aircraft - Bending moment distribution over the aircraft - Shear flow in thin-webbed beams with non-parallel flanges - Complete tension field beam, Semi-tension field beam theory.

Expected Outcome

The students will be able to

i. analyse the aircraft wings and fuselage
ii. demonstrate the behavior of major aircraft structural components.

Text Books:

1. Bruhn. E.H., "Analysis and Design of Flight Vehicles Structures", Tri-state off-set Company, USA,1985
2. Megson T M G , "Aircraft Structures for Engineering Students", Elsevier Ltd, 2007
3. Peery, D.J., and Azar, J.J., "Aircraft Structures", 2nd edition, McGraw – Hill, N.Y., 1999

References:

1. Howard D Curtis, "Fundamentals of Aircraft Structural Analysis", WCB-McGraw Hill, 1997
2. Rivello, R.M., "Theory and Analysis of Flight Structures", McGraw Hill, 1993.

Course Plan

Module	Contents	Hours	End Sem. Exam Marks
I	Bending of symmetric beams subject to skew loads	2	15%
	Bending stresses in beams of unsymmetrical sections	2	
	Generalized ‘k’ method,	2	
	Neutral axis method, and principal axis method	2	
II	Thin walled beams – concept of shear flow	1	15%
	Shear flow distribution in symmetrical, unsymmetrical thin-walled sections	2	
	The shear center and its determination	2	
	Structural idealization – shear flow variation in idealized sections.	3	
FIRST INTERNAL EXAMINATION			

III	Bredt - Batho theory	1	15%
	Single-cell and multi-cell tubes subject to torsion	2	
	Shear flow distribution in thin-walled single & multi-cell structures subject to combined bending torsion – with walls effective and ineffective in bending	3	
	Shear center of closed sections.	1	
IV	Bending of thin plates – rectangular sheets under compression	1	15%
	Local buckling stress of thin walled section	2	
	Crippling strength estimation – thin-walled column strength	2	
	Load carrying capacity of sheet stiffener panels – effective width.	2	
SECOND INTERNAL EXAMINATION			
V	Loads on an aircraft – v-n diagram	1	20%
	Shear force distribution over the aircraft wing and fuselage	2	
	Bending moment distribution over the aircraft wing and fuselage	2	
VI	Shear flow in thin-webbed beams with parallel flanges	2	20%
	Shear flow in thin-webbed beams with non-parallel flanges	1	
	Complete tension field beams	1	
	Semi-tension field beam theory	2	
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100 Exam duration: 3 hours

The question paper shall consist of three parts

Part A
4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B
4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C
6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed.