

Course code	Course Name	L-T-P-Credits	Year of Introduction
AO208	AIRCRAFT MATERIALS AND PROCESSES	3-0-0-3	2016
Prerequisite : Nil			
Course Objectives: <ul style="list-style-type: none"> To study types of materials and mechanical behavior of materials for aircraft applications 			
Syllabus Structure of solid materials - mechanical properties -Ferrous, non-ferrous, aluminium, titanium, copper and magnesium alloys - Non-Metallic Materials -Composite materials -Metal working process-heat treatment -corrosion – high temperature materials – super alloys.			
Expected Outcome The students will be able to <ol style="list-style-type: none"> Understand role of corrosion and heat treatment processes of aircraft materials Know the usage of composite materials in aircraft component design. Know the use of high temperature materials in space applications Familiarize the different types of metal working processes. 			
Text Books: <ol style="list-style-type: none"> Titterton.G., "Aircraft Materials and Processes", V Edition, Pitman Publishing Co., 1995. Advanced Composites –Cindy Forema 			
References: <ol style="list-style-type: none"> Martin, J.W., "Engineering Materials, Their properties and Applications", Wykedham Publications (London) Ltd., 1987. Van Vlack.L.H., "Materials Science for Engineers", Addison Wesley, 1985. Airframe and Power plant Mechanics-General Hand Book-FAA Himalayan Book House , New Delhi. 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Structure of solid materials – Atomic structure of materials – crystal structure	2	15%
	millier indices – density – packing factor – space lattices	1	
	x-ray diffraction – imperfection in crystals	2	
	Mechanical properties of materials - physical metallurgy - general requirements of materials for aerospace applications	2	
	Structural Metals – Ferrous aircraft metals and alloys	2	
	Non-Ferrous Aircraft metals and Alloys	2	

II	Aluminum and Aluminum alloys, Titanium and Titanium Alloys	2	15%
	Copper and Copper Alloys Magnesium and Magnesium alloys.	2	
FIRST INTERNAL EXAM			
III	Non-Metallic Materials - Wood, Fabrics ,Plastics , Transparent materials Rubber and Synthetic rubber	1	15%
	Composite materials - Introduction	2	
	Reinforcing Fibers, Matrix materials	2	
	Core materials& manufacturing of composites.	2	
IV	Metal working process	1	15%
	Cold working and Hot working	1	
	Heat Treatment-Hardening, Tempering, Annealing, Normalizing, Case hardening	2	
	Machining Process-Turning, Taper Turning, Milling, Shaping, Grinding. Thread Cutting . Sheet Metal Rolling	1	
SECOND INTERNAL EXAM			
V	Types of corrosion	1	20%
	Effect of corrosion on Mechanical properties, Stress corrosion	2	
	Factors affecting corrosion	2	
	Corrosion resistant materials used in for space vehicles.	2	
VI	Classification, production and characteristics of high temperature materials – methods and testing	2	20%
	determination of mechanical and thermal properties of materials at elevated temperatures	2	
	application of these materials in thermal protection systems of aerospace vehicles	1	
	super alloys – high temperature material characterization.	2	
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100

Exam duration: 3 hours

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.