

AIRCRAFT PRODUCTION TECHNOLOGY

V Semester: AE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AAEB16	core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 60	
OBJECTIVES:								
The course should enable the students to:								
I. Study the composition of microstructures of metals and alloys with their applications in aerospace industry.								
II. Discuss the various manufacturing processes and selection of process for suitable applications								
III. Understand the working principles and applications of conventional and unconventional machining alongwith their advantages and disadvantages.								
IV. Demonstrate the importance of composites with their applications in different areas of aerospace industry								
COURSE OUTCOMES (COs):								
CO 1: Demonstrate different type of materials used in aircraft industry and study its properties								
CO 2: Understand the process of casting and inspection techniques used for production.								
CO 3: Explain sheet metal operations and its tooling operations used for aircraft industry.								
CO 4: Gain knowledge about the basic convectional and unconventional Machining.								
CO 5: Understand the importance of composites and its manufacturing process.								
COURSE LEARNING OUTCOMES (CLOs):								
1. Choose a concept or idea of technical real time problems to form solutions for the same.								
2. Understand, Identify, Study and comprehend processes that lead to solutions to a particular production								
3. Develop one- self to extend the outputs of research.								
4. Outline performance of the output of research, development or design.								
5. Identify, solve new problems and gain new knowledge.								
6. Understand about the turning, milling, grinding and drilling of a specimen.								
7. Getting knowledge about the techniques to produce a safe, effective, economic final product.								
8. Understand the theoretical knowledge behind the design and development of aircraft components.								
9. Gain knowledge about the basic convectional, unconventional riveting and welding for knowledge based exams								
10. Discuss the principle of advanced materials and what factors drive to develop the composite materials.								
11. Extend the outputs of earlier research and discover good ideas for new products or improving current products.								
12. Memorize procedure and steps to keep the products working effectively.								

13. Gain knowledge about what materials used to manufacture for each component in an aircraft. 14. Ability to summarize the efficiency of the product development in achieving the mission goal 15. Ability to summarize the efficiency of the safety of flight.		
MODULE-I	AIRCRAFT ENGINEERING MATERIALS	Classes: 10
Engineering materials Steels, study of iron, iron carbon phase diagram, heat treatment-annealing, normalizing, hardening and tempering of Aluminum and steel, Non-Ferrous metals and Alloys: Structure and properties of copper and its alloys, Aluminum and its alloys, Titanium and its alloys, Corrosion - Types of Corrosions - Prevention – Protective Treatments.		
MODULE-II	CASTING, WELDING AND INSPECTION TECHNIQUES	Classes: 09
General principles of various casting processes Sand casting, die-casting, centrifugal casting, investment casting, Shell molding types; Principles and equipment used in arc welding, gas welding, resistance welding, solid, laser welding, and electron beam welding, soldering and brazing techniques. Need for NDT, ultrasonic testing, Radiographic testing, Flight testing.		
MODULE-III	SHEET METAL PROCESSES IN AIRCRAFT INDUSTRY	Classes: 10
Sheet metal operations: shearing, punching, super plastic forming; operations in bending like stretch forming spinning drawing. Riveting, types and techniques, equipment, fasteners, integral tanks, final assembly of aircraft, Jigs and Fixtures, stages of assembly, aircraft tooling concepts.		
MODULE-IV	CONVENTIONAL AND UNCONVENTIONAL MACHINING PROCESSES	Classes: 08
General working principles, applications and operations of lathe, shaper, milling machines, grinding, drilling machine, computer numeric control machining. Working principles and applications of abrasive jet machining, ultrasonic machining, Electric discharge machining and electro chemical machining, laser beam, electron beam, plasma arc machining.		
MODULE-V	AIRCRAFT COMPOSITES	Classes: 08
Production of semi-fabricated forms, Aerospace applications, Plastics and rubber, Introduction to fiber reinforced plastics, glass and carbon composites; Fibers and resins; Characteristics and applications, Classification of aircraft materials; Materials used for aircraft components, Application of composite materials, Super alloys, indigenized alloys, emerging trends in aerospace materials..		
Text Books:		
<ol style="list-style-type: none"> 1. S. Kalpakjian, Steven R. Schmid, “Manufacturing Engineering and Technology”, Addison Wesley 5th Edition, 1991. 2. S. C. Keshu, K. K Ganapathy, “Aircraft production technology and management”, Interline Publishing House, Bangalore, 3rd Edition, 1993. 3. Douglas F. Horne, “Aircraft production technology”, Cambridge University Press, 1st Edition, 1986. 		
Reference Books:		
<ol style="list-style-type: none"> 1. S. C. Keshu, K. K Ganapathy, “Air craft production techniques”, Interline Publishing House, Bangalore, 3rd Edition, 1993.. 2. R. K. Jain, “Production Technology”, McGraw-Hill, 1st Edition, 2002. 3. O. P. Khanna, M. Lal, “Production Technology”, Dhanpat Rai Publications, 5th Edition, 1997. 		

Web References:

1. <https://www.mdpi.com/journal/aerospace>
2. <http://library.stanford.edu/guides/aircraft-materials-and-avionics>
3. <https://www.cranfield.ac.uk/courses/taught/aerospace-materials>

E-Text Books:

1. <https://bookboon.com/en/manufacturing-processes-and-materials-exercises-ebook#download>
2. <https://www.amazon.com/Introduction-Aerospace-Materials-Woodhead-Publishing-ebook/dp/B00HLLNFYO>