DHANALAKSHMI SRINIVASAN

COLLEGE OF ENGINEERING AND TECHNOLOGY

MAMALLAPURAM, CHENNAI

(Affiliated to Anna University, Chennai ,Approved by AICTE and Accredited by NACC)

DEPARTMENT OF AERONAUTICAL ENGINEERING

COURSE FILE

COURSE CODE : C201

SUBJECT CODE : AE3301 (Regulation 2021)

SUBJECT NAME : ELEMENTS OF AERONAUTICAL ENGINEERING

YEAR / SEMESTER : II / III

QUESTION BANK

Subject Code & Name : AE3301 – ELEMENTS OF AERONAUTICAL ENGINEERING

Year / Sem : II / III

UNIT I HISTORY OF FLIGHT			
Q.No	**Question**	**BT Level**	**Competence**
PART – A			
1.	What are the difference between balloon flight and aircraft flight?	BTL2	Understanding
2.	Name the forces acting on an aeroplane	BTL1	Remembering
3.	Differentiate between biplane and monoplane	BTL2	Understanding
4.	Define aspect ration of wing	BTL1	Remembering
5.	Write a short note on balloon flight.	BTL1	Remembering
6.	Bringout the differences between monoplanes and biplanes.	BTL2	Understanding
7	Define ornithopter, who invented it.	BTL2	Understanding
8.	Write down the principle difference between lighter than air and heavier than airplanes.	BTL2	Understanding
9.	State the two kinds of aircraft.	BTL2	Understanding
10.	List out the difference classification of flight vehicles	BTL1	Remembering
11.	Distinguish between a glider and a sail plane	BTL2	Understanding
12.	What is the role of rudder?	BTL1	Remembering
13.	What are the function of ailerons in an aircraft?	BTL2	Understanding
14.	Name any four components of airplane of an airplane and mention their functions.	BTL2	Understanding
15.	What are basic instruments for flying?	BTL2	Understanding
16.	What is the purpose of turn and slip indicator.	BTL2	Understanding
PART – B & PART - C			

1.	Explain early developments in aerodynamics related to subsonic and supersonic flights.	BTL3	apply
2.	Explain the developments in aircraft structures over the years.	BTL3	Apply
3.	Briefly explain how the modern developments in the subjects of aerothermodynamics and aerospace materials influenced aircraft design.	BTL2	apply
4.	Bring out the essential difference in the structural design approaches of fuselage with respect to early airplane and modern airplanes.	BTL2	Understanding
5.	Draw a three view diagram of an aircraft and mention all the parts.	BTL3	Apply
6.	Sketch a typical system for control actuation. Explain the operation. what are the recent developments in the control actuation systems.	BTL3	Apply
7.	Write a short note on orthipters. Draw a schematic diagram of wright brothers first successful airplane and discuss it in detail.	BTL2	Understanding
8.	Discuss in details about the various materials used on airplanes over the years	BTL3	Apply

UNIT II AIRCRAFT CONFIGURATIONS AND ITS CONTROLS			
Q.No	**Question**	**BT Level**	**Competence**
PART – B & PART C			
1	Name the various types of drags and briefly explain the methods to minimize the drags in an aircraft.	BTL3	Applying
2	By deriving suitable expression discuss the relationship of the pressure, density and temperature at various altitudes.	BTL3	Applying
3	Explain the basic structure of atmosphere with a neat sketch and derive the relation for pressure and temperature variation with altitude.	BTL2	Understanding
4	Explain with aid of plots about the variation of lift coefficient and drags coefficients with angle of attack for symmetrical and cambered airfoils.	BTL2	Understanding
5	What are the different classification of airfoils and explain with examples?	BTL3	apply

6	Explain briefly about the role of carbon dioxide in atmosphere.	BTL3	apply
7	Discuss in briefly about the various layers of atmosphere based on temperature variation.	BTL3	apply
8	What are the ISA mean seal- level values prescribed? Using them, calculate the pressure, density and temperature values at 8Km altitude and 26 Km altitude.	BTL3	apply
9	Draw typical aerodynamics characteristics curve of symmetrics and cambered airfoil. Explain the nature of the curve.	BTL3	apply

UNIT III BASICS OF AERODYNAMICS			
Q.No	**Question**	**BT Level**	**Competence**
PART – A			
1.	Differentiate between symmetrical and cambered airfoils.	BTL1	Remembering
2.	Define ISA and what is its significance ?	BTL1	Remembering
3.	Define Mach number.	BTL1	Remembering
4.	What are the two major constituents of the atmosphere ? Name them with their average proportions.	BTL1	Remembering
5.	Define centre of pressure.	BTL1	Remembering
6.	What are the three types of stabilizing surface present in aircraft ?	BTL1	Remembering
7.	What are the three types of control surface present in aircraft ?	BTL2	Understanding
8	What is the function of aileron?	BTL2	Understanding
9.	What is the function of rudder?	BTL2	Understanding
10.	What is the function of elevator?	BTL2	Understanding

11.	What are the types of non power driven aircrafts?	BTL2	Understanding
12.	What is fuselage?	BTL2	Understanding
13.	What are main plane/ Wing?	BTL2	Understanding
14.	What is strut?	BTL2	Understanding
15.	What are basic instrument for flying?	BTL2	Understanding
16.	What are basic instrument for flying?	BTL2	Understanding
17.	. Define absolute altitude?	BTL2	Understanding
PART – B & PART – C			
1	Write down the classification of flight vehicles and briefly explain the importance features.	BTL3	apply
2	Explain in details with sketches about power assisted and power operated control mechanism.	BTL3	Applying
3	write down and explain the classification of flight vehicle , with respect to principle of operation and configuration.	BTL3	Applying
4	Explain with neat sketch the components of an airplane and their functions.	BTL2	Understanding
5	How do you classify different types of flight vehicle? Discuss the criteria for classification.	BTL3	Applying
6	Draw various types of wings used in aircraft and how they are attached to the fuselage. Discuss them in details.	BTL3	apply
7	With neat sketches, explain in details about conventional control and powered control systems used in airplanes.	BTL3	apply

UNIT V	BASICS OF aircraft structure		
Q.No	**Question**	**BT Level**	**Competence**
	PART - A		
1.	Differentiate between Pratt and Warren trusses in the fuselage construction.	BTL1	Remembering
2.	What are the functions of ribs and spars ?	BTL1	Remembering
3.	Mention the key advantage of sandwich structure.	BTL1	Remembering
4.	Differentiate between Pratt and Warren trusses of the fuselage construction.	BTL1	Remembering
5.	State the uses of stringers and longerons.	BTL1	Remembering
6.	What is meant by Hooke's law ?	BTL1	Remembering
7.	What are secondary control surface?	BTL2	Understanding
8.	Define biplane interference.	BTL2	Understanding
9.	Define aerodynamics center	BTL2	Understanding

10	What is tropopause?	BTL2	Understanding
11	What ISA and explain its significance.	BTL2	Understanding
12	What is high lift device? What has prompted their development?	BTL2	Understanding
13	What is a cambered airfoil?	BTL1	Remembering
14	Define AR, camber of an airfoil	BTL2	Understanding
15.	Differentiate between anhedral and didhedral	BTL2	Understanding
16.	What do you mean by absolute ceiling?	BTL2	Understanding
17.	Draw airfoil structure	BTL2	Understanding
	PART – B & PART - C		
1	Write short notes on any four materials used in aircraft structures, also discuss their advantages.	BTL3	apply
2	Draw the stress-strain diagram and define the terms proportional limit, yield stress and ultimate tensile stress. How the stress-strain diagram of aluminium and steel differs ?	BTL3	apply
3	Briefly explain stressed skin or semi-monocoque structure.	BTL3	apply
4	State the importance of composite materials used in aircraft.	BTL3	apply
5	Explain different types of loads acting on aircraft.	BTL2	Understanding
6	Describe the stress-strain curves of an aluminium alloy say 24-ST and mild steel. Elaborate on the salient features in each case. (6)	BTL2	Understanding
7	Discuss in detail about the types of construction of aircraft fuselage structure with necessary sketches.	BTL3	apply

8	Explain the application of composite material in the construction of the airplane airframe.	BTL2	Understanding
9	Draw stress-strain diagram for brittle and ductile materials. Indicate all salient point on it and explain them.	BTL3	apply

UNIT IV BASICS OF PROPULSION			
Q.No	**Question**	**BT Level**	**Competence**
	PART - A		
1.	Give any two fundamental differences between piston engine and jet engine from operation point of view.	BTL1	Remembering
2.	What is the basic function of an aircraft propeller ?	BTL1	Remembering
3.	Define specific impulse.	BTL1	Remembering
4.	Write down the differences between the piston engines and gas turbine engines.	BTL1	Remembering
5.	What do you mean by Cryogenic Propellants ?	BTL1	Remembering
6.	Differentiate between reciprocating engines and Gas Turbine Engines.	BTL1	Remembering
7.	State the propellant burning configuration possible in solid propellant motors.	BTL2	Understanding
8.	What are hypergolic propellants? give an example	BTL2	Understanding
9.	Why is it that turbo fan engine is very widly used in commercial aircraft?	BTL2	Understanding
10.	What are the limitations of a piston engines for aircraft propulsion	BTL2	Understanding
11.	Define specific impulse of a rocket	BTL2	Understanding
12.	What is jet thrust?	BTL2	Understanding
13.	What are the requirements of a good power plant	BTL2	Understanding
14.	Why does the blade angle of a propeller decrease from boss to tip	BTL2	Understanding

15.	What is 'Ramjet' engine?	BTL2	Understanding
16.	What are the advantages and the disadvantages of rocket propulsion?	BTL2	Understanding

PART – B & PART - C			
1	i) Write the classification of rockets. ii) With aid of neat sketch explain the operation of Liquid Propellant Rocket engine.	BTL3	apply
2	Write down the classification of aircraft engines. Explain any one engine with aid of a diagram. List down the comparison of different engines.	BTL3	apply
3	Sketch a typical liquid propellant rocket power plant and name the important components. State the advantages of liquid propellant rocket over solid propellant rockets. (10)	BTL3	apply
4	Write down the classification of rocket engine.	BTL3	apply
5	Sketch a schematic diagram of a turbojet engine, mark all the subsystems and explain their functions. What are the advantages and disadvantages? (10)	BTL2	Understanding
6	Differentiate between gas turbine engines and piston engines.	BTL1	Remembering
7	Explain in detail about turbofan engine with a neat sketch. Also compare the merits and demerits of various power plants used in aircrafts.	BTL3	apply
8	Explain the basic principle of operation of rocket engine. Discuss in detail about the various types of rockets with their applications.	BTL3	apply