INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

AERONAUTICAL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	**AIRCRAFT SYSTEMS**
Course Code	:	**A62113**
Class	:	III B. Tech II Semester
Branch	:	Aeronautical Engineering
Year	:	2017 – 2018
Course Coordinator	:	Ms. G Sravanthi, Assistant Professor, Department of Aeronautical engineering.
Course Faculty	:	Ms. G Sravanthi, Assistant Professor, Mr. R Suresh Kumar Assistant Professor, Department of Aeronautical engineering.

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

S No	Question	Blooms Taxonomy Level	Course Outcomes
UNIT - I INTRODUCTION TO AIRCRAFT SYSTEMS AND INTEGRATION			
Part - A (Short Answer Questions)			
1	Define design drivers concept in aircraft system.	Remember	1
2	State the Vehicle System of the aircraft.	Understand	1
3	Define the Avionic System of the aircraft.	Understand	1
4	Define the mission System of the aircraft.	Understand	1
5	State the generic aircraft system.	Remember	1
6	Discuss the process of System Integration in aircraft system.	Understand	1
7	List out the different levels of system integration.	Remember	1
8	Define Integration in terms of aircraft systems.	Remember	1
9	State product system of product environment.	Understand	1
10	Define Interdependence of different aircraft sub systems.	Remember	1
Part - B (Long Answer Questions)			
1	Describe the Vehicle System of the aircraft with examples.	Understand	1
2	Define system and explain every day examples of system.	Understand	1

S No	Question	Blooms Taxonomy Level	Course Outcomes
3	Describe the Avionic System of the aircraft with examples.	Understand	1
4	Describe the mission System of the aircraft with examples.	Remember	1
5	Explain the generic aircraft system with examples.	Understand	1
6	Write the interpretation of System Integration in different levels in the Aircraft.	Remember	1
7	Explain the interface between the sensor and actuator of a control system.	Understand	1
8	Explain the radio frequency radiation, altitude and temperature of product environment.	Remember	1
9	Sketch hierarchical view of a product system.	Understand	1
10	Justify how external environment will affect the system with examples.	Remember	1
Part - C (Problem Solving and Critical Thinking Questions)			
1	Explain the health, safety and environmental issues and standards, regulations of project environment.	Understand	1
2	Explain the fallowing aircraft systems / sub systems indicating Purpose with brief description Safety aspects, Integrity, Interfaces and Design Drivers	Remember	1
3	Explain component integration level with examples.	Understand	1
4	Describe the business environment with neat sketches.	Remember	1
5	Explain project operating level environment with neat sketches.	Understand	1
6	Explain project level environment with neat sketches.	Understand	1
7	Explain briefly system thinking of system integration.	Remember	1
8	Write short notes on Interdependence of aircraft systems and Design drivers.	Understand	1
9	Explain dual redundant aircraft systems with block diagram.	Remember	1
10	Explain product environment with neat sketches.	Understand	1
UNIT - II ELECTRICAL SYSTEMS AND FLIGHT CONTROL SYSTEMS			
Part – A (Short Answer Questions)			
1	Define Power conversions of electrical systems.	Remember	2
2	Define Energy storage devices and give examples.	Remember	2
3	Describe Electrical load protection devices.	Understand	2
4	What is Transformer Rectifier Unit with neat sketch?	Remember	2
5	Define Electrical Load Management System.	Understand	3
6	Write primary flight controls of aircraft.	Remember	8
7	What are secondary flight controls of aircraft?	Understand	8
8	What is trim and feel explain briefly.	Remember	8
9	Define multiple redundancy actuations.	Understand	8
10	Define Flyby wire technology.	Understand	9
Part - B (Long Answer Questions)			
1	Justify How a push pull control rod system mechanism helped for flight controls.	Understand	8
2	Discuss the merits and de merits of cable and pulley system for controlling the flight control surfaces.	Remember	8
3	Explain any one advanced actuation system.	Understand	9
4	Explain Mechanical Screw jack Actuator.	Remember	9

S No	Question	Blooms Taxonomy Level	Course Outcomes
5	Explain the Electrical Load Management System.	Understand	3
6	Describe working principle of Variable Speed Constant Frequency (VSCS).	Understand	2
7	Explain AC power generation in aircraft.	Remember	3
8	Explain Emergency power generation in aircraft.	Understand	3
9	Explain different electrical loads in aircraft.	Remember	3
10	Explain few high lift control devices.	Understand	3
Part – C (Problem Solving and Critical Thinking)			
1	Write the different types of Power conversions required in aircraft.	Remember	2
2	Write short notes on Autotransformer, Inverter and Transformer Rectifier Unit	Understand	2
3	Explain the primary power distribution of aircraft with neat sketch.	Remember	3
4	Explain the voltage regulation and load protection of D.C power generation.	Understand	2
5	List out the various types of modern electrical power generations in aircraft and their applications.	Remember	2
6	Explain DC power generation in aircraft.	Understand	2
7	Write short notes on the following 270V DC System and more electric aircraft.	Remember	2
8	Explain the secondary power distribution of aircraft with sketch.	Understand	3
9	Justify Why redundancy is required in flight control actuation? Explain the multiple redundancy actuations with suitable sketch.	Remember	2
10	Explain the circuit breaker load protection in electrical system.	Understand	2
UNIT-III HYDRAULIC SYSTEMS			
Part - A (Short Answer Questions)			
1	What is hydraulic system and sketch the circuit design.	Understand	4
2	Write the components of a typical hydraulic system.	Remember	4
3	Define Redundancy.	Remember	4
4	Write any two Hydraulic fluids.	Understand	4
5	Define Fluid temperature.	Understand	4
6	Define Hydraulic fluid flow rate.	Understand	4
7	Write the different hydraulic pumps.	Remember	4
8	What is a landing gear with sketch?	Understand	5
9	Write the full form of ABS.	Remember	5
10	What is anti skidding system?	Understand	5
11	Define actuation.	Understand	4
12	Define actuators in aircraft system.	Remember	4
13	What is hydraulic pump?	Understand	5
14	Sketch the nose gear of Boeing aircraft.	Remember	5
15	Name advanced actuation systems.	Understand	5
16	Define oleo strut in landing gear mechanism.	Understand	4
17	Define hydraulic pressure in hydraulic actuation.	Remember	4
18	Define hydraulic reservoir.	Understand	5
19	Define main gear in landing gear system.	Remember	5

S No	Question	Blooms Taxonomy Level	Course Outcomes
20	State braking system.	Understand	4
21	Define automatic braking system.	Remember	4
22	What is EHA	Understand	5
23	What is EMA in hydraulic system?	Remember	5
24	Define direct drive actuation in hydraulic system.	Understand	5
25	List out different types of refrigeration systems in environmental control of an aircraft.	Remember	4
26	Write the need of environmental control system.	Understand	5
27	Name the different types of humidity control systems.	Remember	5
28	Why cabin pressurization is needed?	Understand	5
29	What do you understand by the term hypoxia?	Understand	4
30	How molecular sieve oxygen concentrators (MSOC) supplement oxygen supply?	Remember	4
31	Write the need of anti-g trousers in military aircraft maneuvering.	Understand	5
32	Write the concept of multiple redundancy actuation	Remember	5
33	List out any 4 important valves used in hydraulic systems	Understand	4
34	Distinguish between hydraulic accumulator and hydraulic reservoir	Remember	4
35	Sketch hydraulic screw jack.	Understand	5
36	What is cavitation with respect to fuel systems?	Understand	4
37	List out the important characteristics of hydraulic fluid.	Remember	4
39	What is meant by FCOC in fuel system and its purpose?	Understand	5
40	What is bleed air? From where it will be collected?	Remember	5
41	Discuss any 3 applications of bleed air systems.	Remember	4
42	Write the important monitoring sensors in fuel systems.	Understand	4
43	Draw a line diagram indicating important parts of a simple engine control system.	Remember	4
44	Distinguish between LP cock valves and HP cock valves with respect to fuel control system.	Remember	4
45	List out various engine rotation methods (cranking the engine).	Remember	4
46	How a booster pump differs from transfer pump in fuel systems.	Understand	4
	Part – B (Long Answer Questions)		
1	Write the components of aircraft which use hydraulic systems.	Remember	4
2	Write the applications of hydraulic Systems in aircraft.	Understand	4
3	Examine the important components of a typical hydraulic system and their functions.	Remember	4
4	Justify Why Redundancy is required in hydraulic systems.	Remember	4
5	Explain the yellow channel hydraulic system.	Understand	4
6	Explain the working of hydraulic pump.	Remember	4
7	Explain the green channel hydraulic system.	Understand	5
8	Explain the fluid conditioning and reservoir.	Understand	5
9	Explain the BAE systems hawk 200 hydraulic systems.	Remember	5

S No	Question	Blooms Taxonomy Level	Course Outcomes
10	Explain Tornado Hydraulic System.	Understand	5
Part – C (Problem Solving and Critical Thinking)			
1	Justify how a hydraulic system takes an important role in aircraft.	Remember	4
2	Explain the multi wheel systems with neat sketches.	Understand	4
3	Explain the block diagram of hydraulic system in aircraft.	Remember	4
4	Explain with suitable diagram the working of a hydraulic system.	Understand	4
5	Write short notes on Hydraulic fluids, Fluid temperature, and Hydraulic fluid flow rate.	Understand	4
6	List different types of hydraulic pumps. Explain the working of any one.	Remember	4
7	Explain what is a landing gear? Explain the nose landing gear system with neat.	Understand	5
8	Explain the main landing gear system with neat diagram.	Remember	5
9	Explain the working principle of the fallowing braking and anti skidding system in use in aircrafts - Dunlop Maxaret Anti skidding system, Electronic control of braking and anti skidding system and Dunlop Automatic brake control system.	Understand	5
10	List out various types of braking and anti skidding systems in aircraft and discus the working principle briefly.	Remember	5
UNIT-IV PNEUMATIC AND ENVIRONMENTAL CONTROL SYSTEMS			
Part – A (Short Answer Questions)			
1	Discuss the concept of bleed air system.	Remember	6
2	What is Wing anti icing system with sketches?	Understand	6
3	Discuss engine anti icing system.	Understand	6
4	Define Engine Start.	Remember	6
5	Define Thrust reversers.	Remember	6
6	What is a Pitot –Static system?	Understand	6
7	Define g tolerance.	Understand	6
8	Define Humidity control.	Understand	6
9	Write the full form of MSOC.	Remember	6
10	Define Cabin pressurization.	Understand	6
Part – B (Long Answer Questions)			
1	What is a bleed air write application/use of bleed air in aircraft systems?	Remember	6
2	Explain Wing and engine anti icing system.	Understand	6
3	Explain Engine Start and Thrust reverser's process.	Understand	6
4	Explain how a pitot static pressure is used for measuring airspeeds, aircraft altitudes and vehicle speeds.	Understand	6
5	What is the need for control environment for crew, passengers and equipment?	Remember	6
6	Discuss g tolerance, Humidity control.	Understand	6
7	Sketch and write the working principle of pressure reducing shut off valves.	Remember	6
8	Show the synoptic display of a typical bleed air system labelling the components.	Remember	6
9	Distinguish between kinetic heating and solar heating.	Remember	6

S No	Question	Blooms Taxonomy Level	Course Outcomes
10	Describe the international standard atmosphere with sketch.	Understand	6
Part – C (Problem Solving and Critical Thinking)			
1	Explain the need for avionics conditioning and cabin conditioning.	Understand	6
2	Explain Bleed Air System Indications and Engine Bleed Air Control.	Understand	6
3	Explain the purpose of auxiliary power unit.	Remember	6
4	Explain any two air cycle refrigeration systems with sketch.	Remember	6
5	Discuss the different HEAT source for heat loads in A/C g tolerance ,Humid control, MSOC ,Cabin pressurization	Understand	6
6	Explain Ram air cooling and fuel cooling with sketches.	Understand	6
7	Explain the difference between hydraulics system and pneumatic system.	Understand	6
8	Compare the sequence wall and modulator wall.	Remember	6
9	Differentiate shut off valve and NRV.	Remember	6
10	Justify how environment systems affect the aircraft systems.	Understand	6
UNIT-V ENGINE CONTROL AND FUEL SYSTEMS			
Part - A (Short Answer Questions)			
1	Define flow control in fuel systems.	Understand	7
2	What is FADEC?	Remember	7
3	Write input and output signals of engine control system.	Understand	7
4	Discuss Engine Power off takes.	Remember	7
5	Define Fuel Tank safety.	Understand	7
6	What is Fuel jettison?	Remember	7
7	Write the Fuel System Components.	Understand	7
8	What is fuel inverting system?	Remember	7
9	What is gas turbine engine?	Understand	7
10	Define Fuel Quantity measuring sensors.	Understand	7
Part - B (Long Answer Questions)			
1	Explain briefly few early jet engines.	Understand	7
2	Explain engine control system parameters.	Remember	7
3	Describe a gas turbine engine with neat sketch.	Understand	7
4	Explain in flight refuelling system with examples.	Remember	7
5	Explain the fuel booster pumps in fuel systems.	Understand	7
6	Explain the engine indicators in the cockpit controller.	Understand	7
7	Justify How fuel transfer pump differs from fuel booster pump.	Remember	7
8	Enumerate the different fuel transfer valves.	Understand	7
9	How can you measure the fuel quantity in fuel tank?	Remember	7
10	Discuss the concept of heat sink.	Understand	7
Part – C (Problem Solving and Critical Thinking)			
1	Evaluate the two important types of flow controls?	Remember	7
2	Justify input and output signals of engine control system .List out these Signals.	Understand	7
3	Write the important components of FADEC and Write its advantages.	Remember	7

S No	Question	Blooms Taxonomy Level	Course Outcomes
4	Explain pilot in loop Engine control system (Manual).	Understand	7
5	Explain Limited authority engine control system with suitable block Diagram.	Understand	7
6	Explain the Sequence of Engine starting.	Remember	7
7	Explain the important Engine indicators/reading parameters/ Engine Monitoring- sensors.	Understand	7
8	Explain fuel quantity measurement.	Understand	8
9	Write Short notes on Engine Power off takes, Fuel Tank safety and In flight fuelling system.	Remember	7
10	Describe the Fuel System Components.	Understand	7

Prepared By: Ms. G Sravanthi, Assistant Professor, Mr. R Suresh Kumar, Assistant Professor

HOD, AE