

Hall Ticket No

--	--	--	--	--	--	--	--	--	--

Question Paper Code: AAE010



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER

Third Year B.TechV Semester End Examinations (Regular), November - 2019

Regulations: IARE - R16

AIRCRAFT SYSTEMS AND CONTROL (Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

1. a) Enumerate the major aircraft systems and their subsystems of a civil transport aircraft. [7M]
b) Explain generic system with block diagram and explain some every day examples of aircraft systems. [7M]
2. a) Define airframe system. Explain all the vehicle subsystems of an aircraft with sketches. [7M]
b) Define system concepts? Explain all the mission subsystems of an aircraft with sketches? [7M]

UNIT – II

3. a) Explain how the aircraft electrical systems have control over power generations and voltage regulation. [7M]
b) Does all aircraft need cabin pressurization systems? Explain fire protection systems. [7M]
4. a) What are various types of air cycle refrigeration system? Explain any two types with sketches. [7M]
b) Explain primary and secondary power distribution with neat sketches. [7M]

UNIT – III

5. a) Explain the application of hydraulic system in landing gear and brake management system with sketches. [7M]
b) Explain the pneumatic system uses in aircraft and oleo-pneumatic struct with sketches. [7M]
6. a) Explain the working of typical hydraulic system? Describe the advantages and disadvantages of nose wheel and tail wheel landing gear system. [7M]
b) Describe the bleed air system users with neat sketches? Explain pitot-static system. [7M]

UNIT – IV

7. a) Explain engine monitoring sensors and engine monitoring indicators? Explain engine control of a modern aircraft. [7M]
b) What are the basic components present in aircraft fuel system with neat sketches? [7M]
8. a) Describe the fuel system characteristics and operating modes of engine control components? [7M]
b) Explain the engine control system parameters with neat sketches and explain any one example system. [7M]

UNIT – V

9. a) Explain the power assisted push pull rod control system with neat sketch. [7M]
b) Explain the electro hydrostatic actuation in aircraft control system. Differentiate with electro mechanical actuation with sketches. [7M]
- 10 a) Explain the fly by wire technology with sketch? explain flight control laws [7M]
b) Explain mechanical actuation with electro mechanical features with sketch? Explain trim and feel condition. [7M]



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

COURSE OBJECTIVES (COs):

The course should enable the students to:

Sl No	Description
I	Explain the concept and meaning of system and classify the various systems required for aircraft and their contribution in order to fulfill the aircraft tasks.
II	Describe the various types of Electrical power generations and distribution in aircraft and impart the knowledge of pneumatic, hydraulic and environmental control system.
III	Demonstrate the different flight control actuators and flight control system and fly-by-wire control laws and give knowledge about the landing gears systems and brake management system.
IV	Explain the concept of different aircraft gas turbine engines and their control systems and describe the fuel system characteristics and their operating modes and knowledge about the fuel safety management.

COURSE OUTCOMES (COs):

CO 1	Define the System concepts, sub-systems, Generic system definition, inputs, outputs, feedback, external influence and describe the Aircraft systems- airframe systems, vehicle systems, avionics systems, mission systems and their sub-systems
CO 2	Describe the Electrical loads in aircraft. Explain Electrical power generation and control- DC, AC-types, variable speed constant frequency (VSCS) cycloconverter, 270 V DC systems. Explain the Basic air cycle systems, Vapour cycle systems, boost-strap systems.
CO 3	Define Hydraulic systems and pneumatic systems. explain their Working principles, Typical air pressure system, Brake system, landing gear systems.
CO 4	Describe the Principle of operation of aircraft gas turbine engines, Engine monitoring sensors, indicators. Describe the Fuel systems- characteristics, components, operating modes, Fuel tank safety- fuel inserting system.
CO 5	Define Flight control systems- primary and secondary flight control explain Engine control systems, Push pull rod system, Modern control systems, Digital fly by wire systems Control linkages, actuation- types.

COURSE LEARNING OUTCOMES (CLOs):

Students, who complete the course, will have demonstrated the ability to do the following:

AAE010.01	Define the meaning of the system and its characteristics and identify different types of aircraft systems.
AAE010.02	Describe the various electrical power generations in the aircraft and discover more electric aircraft.
AAE010.03	Estimate the electrical power requirements and can optimize the load distribution.
AAE010.04	Describe the importance of hydraulic systems and its components and develop hydraulic systems.
AAE010.05	Illustrate the importance and criticality of landing gears.
AAE010.06	Recognize the applications of pneumatic systems and the application of the bleed air.
AAE010.07	Classify the various types of engine control system including advanced digital controls.
AAE010.08	Identify important flight control operations and selects suitable flight control actuations.
AAE010.09	Demonstrate the various types of air conditioning systems and vapour cycle systems.

AAE010.10	Identify the environmental control systems relating to aircraft systems.
AAE010.11	Classify the types of hydraulic fluids applied in aircraft industry and advancement in it.
AAE010.12	Estimate the various fuel inerting systems and indications for aircraft systems.
AAE010.13	Illustrate the importance of fly-by-wire technology in aircraft systems.
AAE010.14	Describe the pneumatics systems and its components.
AAE010.15	Estimate the various engine performances and their application in aircraft systems.

MAPPING OF SEMESTER END EXAMINATION TO COURSE OUTCOMES

SEE Question No.		Course Outcomes		Course Outcomes	Blooms' Taxonomy Level
1	a	AAE010.01	Define the meaning of the system and its characteristics and identify different types of aircraft systems.	CO 1	Remember
	b	AAE010.01	Define the meaning of the system and its characteristics and identify different types of aircraft systems.	CO 1	Understand
2	a	AAE010.01	Define the meaning of the system and its characteristics and identify different types of aircraft systems.	CO 2	Understand
	b	AAE010.01	Define the meaning of the system and its characteristics and identify different types of aircraft systems.	CO 2	Understand
3	a	AAE010.02	Describe the various electrical power generations in the aircraft and discover more electric aircraft.	CO 2	Remember
	b	AAE010.09	Demonstrate the various types of air conditioning systems and vapour cycle systems	CO 2	Understand
4	a	AAE010.10	Identify the environmental control systems relating to aircraft systems	CO 3	Understand
	b	AAE010.03	Estimate the electrical power requirements and can optimize the load distribution.	CO 3	Remember
5	a	AAE010.04	Describe the importance of hydraulic systems and its components and develop hydraulic systems.	CO 3	Understand
	b	AAE010.06	Recognize the applications of pneumatic systems and the application of the bleed air.	CO 3	Remember
6	a	AAE010.05	Illustrate the importance and criticality of landing gears.	CO 3	Remember
	b	AAE010.14	Describe the pneumatics systems and its components.	CO 3	Understand
7	a	AAE010.07	Classify the various types of engine control system including advanced digital controls.	CO 4	Understand
	b	AAE010.12	Estimate the various fuel inerting systems and indications for aircraft systems.	CO 4	Remember
8	a	AAE010.12	Estimate the various fuel inerting systems and indications for aircraft systems.	CO 4	Understand
	b	AAE010.15	Estimate the various engine performances and their application in aircraft systems.	CO 4	Remember
9	a	AAE010.08	Identify important flight control operations and selects suitable flight control actuations.	CO 5	Remember
	b	AAE010.13	Illustrate the importance of fly-by-wire technology in aircraft systems.	CO 5	Understand
10	a	AAE010.13	Illustrate the importance of fly-by-wire technology in aircraft systems.	CO 5	Understand
	b	AAE010.08	Identify important flight control operations and selects suitable flight control actuations.	CO 5	Remember

Signature of Course Coordinator

HOD, AE