Hall Ticket No | | | | | | | | | | | Question Paper Code: BAEB06

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER - I

M.Tech I Semester End Examinations, February - 2020

Regulations: R18

UNMANNED AERIAL VEHICLES

(AEROSPACE 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) Discuss in brief how UAVs can respond to air turbulence. Also discuss about the rotary-wing aerodynamics, and the response to air turbulence. **[7M]**
   b) Describe the different applications of UAS and UAV systems. And also emphasize the various missions they can be applied in. **[7M]**
2. a) Describe the various aspects of long range aircraft, and specifically the types of Long range aircraft they can be used in. **[7M]**
   b) Describe the battlefield aircraft and the scale effects, which are relevant to the various missions they are applied in. **[7M]**

UNIT – II

3. a) Describe the types of long range endurance, and the various scale effects and packaging density. **[7M]**
   b) Describe the visual signature and thermal and radio signature. Also emphasize the various aspects of visual signature and radio signatures. **[7M]**
4. a) For a certain long range role aircraft, describe the various types of thermal signatures. **[7M]**
   b) Describe the TACAN and LORAN C. What are the significance of these in UAV systems? **[7M]**

UNIT – III

5. a) Discuss the way point navigation and inertial navigation radio tracking. **[7M]**
   b) Describe payload control and design for ease of maintenance. **[7M]**
6. a) Discuss HTOL aircraft and Payload control. How important are they with regards to new and upcoming UAV systems? **[7M]**
   b) Describe the various rate and bandwidth usage types in UAV systems, and why they are critical to the functioning of UAV systems. **[7M]**

UNIT – IV

7. a) Define the various aspects of a catapult launch systems and in-flight testing. Explain its importance in UAV systems and why they are employed. **[7M]**
   b) Describe the aspects of systems ground testing. Why is the ground testing an important aspect of UAV systems. **[7M]**
8. a) What is the different types of system certifications that can be obtained? In the certifications, what are the various types that can be a part of the system? **[7M]**
   b) Describe the UAV Sub-Assembly and Sub-System testing. **[7M]**

UNIT – V

9.	a)	Discuss about the various operational trials that are used in UAV systems. What is the significance of operational trials?	**[7M]**
	b)	In Network Centric Operations (NCO), what are the major aspects that are relevant to NCO?	**[7M]**
10.	a)	Explain about teaming with other unmanned systems. Specifically, how will the naval, arm and air force play a significant role in it.	**[7M]**
	b)	What are the various commercial and paramilitary roles that are a part of UAV systems?	**[7M]**

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COURSE OBJECTIVES:

The course should enable the students to:

I	Acquire the knowledge of various disciplines contributing to the design, development and deployment of UAVs.
II	Explain the design of UAV systems and their configuration
III	Develop and deploy the UAV systems.

COURSE OUTCOMES (COs):

CO 1	Understand the various aspects of UAV design
CO 2	Summarize the different design of the UAV flights
CO 3	Demonstrate the various aspects of UAV flights and missions
CO 4	Illustrate the various aspects of the UAV flights and different designs
CO 5	Describe and emphasize the various UAV designs

COURSE LEARNING OUTCOMES (CLOs):

BAEB06.01	Understand the concept of unmanned aircraft and UAV and UAS.
BAEB06.02	Explain the various roles of unmanned aircraft.
BAEB06.03	Emphasize the basic types of mission UAVs
BAEB06.04	Develop the basic systems in the designs of UAV systems.
BAEB06.05	Describe the aerodynamics of UAV vehicles
BAEB06.06	Describe the signature of UAV vehicles
BAEB06.07	Illustrate the various aspects of payloads.
BAEB06.08	Understand the Sensors used in UAVs
BAEB06.09	Explain the Navigation systems used in UAVs
BAEB06.10	Understand the navigation systems that are used in UAVs
BAEB06.11	Explain various navigation systems and the design for maintenance
BAEB06.12	Describe the system certifications
BAEB06.13	Understand the UAV sub-assemblies
BAEB06.14	Explain the various aspects of the documentation of flight testing
BAEB06.15	Discuss various aspects of the UAVs integration into naval carriers

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level
1	a	BAEB06.02	Explain the various roles of unmanned aircraft.	CO 1	Understand
	b	BAEB06.03	Emphasize the basic types of mission UAVs	CO 1	Understand
2	a	BAEB06.02	Explain the various roles of unmanned aircraft.	CO 1	Remember
	b	BAEB06.03	Emphasize the basic types of mission UAVs	CO 1	Remember
3	a	BAEB06.05	Describe the aerodynamics of UAV vehicles	CO 2	Remember
	b	BAEB06.04	Develop the basic systems in the designs of UAV systems	CO 2	Understand
4	a	BAEB06.06	Describe the signature of UAV vehicles	CO 2	Remember
	b	BAEB06.06	Describe the signature of UAV vehicles	CO 2	Understand
5	a	BAEB06.05	Describe the aerodynamics of UAV vehicles	CO 3	Remember
	b	BAEB06.09	Explain the Navigation systems used in UAVs	CO 3	Understand
6	a	BAEB06.08	Understand the Sensors used in UAVs	CO 3	Understand
	b	BAEB06.07	Illustrate the various aspects of payloads.	CO 3	Remember
7	a	BAEB06.12	Describe the system certifications	CO 4	Remember
	b	BAEB06.11	Explain various navigation systems and the design for maintenance	CO 4	Understand
8	a	BAEB06.12	Describe the system certifications	CO 4	Remember
	b	BAEB06.11	Explain various navigation systems and the design for maintenance	CO 4	Remember
9	a	BAEB06.06	Describe the signature of UAV vehicles	CO 5	Remember
	b	BAEB06.13	Understand the UAV sub-assemblies	CO 5	Remember
10	a	BAEB06.15	Discuss various aspects of the UAVs integration into naval carriers	CO 5	Understand
	b	BAEB06.13	Understand the UAV sub-assemblies	CO 5	Remember

Signature of Course Coordinator **HOD, AE**