

CBCS SCHEME

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18AE753

Seventh Semester B.E. Degree Examination, July/August 2022

Unmanned Aerial Vehicles

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Write a short note on Aviation History. (06 Marks)
- b. Explain different missions of UAV. (04 Marks)
- c. Describe classes of UAV system. (10 Marks)

OR

- 2 a. Briefly explain any four UAV's developed in India with technical specification. (10 Marks)
- b. Define the terminologies : i) Range ii) Endurance iii) Payload
iv) Reconnaissance v) Surveillance. (10 Marks)

Module-2

- 3 a. Discuss on the flopping wing mechanism with a neat sketch. (10 Marks)
- b. Discuss the boundary layer concept. How it effects the performance of UAV. (06 Marks)
- c. Define i) Induced drag ii) Up wash and Down wash. (04 Marks)

OR

- 4 a. Derive the range equation for propeller driven and Jet driven Aircraft. (08 Marks)
- b. Explain Climbing and guiding flight. (06 Marks)
- c. Derive the endurance equation for a propeller driven Aircraft. (06 Marks)

Module-3

- 5 a. How to make an Aircraft longitudinally stable when it experience a gust? Explain with supporting graph. (12 Marks)
- b. With a neat sketch, explain the Static stability and Dynamic Stability. (08 Marks)

OR

- 6 a. Draw a block diagram of flight control system and explain the components of Autopilot systems of an UAV. (10 Marks)
- b. Explain the sensors supporting Autopilot system of a UAV. (10 Marks)

Module-4

- 7 a. Write a short note on the following : i) The two cycle engine ii) The Rotary engine
iii) The gas turbine iv) Electric Motors. (08 Marks)
- b. What are the sources of Electric Power in UAV? (04 Marks)
- c. Using momentum generator concepts prove that the power required producing a given amount of lift is inversely proportional to the square of the wing span (or) propeller diameter. (08 Marks)

OR

- 8 a. Explain the maneuver load on the flight with the help of $V - n$ diagram. (08 Marks)
b. Explain the composite structures using in UAV and explain their manufacturing techniques. (08 Marks)
c. Briefly explain Sandwich Construction techniques. (04 Marks)

Module-5

- 9 a. Discuss on the Data rate Restrictions. (10 Marks)
b. Explain the functions of Data link and desirable data link attributes. (10 Marks)

OR

- 10 a. What are the different modes of controlling Payloads and Air vehicles? Explain. (10 Marks)
b. Explain the UAV launch method and Recovery systems for Fixed Wing Vehicles. (10 Marks)

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