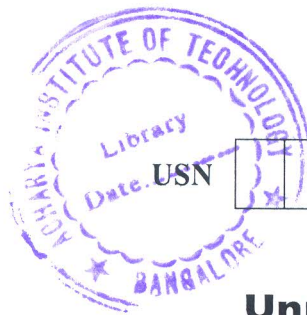


CBCS SCHEME



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15AE661

Sixth Semester B.E. Degree Examination, June/July 2019 Unmanned Aerial Vehicles Basics and Applications

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What are the kinds of aircraft which fly without pilots? (03 Marks)
- b. What are the three types of air vehicle used in UAV system? (03 Marks)
- c. Given an over view of the generic UAV systems. (10 Marks)

OR

- 2 a. Shortly explain the following terms :
i) Hale ii) Very small iii) MPCS. (03 Marks)
- b. State the functions of UAV. (03 Marks)
- c. Classify and explain the UAV based on range, altitude and size. (10 Marks)

Module-2

- 3 a. List the types of drag of an aircraft and explain skin friction drag. (04 Marks)
- b. Draw and explain the three types of vortices occurring in finite wing. (04 Marks)
- c. Prove that induced drag is proportional to lift co-efficient C_L and draw drag polar. (08 Marks)

OR

- 4 a. Prove that the range of a jet engine aircraft is proportional to L/D value. (08 Marks)
- b. Calculate the range in miles of propeller driven aircraft with the following data. $\eta = 0.85$, $c = 0.45$ lb/HP.hr. Consider weight ratio = 0.5 and L/D ratio is 15. (08 Marks)

Module-3

- 5 a. Explain three types of control system with respect to axis. (06 Marks)
- b. Draw a block diagram of flight control system and explain the components of autopilot systems of an UAV. (10 Marks)

OR

- 6 a. Describe the : i) longitudinal stability ii) lateral stability. (08 Marks)
- b. Explain the sensors supporting auto pilot system of a UAV. (08 Marks)

Module-4

- 7 a. List the sources of electric power. Explain the batteries used in a typical UAV. (08 Marks)
- b. Using momentum generator concept prove that the power required producing a given amount of lift is inversely proportional to the square of the wingspan or propeller diameter. (08 Marks)

OR

- 8 a. Explain the composite structures using in UAV and explain their manufacturing techniques. (08 Marks)
b. Draw V-N diagram and explain the boundaries. (08 Marks)

Module-5

- 9 a. Draw and explain the MPCS architecture and its components. (08 Marks)
b. With neat sketch describe the different layers of OSI. (08 Marks)

OR

- 10 a. Compare and explain the different types of Payloads of UAV. (08 Marks)
b. List the different types of UAV launchers and discuss the advantages and disadvantages of RATO launcher. (08 Marks)
