CBCS SCHEME

17AE82

Eighth Semester B.E. Degree Examination, Jan./Feb. 2023
Flight Vehicle Design

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Explain the take off weight buildup and empty weight estimation for new aircraft design. **(10 Marks)**

   b. Show that, at a given load factor, the following must be satisfied regardless of the wing loading $\frac{T}{W} \geq 2n\sqrt{\frac{C_{po}}{\pi A_e}}$. **(10 Marks)**

OR

2 a. Explain the effect of wing loading on stall speed, take off distance, catapult take landing distance, cruise and boiler for endurance. **(16 Marks)**

   b. Draw a flow chart for takeoff weight calculation neatly. **(04 Marks)**

Module-2

3 Write short notes on the following:
   i)   V-n diagram
   ii) Gust envelope
   iii) Load distribution
   iv) Shear and Bending moment analysis. **(20 Marks)**

OR

4 a. With neat sketch and equation, explain the concept of wing/tail layout and loft. **(12 Marks)**

   b. Write brief note on special consideration in configuration layout. **(08 Marks)**

Module-3

5 a. Derive relationship for ground roll distance for take off. **(12 Marks)**

   b. Write a brief note with relevant figure on balanced field length. **(08 Marks)**

OR

6 a. Write a typical spread sheet for turbo jet engine sizing. **(10 Marks)**

   b. Write short note on:
   i) Passive lift enhancement
   ii) Active lift enhancement. **(10 Marks)**

Module-4

7 a. Explain aileron sizing criterion. **(10 Marks)**

   b. Write short notes on environmental constraints of general aviation. **(10 Marks)**

OR

8 a. Discuss the lateral directional stability of aircraft with momentum equation.   (10 Marks)
   b. Explain the contribution of main wing towards lateral stability.   (10 Marks)

Module-5

9 a. What are various landing gear arrangement? Explain briefly.   (10 Marks)
   b. Write a short note on fuel system.   (10 Marks)

OR

10 a. Draw a aircraft sketch, showing primary and secondary controls and explain the function of it.   (15 Marks)
   b. List out the criteria required for material selection of a typical aircraft.   (05 Marks)

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