

CBCS SCHEME

18AE81

Eighth Semester B.E. Degree Examination, June/July 2024 Flight Vehicle Design

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- a. Explain aircraft design process with the help of a flow chart. (10 Marks)
- b. Explain the wing loading effect on takeoff and landing. (10 Marks)

OR

- a. Consider a typical military bomber of $\frac{L}{D} = 16$ warm up and take-off fuel fraction is 0.97. (limb fuel fraction is 0.985 cruise $R = 1500$ nm, $C = 0.5$ /hr, $V = 0.6$ M (same for both cruise condition) 1st Loiter $E = 3$ hrs, $C = 0.4$ /hr 2nd Loiter $E = \frac{1}{3}$ hrs. Landing fuel fraction is 0.995. Estimate take off to landing fuel fraction $\frac{W_f}{W_o}$. From $\frac{W_f}{W_o}$. Calculate the value of W_o . (15 Marks)

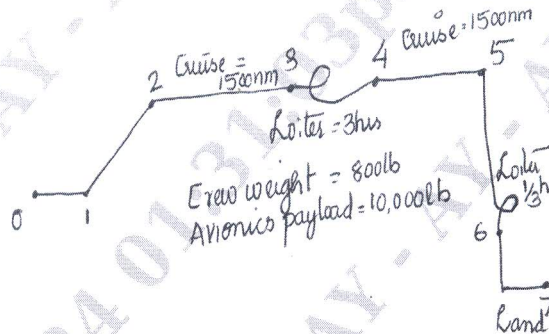


Fig. Q2 (a)

- b. Explain in detail about Thrust Matching. (05 Marks)

Module-2

- a. Briefly describe the Active and Passive lift enhancement approaches. (10 Marks)
- b. Explain in detail the steps involved in conic fuselage development using conic lofting technique. (10 Marks)

OR

- a. Explain Gust Envelope and V-n diagram. (10 Marks)
- b. Write a typical spread sheet for vertical tail stabilizer sizing. (10 Marks)

Module-3

- a. Describe the installed thrust correction for turbojet engine with neat graph. (10 Marks)
- b. Derive an expression for landing ground roll distance. (10 Marks)

OR

- 6 a. Explain the spread sheet structure for turbojet engine sizing. (10 Marks)
b. Derive an expression for take-off ground roll distance. (10 Marks)

Module-4

- 7 a. Explain Cooper-Harper Rating scale. (10 Marks)
b. Explain the criteria for Rudder area sizing. (10 Marks)

OR

- 8 a. Explain longitudinal stability/effect on performance of aircraft. (10 Marks)
b. Discuss on lateral stability/criterion on aircraft design. (10 Marks)

Module-5

- 9 a. Explain the selection criteria of anti-icing and de-icing systems in an aircraft. (10 Marks)
b. Briefly explain the selection criteria of materials to an aircraft. (10 Marks)

OR

- 10 a. Explain the characteristics of fuel system of an aircraft. (10 Marks)
b. Briefly explain weapon carriage and gun installation on military aircraft. (10 Marks)

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