CBCS SCHEME

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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

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

2 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)**

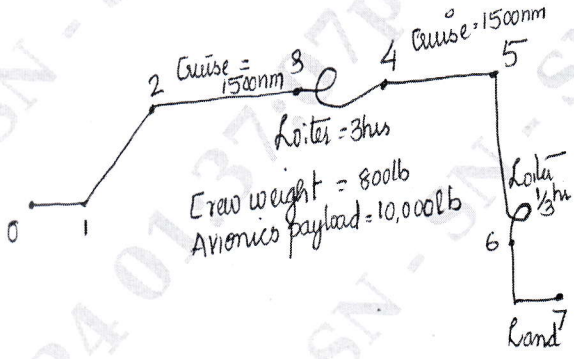

Fig. Q2 (a)

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

Module-2

3 a. Briefly describe the Active and Passive left enhancement approaches. **(10 Marks)**

b. Explain in detail the steps involved in conic fuselage development using conic lofting technique. **(10 Marks)**

OR

4 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

5 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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