

# CBCS SCHEME



15AE82

## Eight Semester B.E. Degree Examination, June/July 2019 Flight Vehicle Design

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

- 1 a. Consider a typical military bomber of  $L/D = 16$ , warm up and take off fuel fraction is 0.97 climb fuel fraction is 0.985, Cruise  $R = 1500\text{Nm}$  or  $R = 2778\text{km}$ ,  $C = 0.5\text{hr}$ ,  $V = 0.6M$  (some for both the cruise condition) 1<sup>st</sup> loiter  $E = 3\text{hrs}$ ,  $C = 0.4/\text{hr}$ , 2<sup>nd</sup> loiter  $E = 13\text{hrs}$ , landing fuel fraction is 0.95. Estimate take off to landing fuel fraction  $W_f/W_o$ . From  $W_f/W_o$  calculate the value of  $W_o$ .

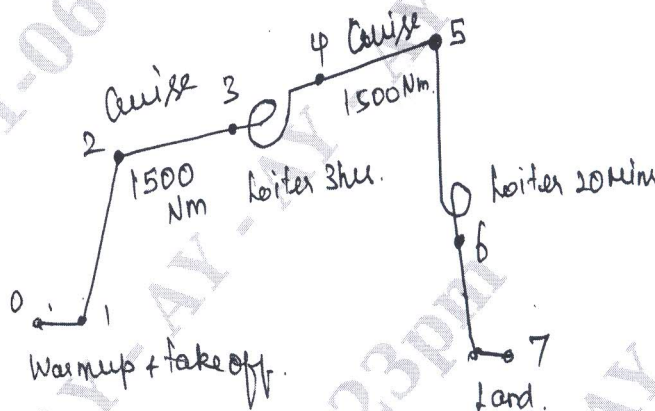


Fig Q1(a)

- b. Draw the flow chart for takeoff weight calculation neatly. (12 Marks)  
(04 Marks)

**OR**

- 2 Explain the effect of wing loading on stall speed, take off distance, Catapult take landing distance, cruise and loiter for Endurance. (16 Marks)

### Module-2

- 3 a. With neat sketch and equations explain the concept of wing/tail layout and loft. (10 Marks)  
b. Write a brief note on structure considerations in configuration layout. (06 Marks)

**OR**

- 4 a. Write a short notes on wing and tail initial sizing with neat sketch. (08 Marks)  
b. Draw a typical  $V - N$  diagram for an Aircraft and explain the important curves. Also draw the Gust envelop of the typical aircraft. (08 Marks)

### Module-3

- 5 a. Discuss the installed thrust correction for turbojet engine with neat graph. (08 Marks)  
b. Write a short notes on Piston - Engine performance and write Thrust equation. (08 Marks)

**OR**

- 6 Discuss the Take - off Analysis and landing analysis with neat sketch. (16 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. Write the Pitching moment equation for Trim condition of longitudinal static stability. (08 Marks)  
b. Discuss the Lateral directional stability of aircraft with moment equations. (08 Marks)

**OR**

- 8 a. Describe the handling qualities of an aircraft Cooper – Harper Rating scale. (08 Marks)  
b. Write a show notes on environmental constraints of general Aviation (08 Marks)

**Module-5**

- 9 a. Write a short notes on feed system Integration with neat sketch. (08 Marks)  
b. Explain landing Gear Arrangement with any one of the subsystem sizing. (08 Marks)

**OR**

- 10 a. Discuss the design Aspect of any four subsystems of an aircraft. (10 Marks)  
b. Write a short note on material selection for a typical aircraft. (06 Marks)

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