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10AE81

**Eighth Semester B.E. Degree Examination, July/August 2021**  
**Flight Vehicle Design**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1 a. Explain the overview of design process. (08 Marks)  
b. List out the performance aspects specified by mission requirements. (04 Marks)  
c. Calculate the near exact weight for an airplane from a guess value for the following data :  
$$\frac{W_e}{W_o} = 0.93W_o^{-0.07}, W_o = \frac{10,800}{1 - 0.314 - \left(\frac{W_e}{W_o}\right)}$$
 (08 Marks)
- 2 a. Briefly explain the effect of using loading on Take Off and landing plane with the help of appropriate graph. (12 Marks)  
b. Derive an expression for using loading effect on climb. (08 Marks)
- 3 a. Explain the using sweep angle selection criteria. (10 Marks)  
b. Mention and briefly explain the aerodynamic consideration made while designing an aircraft fuselage. (10 Marks)
- 4 a. Explain the general methodology for designing a propeller propulsion system for cruise. (10 Marks)  
b. What are the engines installed thrust corrections? (10 Marks)
- 5 a. Describe the balance field length for take off also mention the formula used. (10 Marks)  
b. Enlist all phases of flight landing with schematic sketch and mention all the expressions related to each phase. (10 Marks)
- 6 a. Explain aileron sizing. (08 Marks)  
b. Explain longitudinal stability effect on performance of the aircraft. (12 Marks)
- 7 a. Sketch and explain three commonly used landing gear arrangement. (10 Marks)  
b. With neat sketch, explain fuel system of an aircraft. (10 Marks)
- 8 a. Explain typical flight control systems. (10 Marks)  
b. Briefly explain weapon carriage and gun installation on military aircraft. (10 Marks)

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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.