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18AE61

Sixth Semester B.E. Degree Examination, July/August 2022
Aircraft Performance

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Explain basic parameters of flight in steady unaccelerated flight. **(08 Marks)**
   b. With a graphical approach method, explain
      i) Thrust available and Thrust required
      ii) Power available and power required. **(12 Marks)**

OR

2 a. Derive the equation which shows, V_α for a given T_R depend on T_R/W, W/s, C_{D_O} and K. **(10 Marks)**
   b. Explain the effects of altitude on power available and power required. **(10 Marks)**

Module-2

3 a. Define Gliding flight and Derive an expression for minimum glide angle. **(10 Marks)**
   b. With neat sketch, illustrate absolute ceiling and service ceiling. Explain the method to calculate it. **(10 Marks)**

OR

4 a. Explain the climb performance using Hodograph diagram. **(10 Marks)**
   b. Derive Rate of climb using analytical approach and explain briefly. **(10 Marks)**

Module-3

5 a. Obtain an expression for calculating the stalling velocity with help of $(C_{L\,max})$. **(10 Marks)**
   b. Derive the Aerodynamic relations associated with maximum $\dfrac{C_L}{C_D}$, $\dfrac{C_L^{3/2}}{C_D}$ and $\dfrac{C_L^{1/2}}{C_D}$. **(10 Marks)**

OR

6 a. Derive the Range and Endurance equation for a jet propelled aircraft. **(14 Marks)**
   b. Write a short note on : i) Effect of Head wind   ii) Effect of Tail wind. **(06 Marks)**

Module-4

7 Derive the equations to calculate the ground roll for accelerated flight for takeoff condition. **(20 Marks)**

OR

8 a. For an accelerated flight, considering an aircraft landing, derive the equation to calculate the
   b. approach distance. **(20 Marks)**

Module-5

9 a. Explain the following: i) Level Turn ii) Minimum Turn Radius   iii) Maximum Turn Rate. **(10 Marks)**
   b. Explain the limiting case for large load factor, with necessary equation. **(10 Marks)**

OR

10 a. With neat sketches, explain the pull up and pull out Maneuvers. **(10 Marks)**
    b. Draw the V-n diagram and explain all the parameters in detail. **(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.