CBCS SCHEME

USN | | | | | | | | | | |

15AE63

Sixth Semester B.E. Degree Examination, June/July 2019
Aircraft Performance

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. With a neat graph derive an expression for power required and condition for minimum power required. **(08 Marks)**

b. Derive an relation for max velocity for a propeller driven aircraft. **(08 Marks)**

OR

2 a. With neat graphs/curves explain in detail about thrust required and thrust available curves. **(08 Marks)**

b. Consider a turbofan driven aircraft of Wight 73000 ℔b with wing area 950 sq ft and $C_{D_0} = 0.015$, k = 0.08 flying at an attitude where $\rho_\infty = 8.90 \times 10^{-4}$ slug/ft^3. Calculate minimum thrust required and velocity at which it occurs. **(08 Marks)**

Module-2

3 a. Derive an equation for rate of climb using graphical and analytical approach. **(08 Marks)**

b. With the help of hodograph diagram explain climb performance graph. **(08 Marks)**

OR

4 a. Write an appropriate equation for sink rate and time to climb and explain the same with graphs if required. **(08 marks)**

b. Derive an equation for max rate of climb to prove that R/c decreases with increase in altitude. **(08 Marks)**

Module-3

5 a. Derive appropriate relation for velocity associated with $(L/D)_{max}$ and max endurance for any type of engine to $(L/D)_{max}$. **(08 Marks)**

b. Calculate thrust required for airplane flying at an altitude of 30,000 ft assuming weight = 73000℔b with following air plane datas as S = 950ft^2, $C_{D_0} = 0.015$, K = 0.08, e = 0.9, A.R = 5.92, $\rho_\infty = 8.9068 \times 10^{-4}$ slug/m^3. **(08 Marks)**

OR

6 a. Derive Breguet equation for range and endurance for a propeller driven aircraft. **(08 Marks)**

b. A light single plane engine, propeller driven aircraft has following characteristics as follows: Wing span = 10.912m, Wing area = 16.165m^2, gross weight = 13,127.5N, Fuel capacity = 65 gallons of gasoline, power plant = 1 piston engine of 230 bhp. SFC – 2.0025 N/hp hr, $C_{D_0} = 0.025$, Oswalt's efficiency factor = 0.8, $\eta = 0.8$; K = 1. **(08 Marks)**

Module-4

7 a. With a neat figure derive an equation for calculation of distance to clear obstacle while airborne. **(08 marks)**

b. Derive an equation for calculation of ground roll for taking off during aircraft phase. **(08 Marks)**

OR

8 a. How do you calculate approach distance for an aircraft during landing? **(08 Marks)**

b. Calculate flare approach distance for an aircraft during landing. **(08 Marks)**

Module-5

9 a. Explain level turn in a steady flight and derive an equation for turn radius with help of a figure. **(08 Marks)**

b. Derive an expression for minimum turn radius for a leveled flight condition. **(08 Marks)**

OR

10 a. Derive the equation for limiting case of large load factor. **(08 marks)**

b. Explain in detail about pull up and pull down maneuvers of steady aircraft with appropriate equation. **(08 Marks)**

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