CBCS SCHEME

USN | | | | | | | | | |

15AE63

Sixth Semester B.E. Degree Examination, Aug./Sept.2020
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. Calculate and plot the thrust required curve at an altitude of 30,000 ft, assuming a weight of 73000 lb. Air data : S = 950 ft^2, AR = 5.92, C_{DO} = 0.015 and K = 0.08, V_∞ = 500 ft/s, @30,000 ft $\rho_\infty = 8.9068\times10^{-4}$ slug/ft^3. **(10 Marks)**

b. Derive the equation which shows the variation of drag with altitude, velocity and weight. **(06 Marks)**

OR

2 a. Derive the equation which shows, V_∞ for a given T_R depends on T_R/W , W/S , C_{DO} and K. **(09 Marks)**

b. Describe the effect of altitude on the point corresponding to the minimum thrust required. **(07 Marks)**

Module-2

3 a. Show that $(R/C)_{max}$, being dominated by the thrust o weight ratio, decrease with an increase in altitude. **(10 Marks)**

b. Derive the equation which shows that $(V_V)_{min}$ occurs at $(C_L^{3/2}/C_D)_{max}$ **(06 Marks)**

OR

4 a. Derive the general equation for range. **(08 Marks)**

b. Describe Hodograph for unpowered flight. **(08 Marks)**

Module-3

5 a. Derive the equation to show

$$V_{(C_L^{3/2}/C_D)_{max}} < V_{(C_L/C_D)_{max}} < V_{(C_L^{1/2}/C_D)_{max}}$$ **(10 Marks)**

b. Derive the expression for variation of (L/D) with velocity. **(06 Marks)**

OR

6 a. Derive Range for propeller-driven airplane and jet airplane. **(10 Marks)**

b. Derive Endurance for propeller-driven airplanes. **(06 Marks)**

Module-4

7 a. Explain Intermediate segments of the Ground Roll with neat diagram. **(07 Marks)**

b. Derive the expression for ground roll by using design parameters that govern take off performance. **(09 Marks)**

OR

8 a. Describe the landing path and landing distance with neat diagram. **(07 Marks)**

b. Derive S_g that illustrates the design parameter that govern landing performance. **(09 Marks)**

Module-5

9 a. Derive the expression for turn radius and turn rate. **(06 Marks)**

b. Derive the expression for minimum turning radius. **(10 Marks)**

OR

10 a. Derive the expression for pull up and pull down maneuvers. **(06 Marks)**

b. Derive the equation that gives the load factor for a given velocity and thrust to weight ratio. **(06 Marks)**

c. Describe Ground effects. **(04 Marks)**

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