CBCS SCHEME

USN | | | | | | | | | |

15AE63

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.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. Prove that for a body with linear lift and moment curve, where M_0 and a_0 are fixed values, the aerodynamic centre does exist as a fixed point on the air foil. **(08 Marks)**

b. An passenger aircraft has a wing plan form area of 427.82m^2.
i) Assuming a take off weight of 229517kg and a take off velocity of 71.52m/sec, calculate the lift co-efficient at take off for standard sea level conditions.
ii) Compare the above result with the lift co-efficient for cruise at mach number 0.83 at 9144m assuming the same weight. **(08 Marks)**

OR

2 a. Derive an expression for reciprocating engine cooling diagram. **(08 Marks)**

b. With the help of analytical approach obtain an expression for the minimum power required when the airplane is flying. **(08 Marks)**

Module-2

3 a. Obtain an expression for the rate of climb for steady unacciluated climbing flight. **(08 Marks)**

b. Obtain an expression for equilibrium glide velocity (V_∞). **(08 Marks)**

OR

4 a. For the unpowered gulf stream IV at 30,000 ft. Calculate i) The sink rate for the case of minimum glide cycle ii) The minimum sink rate. **(08 Marks)**

b. Explain with neat sketches, the service and absolute ceilings. **(08 Marks)**

Module-3

5 a. What are high lift device? Name different types of high lift device with neat sketch and show the effect of various high lift devices on the left curve. **(08 Marks)**

b. Obtain an expression for calculating the stalling velocity with the help of $(C_L)_{max}$. **(08 Marks)**

OR

6 a. Derive an expression for the range of a jet propelled aircraft. **(08 Marks)**

b. Write a note for the following :
i) effect of head wind ii) effect of tail wind. **(08 Marks)**

Module-4

7 a. With the help of expression, obtain the various steps for calculation of distance while air bone to clear an obstacles. **(12 Marks)**

b. Consider an airplane with an instantaneous acceleration of 2.438m/s^2 at an instantaneous velocity of 243.84 m/s. At the existing flight conditions, the specific excess power is 91.44m/s. Calculate the instantaneous maximum rate of climb that can be obtained at these accelerated flight conditions. **(04 Marks)**

OR

8 Obtain an expression for calculating the approach distance and flare distances. (16 Marks)

Module-5

9 a. With the help of neat sketch, explain the V – n diagram. (08 Marks)
b. Derive an expression for minimum turning radius. (08 Marks)

OR

10 a. Derive the equation connecting radius of turn during an inverted pull down maneuver and "g". (10 Marks)
b. Explain the limitations of pull up and push over. (06 Marks)

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