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

10AE62

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Aircraft Performance

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Calculate the temperature at 8500 meters above sea level. The temperature at sea level is 15°C. **(10 Marks)**

b. Prove that an airfoil has an aerodynamic centre within it. **(10 Marks)**

2 a. Calculate thrust required for level unaccelerated flight at 8000 ft high given that the aircraft weight is 75,000 lb, $\rho_\infty = 8.9\times10^{-4}$ slugs/ft^3, S = 950 ft^2, V = 500 ft/sec, $C_{D_0} = 0.015$ and k = 0.08. **(10 Marks)**

b. Calculate the minimum thrust required and the velocity at which it occurs for the data W = 75,000 lb, S = 950 ft^2, $\rho_\infty = 8.9\times10^{-4}$ slugs/ft^3, $C_{D_0} = 0.015$ and k = 0.08. **(10 Marks)**

3 a. Derive an equation for max rate of climb. **(10 Marks)**

b. What is absolute ceiling and service ceiling of a jet aircraft? **(10 Marks)**

4 a. Calculate L/D for an aircraft with weight 75,000 lb, S = 950 ft^2, $C_{D_0} = 0.015$ and k = 0.08 flying level at 3000 ft high where $\rho_\infty = 8.9\times10^{-4}$ slugs/ft^3 and the speed of the aircraft is 400 ft/sec. **(10 Marks)**

b. Draw and explain the trailing edge high lift devices used in modern passenger plane and select the best out of it. **(10 Marks)**

PART – B

5 a. Derive the range equation for a jet airplane and wrote the condition for maximum range. **(10 Marks)**

b. Derive the endurance equation for a propeller aircraft and give the condition for maximum endurance. **(10 Marks)**

6 a. Derive an equation for the Ground Rum distance to reach V_{To}. **(10 Marks)**

b. Calculate the ground run distance for an aircraft at V_{To} = 20 ft/sec to clear an obstacle of 50 ft high. **(10 Marks)**

7 a. What are the factors affecting the landing distance required for an airplane to land. **(10 Marks)**

b. Explain the "ground effect" on an airplane while landing. **(10 Marks)**

8 a. Derive the equation connecting radius of turn during an inverted pull down maneuver and "g". **(10 Marks)**

b. Draw a detailed V-n diagram. **(10 Marks)**

* * * * *