

Code: AE2T5

I B.Tech - II Semester – Regular Examinations – JULY 2015

**INTRODUCTION TO AERONAUTICAL
ENGINEERING
(AERONAUTICAL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1. a) Classify the types of heavier-than-air aircrafts.
- b) What is use of aileron?
- c) Write the expression, which relates density and temperature in gradient region?
- d) What is difference between symmetric airfoil and cambered airfoil?
- e) Write an expression for lift and moment coefficient.
- f) Write the equations of motion for an airplane in translational flight?
- g) What are the structural elements of the fuselage?
- h) Write an expression for moment coefficient about the centre of gravity?
- i) Define canard configuration.
- j) What is stick free static stability?
- k) Write the applications of Turboprop Engine?

PART – B

Answer any **THREE** questions. All questions carry equal marks. 3 x 16 = 48 M

2. Classify the types of aircraft in detail. Mention the application of each type of aircraft. 16 M

3. Into how many parts the Atmosphere is divided? Name them? Characterize each part of the atmosphere in detail. 16 M

4. a) Given two wings, one full size ($S = 5 \text{ m}^2$) and one a scale model ($S = 0.2 \text{ m}^2$), each with different airspeed and air density, compare the lift of each. 8 M

- b) Explain lift on an airfoil in the context of Bernoulli's equation. State all assumptions. 8 M

5. Derive the expression for Range and Endurance of a Propeller driven airplane. 16 M

6. Illustrate the static instability of an airplane for the following cases:
 - i) Equilibrium position (trimmed)
 - ii) Pitched upward by disturbance.
 - iii) Pitched downward by disturbance.16 M