

**B.Tech. AEROSPACE ENGINEERING
(BTAE)**

Term-End Examination

00280

June, 2017

BAS-009 : INTRODUCTION TO AERONAUTICS

Time : 3 hours

Maximum Marks : 70

Note : Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. Show and label fixed surfaces, primary control surfaces and secondary control surfaces with the help of sketches of a typical medium range transport aircraft. Explain the function of primary control surfaces. 7+3=10
2. Derive the expressions for temperature, pressure and density for troposphere and stratosphere. Calculate the values of pressure, temperature and density in standard atmosphere at an altitude of 17 km. Given : Temperature at 11 km is -56.5°C . 5+5=10

3. Explain the nomenclature of NACA 4-digit, 5-digit and 6-digit series. Explain the importance of supercritical airfoil with the help of a sketch.

6+4=10

4. Define the following terms :

5×2=10

- (a) Critical Mach Number
- (b) Aerodynamic Center
- (c) Service Ceiling
- (d) Pressure Altitude
- (e) Geometric Twist

5. Derive the expressions for calculating maximum range and endurance for a turbo-prop engine aircraft.

10

6. Write short notes on the following with the help of sketches :

3+3+4=10

- (a) Speed Instability
- (b) Area Rule
- (c) High Lift Devices

7. Define Drag. Categorize and explain various types of drag for a supersonic aircraft.

10

8. Explain the functions of the following : $5 \times 2 = 10$

- (a) Tab
- (b) Ailerons
- (c) Flaps
- (d) Leading Edge Slats
- (e) Ruddervators

9. Write notes on the following with the help of sketches : $2 \times 5 = 10$

- (a) Flight Envelope for a Fighter Aircraft
 - (b) Working of a Turbojet Engine
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