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BAS-009

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

December, 2015

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. (a) Explain briefly the contributions of Otto Lilienthal. *4*

(b) Define an aircraft. Classify aircrafts based on features and purpose. *6*

2. Distinguish between the following :

(a) Fixed wing and Rotary wing aircrafts *5*

(b) NACA 4-digit and 6-digit series *5*

3. 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 10 km.

Given : Lapse Rate = – 6·5 K/km. *10*

4. Write short notes on the following : *2×5=10*

   (a) High-lift devices

   (b) Different types of propellers

5. Explain the following terms : *5×2=10*

   (a) Drag divergence Mach Number

   (b) Geopotential Altitude

   (c) Area Rule

   (d) Absolute Ceiling

   (e) Aerodynamic Twist

6. Derive the expressions for calculating maximum range and endurance of turbojet engine aircraft. *10*

7. Sketch the pressure distribution over an airfoil subjected to subsonic airflow at low and high angles of attack. Explain the phenomenon of stalling. *6+4=10*

8. Explain the functions of the following, with the help of sketches : *5×2=10*

   (a) Rudder

   (b) Trim Tab

   (c) Flap

   (d) Spoiler

   (e) Under-carriage

9. Write notes on the following with the help of sketches : *6+4=10*

(a) Flight envelope for transport aircraft

(b) Take-off and Landing distances