| BAS-009 |

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination
December, 2016

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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. Define 'absolute', 'geometric' and 'geopotential' altitudes. Calculate the standard atmospheric properties at a geopotential altitude of 19 km. Take lapse rate for gradient region as – 6·5 K/km. *3+7*

2. Sketch the three views of a typical aircraft showing fixed and control (primary and secondary) surfaces. Also explain the functioning of primary control surfaces. *6+4*

3. Write notes on the following with the help of sketches : *3+3+4*

   (a) Laminar Airfoil

   (b) Supercritical Airfoil

   (c) V/STOL Machines

4. Distinguish between the following : *4+3+3*

   (a) Active and Passive boundary layer control devices

   (b) Stratosphere and Troposphere

   (c) Range and Endurance

5. Define lift and drag. Show the tentative pressure distribution over an airfoil at different angles of attack. Explain skin friction drag and induced drag. *10*

6. Write short notes on the following : *4+6*

   (a) Drag polar

   (b) V-n diagram

7. Derive the expressions for climb angle and rate of climb for an unaccelerated flight. Also draw the hodograph. *8+2*

8. (a) Give a brief historical review of various efforts in Pre-Wright Brothers Era.

   (b) Describe in brief the various types of propellers. *5+5*

9. (a) Discuss the working principle of aircraft altimeter.

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