

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

Term-End Examination

June, 2016

00368

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) Derive the expressions for calculating standard atmospheric properties for isothermal and gradient atmospheric regions.
- (b) Calculate the standard atmospheric properties at a geopotential altitude of 7 km. The lapse rate for gradient region is -6.5 K/km . $6+4=10$
2. (a) What do you understand by stability of atmosphere? With the help of expressions, comment on the stability of the atmosphere.
- (b) Distinguish between equivalent and true speeds. $7+3=10$

3. Write short notes on the following : $5+5=10$
- (a) Various categories of propellers
 - (b) V/STOL Machines
4. What is drag polar ? Explain the drag polar for a symmetrical and cambered airfoil with the help of sketches. Write the equation of drag polar for both the cases. 10
5. Derive the expression for range and endurance for a turbojet engine. Also, define range and endurance. 10
6. Define the following terms : $5 \times 2 = 10$
- (a) Critical Mach Number
 - (b) Induced Drag
 - (c) Drag Divergence Mach Number
 - (d) Area Rule
 - (e) Geopotential Altitude
7. (a) Explain the terms used to define the nomenclature of an unsymmetrical airfoil with the help of a sketch.
- (b) Explain the 4-digit and 5-digit NACA airfoil series. $6+4=10$

8. Describe V-n diagram for a typical fighter aircraft with the help of a neat sketch. 10

9. Write short notes on the following : 5+5=10

(a) Classification of Aircraft

(b) High Lift Devices
