No. of Printed Pages : 3

BAS-009

00280

B. TECH (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

June, 2013

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) What is the "Area rule" in an airplane ? What effect does it have on the aerodynamics of the airplane? 5

   (b) What is a super critical airfoil ? Make a neat sketch and explain. 5

2. Define the following terms : - 10

   (a) Flaps

   (b) Drag Divergence Mach no.

   (c) Sweep Back

   (d) Ailerons

   (e) Wing Warping.

3. What are the various layers of atmosphere ? Distinguish between Troposphere and Stratosphere. **10**

4. What is NACA? Give nomenclature details of NACA 4 digit, 5 digit and 6 digit airfoils with suitable examples. **10**

5. (a) What are sweptback wings and what purpose do they serve ? Explain with the help of a neat sketch. **5**

   (b) Explain delta wings with a neat sketch. Enumerate its advantages over a conventional wing. **5**

6. (a) Explain " skin friction drag" and "pressure" drag. **5**

   (b) What is the cause of induced drag ? Discuss. **5**

7. (a) Derive expression for R(radius of turn) and ω (rate of turn) for pull up and pull down maneuvers. **5**

   (b) Derive the expression for $(L/D)_{max.}$ in a steady level flight. What inference can you draw from the desired expression? **5**

8 (a) Explain positive, negative limit load factor, stall area and corner velocity in a V-n diagran. Make a neat sketch. **5**

(b) For an aircraft W/S=400 Kg/m2, CL_{max}=1.2, positive limit load factor=4.5. Calculate the airplane's corner velocity at sea level. 5

9 (a) Define lift, drag and moment co-efficients for a given body. Also give their significance. 5

(b) Boeing 777 has a wing planform area of 415 m^2, take-off weight 23000 kg and take - off velocity 256 km/h 5

(i) Calculate lift co-efficient at take-off for standard sea level conditions.