B.Tech. AEROSPACE

Term-End Examination

June, 2014

BASE-003 : HIGH SPEED AERODYNAMICS

Time : 3 hours   *Maximum Marks : 70*

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

1.   Explain in detail 'Transonic area rule'.   **10**

2.   Assuming the laminar flow at sea level conditions,   **10**
     calculate the momentum thickness for the flow
     of air over a flat plate, if the boundary layer
     thickness is 1.21×10^{-2} m.

3.   Explain in detail the properties of Hypersonic   **10**
     flow with neat sketches.

4.   Explain the effect of pressure distribution on   **10**
     3D - shock wave/boundary layer with neat
     sketches. Compare theoretical aspects with
     experimental results.

5.   What is Mach Number independence principle ?   **10**
     Prove that Hypersonic flows are Mach Number
     independent.

6.   Explain in detail the Reference Temperature   **10**
     Method and Entropy Layer effects on
     Aerodynamic Heating.

7. (a) List down the salient features of linearized 7 supersonic flow theory.
   (b) Define Upper Critical Mach No., 3 Power Critical Mach No., and Super Critical Aerofoil.

8. Explain in detail about "Linearised two 10 dimensional subsonic flow theory".

9. Define the following : 5x2=10
   (a) Fanno flow
   (b) Momentum
   (c) Swept wing
   (d) Hypersonic tunnels
   (e) Lift

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