Code No: R05422104 **R05** **Set No. 2**

IV B.Tech II Semester Regular/Supplementary Examinations,May 2010
HYPERSONIC AERODYNAMICS
Aeronautical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. With a neat sketch, explain the concept of boundary layer. [16]
2. Write the dimensionless variables for boundary conditions? [16]
3. With neat sketches write a brief note on:
   (a) Thin Shock Layer
   (b) High Temperature flows
   (c) Viscous interaction. [16]
4. Explain the Newton theory of hypersonic flow? [16]
5. Explain with a neat sketch the centrifugal effects on a fluid element. [16]
6. In a hypersonic wind tunnel, the flow Mach number is 15 and operating pressure is 2atm. If the flow encounters an expansion corner of 6^0, calculate the Mach number after the expansion, pressure. Assume that Mach number is very large. [16]
7. Write a detail answer on the aerodynamic forces increasing in the hypersonic free molecular flow around a simple geometry? [16]
8. Compare the Experimental and Theoretical Computations for the Hypersonic Shock wave/ Boundary layer interaction over a flat plate at Mach 3?
   (a) Describe a three-dimensional hypersonic shock wave/ boundary layer interaction over a wedge on a flat plate?
   (b) Compare the computational and experimental results using the pressure and heat transfer distributions? [16]

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