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. What is meant by shock wave/boundary layer interaction explain with neat diagrams? [16]

2. Write a note on:

   (a) Mach Number

   (b) Prandtl Number

   (c) Temperature Boundary condition

   (d) Adiabatic Wall Boundary condition. [16]

3. What are the different Rarified Gas regimes? Explain the changes in the boundary conditions over hypersonic vehicles at very high altitudes. [16]

4. Calculate the local skin-friction coefficient for a flat plate at sea-level conditions at a station 1.4 m from the leading edge. The flow velocity is 70 m/sec. Assume laminar flow and sea-level conditions. [16]

5. What are different rarified gas dynamics flow regimes and how does Knudsen number influence these flow regimes? [16]

6. Consider the flow past a 20^0 expansion corner. The upstream conditions are $M_1 = 3$, $P_1 = 3$ atm, and $T_1 = 400k$. Calculate the downstream Mach number, and total Pressure. [16]

7. Explain the conceptual design of hypersonic vehicle? [16]

8. Write a brief note on the Reference Temperature Method and Entropy layer effects on Aerodynamic Heating? [16]

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