Code No: 45046 **R07** **Set No - 3**

III B.Tech I Semester Regular Examinations,Nov/Dec 2009
AERODYNAMICS-II
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Describe two practical situations where oblique shocks waves are produced. How are strong and weak shocks are generated and how they effect the flow. [16]

2. Write about quasi-one-dimensional flow. Air flowing in a duct has a velocity of 300 m/s, pressure 1.0 bar and temperature 290 K taking γ=1.4, R=287 J/kgK. Determine
   (a) Stagnation pressure and temperature
   (b) Velocity of sound in the dynamic and stagnation conditions.
   (c) Stagnation pressure assuming constant density. [16]

3. Briefly write about following
   (a) Velocity of sound
   (b) Mach number
   (c) Flow regimes. [16]

4. (a) A wedge with half angle 10^0 is placed in a flow of Mach 10 at sea-level conditions. Calculate pressure, density, temperature, Mach number of air after the shock.
   (b) Explain in detail thin-shock layer and high-temperature flows in hypersonic flows. [8+8]

5. (a) Explain the working principle of six component strain gauge balance.
   (b) Write short notes on
      i. Wall interference
      ii. Solid blockage effect
      iii. Two dimensional wing [7+9]

6. (a) Derive velocity potential equation for a two-dimensional, steady, irrotational, isentropic flow.
   (b) Explain what do you understand by linearization. [8+8]

7. (a) Discuss the variation of linearized pressure coefficient (C_p) with Mach number (M_∞) with a suitable plot.

(b) A uniform supersonic stream with M_1= 3.0, P_1= 1 atm and T_1= 288 K encounters a compression corner which deflects the stream by an angle θ= 20°. Calculate the shock wave angle and P_2, T_2, M_2, P_{02} and T_{02} behind the shock wave. [6+10]

8. (a) Write a short note on
   i. Measurement errors
   ii. Horizontal buoyancy
   iii. Flow angularity

   (b) Describe the methods used for measuring flow angularity in a supersonic wind tunnel. [9+7]

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