Code No: 45046 **R07** **Set No - 2**

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. (a) Contrast subsonic & supersonic flows. With neat sketches explain using the example of subsonic and supersonic flow over a wedge.
   (b) Derive the velocity potential equation for a 2D steady, irrotational isentropic flow. [6+10]
2. For flow over an airfoil at subsonic speed derive velocity potential equation. [16]
3. (a) Define stagnation enthalpy and stagnation temperature do these quantities define the stagnation state. Derive expressions for speed of sound.
   (b) Argon is stored in a reservoir at 300K ; Determine stagnation enthalpy and velocity of sound in it γ=1.658 and the molecular weight of argon is 39.94. [8+8]
4. (a) Describe the method for measuring pressure distribution on a model.
   (b) Describe the turbulence sphere. Explain how turbulence of a tunnel is measured. [8+8]
5. (a) Derive expressions for alternative forms of one-dimensional energy equation.
   (b) Derive normal shock relation. [8+8]
6. (a) Explain the parameters to be simulated in a wind tunnel so that the data is useful for the design of an aircraft.
   (b) Define Mach number. Explain the major differences between subsonic and supersonic wind tunnels. [8+8]
7. What do you understand by regular reflection from a solid boundary. Enumerate the significance of incident shock and reflected shock with appropriate sketches.[16]
8. (a) Write a note on the Mach number independence principle in hypersonic flows.
   (b) Consider an infinitely thin flat plate at an angle of attack 12^0, 16^0, 25^0 in Mach 3 flow. Calculate the wave drag by Newtonian and Modified Newtonian theories. [8+8]

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