Code No: 45046 $\boxed{\textbf{R07}}$ $\boxed{\textbf{Set No - 1}}$

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 3D steady, irrotational isentropic flow. [6+10]

2. What do you understand by one dimensional flow? Derive momentum equation for quasi-one-dimensional flow. [16]

3. Explain about following briefly

   (a) Intersection of shocks of opposite families

   (b) Intersection of shocks of same families

4. Derive expression for Prandtl-Glauert compressibility correction. [16]

5. (a) What is Similarity role and enumerate its significance with the help of an example? How do you define similarity of flows?

   (b) Explain in detail about various methods for measuring pressures on a model in a wind tunnel. [8+8]

6. (a) What are different rarified gas regimes? Explain the changes in boundary conditions over hypersonic vehicles at very high altitudes.

   (b) A compression corner of angle 6^0 is at sea-level conditions. Calculate pressure, density, temperature, Mach number of air after the shock, if the flow Mach number is 10. [7+9]

7. A high speed subsonic Mc.Douglas DC 10 airliner is flying at 10 km, a pitot tube on the wing tip measures a pressure of 4.24×10^4 N/m^2. Calculate the mach number at which the airplane is flying and the static air temperature is 230K, Find the air speed. Also write what do you understand by True air speed. [16]

8. (a) Explain the major differences between the low subsonic and high subsonic wind tunnels.

   (b) Explain the working of a three component balance and a six component balance. [8+8]

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