

R09

Code: 9A21503

B.Tech III Year I Semester (R09) Supplementary Examinations, May 2013

AERODYNAMICS - II
(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

Isentropic Expansion, Normal shock, oblique shock tables/codes and permitted in the examination hall.

1. Derive the momentum equations for a fluid flow, in differential form. From these, deduce the momentum equations for a steady inviscid compressible flow, ignoring the body forces. Explain all the parameters used, clearly.
2. (a) What are the main differences between subsonic and supersonic wind tunnels?
(b) Describe a supersonic wind tunnel, with the help of a neat sketch.
3. A solid body encounters an inviscid free stream flow of Mach number 3. The downstream pressures are designated P_{nor} in the case of a normal shock and P_{ob} in the case of an oblique shock over a 22.5 degree wedge. Compute the ratio of these pressures.
4. (a) Define 'velocity potential'. Derive the velocity potential equation.
(b) Write notes on 'area rule'.
5. (a) State the linearized velocity potential equation for a supersonic flow and explain.
(b) Describe the flow over a cone in a supersonic flow.
(c) Write notes on the flow over a body travelling at a supersonic speed.
6. Derive the flow properties over a flat plate at an angle of attack in a hypersonic flow.
7. Write notes on:
 - (a) Laser – Doppler anemometer.
 - (b) Horizontal buoyancy.
 - (c) Pi numbers.
8. Explain
 - (a) Scale effects.
 - (b) Induced drag.
 - (c) Strain gauge.
