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SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act,1956)

Course & Branch :B.E - AERO
Title of the Paper :Aerodynamics – II — Max. Marks :80
Sub. Code :526502-26501 — Time : 3 Hours
Date :09/11/2009 — Session :FN

PART - A (10 x 2 = 20)

Answer ALL the Questions

1. Write the one dimensional continuity.
2. Write the area velocity relation for supersonic flow.
3. Define Normal Shock and Oblique Shocks.
4. What is a Hodograph?
5. Define super critical aerofoil.
6. What is meant by perturbation velocity?
7. Bring out the essential differences between subsonic and supersonic aerofoils.
8. What is Interference Drag and Wave Drag?
9. Define Shock Tube.
10. What are the components available in supersonic tunnel?

PART – B (5 x 12 = 60)

Answer All the Questions

11. Discuss the performance of Nozzles under various Back Pressures.

(or)

12. Derive the one dimensional continuity equation and momentum equation for compressible flows.

13. Derive Prandtl Equation and from that prove that the mach No. beyond normal shock is always less than one.

(or)

14. (a) A Supersonic Flow with M1 = 1.5, P1 = 1 x 10^5 N/m^2 and T_1 = 288 k is expanded around a sharp corner through a deflection angle of 20°. Calculate M_2, P_2, T_2, P_{02} and T_{02}. (8)

(b) Distinguish Between Expansion Waves and Shock Waves. (4)

15. (a) What are the salient features of "Linearized Supersonic flow theory"? (8)
(b) Super Critical Aerofoil. (4)

(or)

16. Using linearised theory derive an expression for lift and drag coefficients, for the super sonic flow over a flat plate.

17. Write short notes on:
(a) Drag Divergence Mach number (8)
(b) Transonic area Rule (4)

(or)

18. What is critical mach no? Explain the moment of shock wave due to increase in critical mach no.

19. With a neat sketch, explain the operation of a shock tube. What is its application? Draw the schematic diagram of a hypersonic wind tunnel and explain the working principle of the components of hypersonic tunnel.

(or)

20. Sketch a typical layout of a supersonic tunnel and mark all the components. Explain the functions of various components of the tunnel system.