Reg. No. :

Question Paper Code: 1107072

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Seventh Semester
Aerospace Engineering
U20AS701- HYPERSONIC AERODYNAMICS FOR AEROSPACE VEHICLES
(Regulation 2020)

Time: Three Hours   Maximum: 100 Marks

Answer ALL questions

PART – A   (10 x 2 = 20 Marks)

1.   Define compressible and incompressible flows.

2.   Using a neat sketch show the expansion waves in supersonic flow regime.

3.   Define tangent cone.

4.   Define Mach reflection.

5.   What is entropy effect?

6.   What is blast wave theory?

7.   Write the boundary layer equation.

8.   How to reduce aerodynamic heating?

9.   What is a viscous interaction?

10.   Explain hypersonic boundary layer transition.

PART – B   (5 x 16 = 80 Marks)

11. (a) Explain the intersection of shock wave in same and opposite families of in viscid hypersonic flows. (16)

(OR)

(b) Derive the maximum turning angle using Prandtl-Meyer Expansion Waves equation for supersonic flow. (16)

12. (a) Describe the surface pressure estimation for in viscid hypersonic flow. (16)

(OR)

(b) Explain flat plate and thin aerofoil theory techniques. (16)

13. (a) Derive hypersonic small perturburation equation and theory of small slender bodies. (16)

(OR)

(b) Explain about the hypersonic thin shock theory. (16)

14. (a) Derive Navier Stoke Equation for supersonic flow. (16)

(OR)

(b) Elaborate hypersonic aerodynamic heating and entropylayers effects on aerodynamic heating. (16)

15. (a) Enumerate the hypersonic shockwaves and boundary layer interactions in viscous hypersonic flow. (16)

(OR)

(b) Discuss the Role of similarity parameter for laminar viscous interactions in hypersonic viscous flow. (16)

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