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BASE-003

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

00193

June, 2018

BASE-003 : HIGH SPEED AERODYNAMICS

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any* ***seven*** *questions. All questions carry equal marks. Use of scientific calculator is permitted. All symbols and notations have their usual meaning.*

1. Derive the Prandtl – Glauert relationship for two-dimensional subsonic flow. *10*

2. Discuss the linearized and exact two-dimensional supersonic flow theory in detail. *10*

3. Explain the significance of pitching moment and centre of pressure in supersonic profiles. *10*

4. Explain in detail 'Transonic Area Rule'. *10*

5. Discuss in detail the flow past unswept airfoils. *10*

6. Explain small perturbation potential theory for supersonic flow. *10*

7. (a) What is the relationship between internal energy and enthalpy ?

   (b) Define strong shock wave and weak shock wave in a compressible flow.

   (c) Differentiate between a Shock wave and a Mach wave. *4+3+3=10*

8. Make a comparative study of 2D and 3D shock waves / boundary layer interaction. *10*

9. Define the following *5×2=10*

   (a) Pitching moment

   (b) Adiabatic flow

   (c) Forward swept wing

   (d) Fanno flow

   (e) Turbulent flow