00301

No. of Printed Pages : 2

BASE-003

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

December, 2015

BASE-003 : HIGH SPEED AERODYNAMICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. Each question carries equal marks.*

1. Explain with neat sketches how shock waves are produced in supersonic flow. *10*

2. Explain briefly flow past unswept airfoils at transonic speed. *10*

3. Derive the linearized potential flow equation for supersonic flow using small perturbation theory. *10*

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

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

6. (a) State the area rule.

(b) What is the relationship between internal energy and entropy ? *5+5=10*

7. Explain the significance of centre of pressure in supersonic profiles. *10*

8. Briefly explain any ***two*** of the following : *5+5=10*

(a) Drag

(b) Lift

(c) Nozzle

9. Show that $M^2 = \dfrac{1 + \dfrac{\gamma - 1}{2} M_1^2}{\gamma M_1^2 - \dfrac{\gamma - 1}{2}}$,

where the symbols have their usual meaning. *10*

10. Write short notes on any ***four*** of the following : $4 \times 2\frac{1}{2} = 10$

(a) Mach Angle

(b) Sweepback

(c) Pitching Moment

(d) Forward Swept Wing

(e) Transonic Flow

(f) Adiabatic Flow