

00342

**B.Tech. AEROSPACE ENGINEERING
(BTAE)**

Term-End Examination

December, 2017

BASE-003 : HIGH SPEED AERODYNAMICS

Time : 3 hours

Maximum Marks : 70

Note : (i) Answer any seven questions.

(ii) All questions carry equal marks.

(iii) Use of scientific calculator is permitted.

(iv) All symbols and notations have their usual meaning.

1. With a neat sketch, explain the concept of boundary layer. 10

2. Explain the Mach number independence principle with respect to hypersonic flows. 10

3. (a) Derive the relation $M_1^* M_2^* = 1$ 5+5=10

(b) Hence show that $M_2^2 = \frac{1 + \frac{\gamma - 1}{2} M_1^2}{\gamma M_1^2 - \frac{\gamma - 1}{2}}$

4. Explain in detail the properties of hypersonic flow with neat sketches. 10
 5. Discuss in detail about "Linearised two dimensional subsonic flow theory". 10
 6. Explain briefly flow past unswept airfoils at transonic speed. 10
 7. List down the salient features of linearized supersonic flow theory. 10
 8. Discuss the linearized theory for subsonic compressible flow about a thin wing at a small angle of attack. 10
 9. Define the following :- 5x2=10
 - (a) Mach angle
 - (b) Momentum
 - (c) Swept wing
 - (d) Aerodynamic centre
 - (e) Transonic flow
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