

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

Term-End Examination

00133

June, 2017

BASE-003 : HIGH SPEED AERODYNAMICS

Time : 3 hours

Maximum Marks : 70

Note : Attempt any **seven** questions. All questions carry equal marks.

1. For a normal shock wave, derive the following relationship between pressure, ahead and behind the shock wave : 10

$$\frac{P_2}{P_1} = 1 + \frac{2\gamma}{\gamma + 1} (M_1^2 - 1)$$

2. Make a comparative study of 2D and 3D shock wave/boundary layer interaction. 10
3. Differentiate between supersonic and hypersonic flows with the help of neat sketches by using the example of supersonic and hypersonic flows over a wedge. 10

4. What are the important parameters governing the re-entry vehicle design ? Explain any two re-entry vehicles. 10
 5. Explain in detail viscous interaction and high temperature flows in hypersonic flows. 10
 6. Derive the relationship between velocities downstream and upstream of oblique shock wave in hypersonic flows. 10
 7. Explain the independence of centre of pressure on a very high Mach number. 10
 8. Enumerate some physical aspects of transonic flows. 10
 9. Explain the construction and working of a supersonic nozzle with a neat sketch. 10
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