BASE-003

B.Tech. AEROSPACE

Term-End Examination

December, 2013

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**.

1. Write a brief note on the reference temperature method and entropy layer effects on aerodynamics heating. **10**

2. Explain the linearized theory for subsonic compressible flow about a thin wing at small angle of attack. **10**

3. Discuss the performances of nozzles under various back pressures. **10**

4. (a) A supersonic flow with $M_1 = 1.5$, $P_1 = 10^5 N/m^2$ and $T_1 = 288K$ is expanded around a sharp corner through a deflection angle of 15°. Calculate M_2, P_2, T_2, Po_2 and To_2. **7**

$M_1 = 1.5$, $P_1 = 10^5 N/m^2$ and $T_1 = 288K$
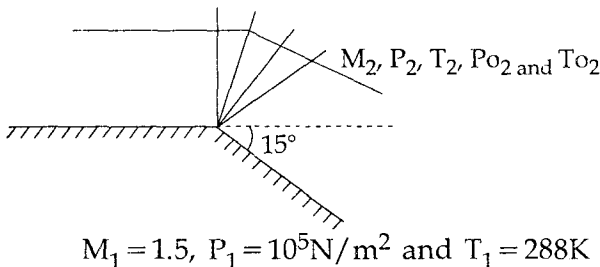
    (b)   Distinguish between Expansion Waves and   **3**
            Shock Waves.

5.   (a)   Derive the compressible flow Bernoulli's   **7**
            equation from one dimensional Euler's
            equation.

    (b)   Define compressibility of a gas.   **3**

6.   Derive the Prandtl - Glavert relationship for two   **10**
    dimensional subsonic flow.

7.   Explain in detail shock polar with neat sketches.   **10**

8.   Write a brief note on "supersonic flows" with   **10**
    neat sketches.

9.   Write a brief note on "Adiabatic steady state flow   **10**
    equations".