



**B.E/B.Tech (Full-Time) DEGREE END SEMESTER EXAMINATIONS, APR/ MAY 2012**

**Mechanical Engineering Branch**

**FIFTH SEMESTER - (REGULATIONS 2004)**

**ME 371 – GAS DYNAMICS AND JET PROPULSION**

Time : 3 hr

Max Mark : 100

86

- Instructions: ① Use of Gas Tables Allowed  
② State clearly any assumption made with justification

**Answer ALL questions**

**Part A – (10 × 2 = 20 marks)**

1. Define stagnation pressure.
2. State the significance of stagnation properties in a steady flow system.
3. What is the difference between compressible and incompressible flow?
4. What do you mean by friction choking?
5. What are the assumptions used in simple diabatic flow?
6. Distinguish between oblique shock and normal shock.
7. Distinguish between ramjet and turbojet engine.
8. Define –TSFC.
9. What is the need for multistaging in rocket engines?
10. Define specific impulse.

**Part B – (5 × 16 = 80 marks)**

- 11.a) Explain clearly by means of a sketch, the operating characteristics of both Converging and Converging-Diverging (CD) nozzle for various cases of decreasing back pressure
- 12.a) Air enters a duct having a constant diameter of 60 cm. At entrance the mach number is 2.8, static temperature: 40 deg.C and static pressure: 45 kPa. At some section in the duct, where mach number is 2.5, a normal shock occurs. The duct discharges air with a mach number 0.7 into a reservoir.  
Assume  $f=0.005$  and  $\gamma=1.4$ . Calculate the following:
- (i) The distance from the entrance section of the duct to the location of the normal shock
  - (ii) The static and total pressure at the duct exit section
  - (iii) The total length of the duct
  - (iv) The entropy change for the gas between entrance and exit section of the duct

(Or)

- b) Write short notes on the following:
- (i) First and second critical point in De Laval nozzle
  - (ii) Zone of action and Zone of silence
  - (iii) Knudsen number and Crocco number
  - (iv) Under expansion and Overexpansion wave in a supersonic nozzle (4 x 4)