Code No: 45048 **R07** **Set No - 2**

III B.Tech I Semester Regular Examinations,Nov/Dec 2009
AEROSPACE PROPULSION-I
Aeronautical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Determine the pressure ratio of a single sided centrifugal compressor and the power required to drive it, assuming that the velocity of air at inlet is axial, with the help of following data:
Rotational speed = 270rev/s
Overall diameter of impeller = 0.45m
Air mass flow = 8kg/s
Inlet stagnation temperature = 290K
Isentropic efficiency = 0.79
Slip factor = 0.9

   (b) Derive the relationship for work done and pressure ratio of a centrifugal compressor. [8+8]

2. Explain the significance of combustion efficiency with respect to the actual and theoretical total temperature rise across a gas turbine combustor. [16]

3. Discuss significance of capture area ratio (mass flow ratio) characteristic on the performance of supersonic inlet. [16]

4. (a) Derive an expression for work input to the compressor and explain.
   (b) What is meant by work done factor? [8+8]

5. State the various laws used in designing turbo-machines and the relationship between enthalpy and internal energy for a gas turbine? [16]

6. What do you understand by the term diffusion? Explain its significance with reference to static pressure rise across divergent inlets. [16]

7. (a) Describe the exhaust mechanism in a convergent nozzle of fixed area with a neat sketch.
   (b) Discuss the airflow mechanism in a convergent-divergent nozzle of variable area with a schematic. [8+8]

8. Explain about the limitations of the following in gas turbine combustors with their relative importance
   (a) Pressure.
   (b) Temperature.
   (c) Inlet air velocities.

(d) Flame speeds.

(e) Light gauge heat resistant sheets.

[16]

⋆ ⋆ ⋆ ⋆ ⋆