Applied Thermodynamics-II
(ME-210, MAY 2007)

Time: 3 Hrs
Max Marks: 60

Note: Section A is compulsory. Attempt any four questions from section B and any two from Section C.

Section-A
1. a) What is compression ratio?
   b) What is knocking?
   c) What is surging in compressor?
   d) What is slip factor?
   e) What is Prewhirl?
   f) What is chocking?
   g) What is diffuser efficiency?
   h) What is regeneration?
   i) Write the name of two solid propellants?
   j) What is Ram jet?

Section-B
2. Compare 'air swirl' in CI engines with 'turbulence' in SI engines.
3. What is the basic difference in the combustion process of SI and CI engines?
4. The first stage of an axial flow compressor is to be designed for an axial velocity of 133 m/s, mass flow of air 22.7 kg/s and for ambient conditions of 1 kgf/cm^2 and 10º C.
5. A gas turbine plant works between the temperature limits of 1152º K and 288º K, isotropic efficiencies for compressor and turbine are 0.85 and 0.8 respectively. Determine the optimum ratio for maximum work output and also for maximum cycle thermal efficiency.
6. Derive an expression for the optimum pressure ratio giving maximum specific output in simple cycle gas turbine.

Section-C
7. Differentiate between centrifugal and axial compressor? Define dimensionless parameters such as flow coefficient, pressure coefficient and reaction.
8. a) A rotary vane compressor works between the pressure limits of 1 kgf/cm^2 and 1.5 kgf/cm^2 and gives 4m^3/min of free air delivered when running at 200 rpm. Determine the horse power required to drive the compressor when ports ar so placed that there is no internal compression.
   b) State merits and demerits of closed cycle gas turbine over open cycle.
9. a) Air enters at the rate of 900 kg/min into a compressor of jet aircraft traveling at 241 m/s. the air-fuel ratio is 60:1 and the compression pressure ratio is 6:1. The calorific value of the fuel is 10,000 kcal/kg. Neglecting all losses, calculate the thrust, the specific fuel consumption and propulsive efficiency.
   b) Explain the principle of jet propulsion.