2008-PUNJAB TECHNICAL UNIVERSITY
B.TECH I SEMESTER REGULAR EXAMINATION
THERMO DYNAMICS
(MECHANICAL ENGINEERING)

TIME-3HOUR
MARKS-80

ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS

MARKS [16*5=80]

1. (a) What are different forms of work energy? Explain each briefly.

(b) Why does free expansion have zero work transfer?

2. In a steady flow apparatus, 135 kJ of work is done by each kg of fluid. The specific volume of the fluid, pressure, and velocity at the inlet are 0.37 m3/kg, 600 KPa, and 16 m/s. The inlet is 32 m above the floor, and the discharge pipe is at floor level, The discharge conditions are 0.62 m3/kg, 100 KPa and 270 m/s. The total heat loss between the inlet and discharge is 9 KJ/kg of fluid. In flowing through, does the internal energy increase or decrease, and by how much?

3. (a) Write Tds equations.

(b) Calculate the entropy change of the universe as a result of the following processes:

i. A copper block of 600 grams mass and with Cp of 150 J/kg-K at 1000C is placed in a lake at 80C.

ii. Two such blocks at 100 and 00C are joined together.

4. (a) Determine entropy of 5 kg of steam at 2 MPa and 3000C ,Take specific heat of super heated steam as 2.1KJ/Kg.K

(b) Throttling colorimeter has steam entering to it at 10Mpa and coming out of it at 0.05 MPa and 1000 C. Determine dryness fraction of steam.

5. 1 kg of air at 1.2 bar pressure and 180C is compressed isentropic ally to 7 bars. Find the final temperature and the work done. If the air is cooled at the upper pressure to the original temperature of 180C ,what amount of heat is rejected and what further work of compression is done.

6. A mixture of ideal gases consists of 3 kg of Nitrogen and 5 kg of carbon dioxide at a pressure of 4 bar and temperature of 250 C .Find

(a) mole fraction of each constituent

(b) equivalent molecular weight of the mixture

(c) Equivalent gas constant of the mixture

(d) Partial pressure and partial volumes

(e) volume and density of the mixture

(f) C p&C v of the mixture.

7. (a) Explain graphically the variation of the efficiency of Diesel cycle with compression ratio and cut off ratio.

(b) A diesel engine has a compression ratio of 15 and heat addition at constant pressure takes place at 6% of stroke. Find the air standard efficiency of the engine.

8. In an ammonia vapour compression system, the pressure in the evaporator is 2 bar. Ammonia at exit is 0.85 dry and at entry its dryness fraction id 0.19. During comptression, the work done per kg of ammonia is 150kJ. Calculate the C.O.P and volume of vapour entering the compressor per minute, if the rate of ammonia circulation is 4.5kg/min. the latent heat and specific volume at 2 bar are 1325kJ/kg and 0.58m3/kg respectively.