Code No. : 5435/N

FACULTY OF ENGINEERING
B.E. 2/4 (Mech.) II Semester Examination, May/June 2012
(New/Main)
THERMODYNAMICS

Time: 3 Hours] [Max. Marks :75

***Note**: 1) Answer **all** questions of Part **A**.*
*2) Answer **any five** questions from Part **B**.*
*3) Assume any **missing** data suitably.*
*4) **Use** of steam tables is **permitted**.*

PART – A **(25 Marks)**

1. Define extensive property with examples. **3**
2. How is thermodynamic equilibrium different from thermal equilibrium ? **2**
3. Represent Isochoric and isobaric processes on T-s diagram. **3**
4. Why work transfer is considered as a path function ? **2**
5. State Clausius statement of Second law of thermodynamics. **3**
6. Write down the relation for entropy change for an isobaric process. **2**
7. Define triple point of a pure substance. **3**
8. What is latent heat of vaporisation ? **2**
9. State Amagat-Leduc Law of partial volumes. **3**
10. Plot a sketch of Carnot cycle on P-V diagram. **2**

PART – B **(5×10=50)**

11. Discuss the working principle of constant pressure Ideal Gas thermometer with a neat sketch. **10**
12. Air flows steadily at the rate of 0.4 kg/s through an air compressor, entering at 6 m/s with a pressure of 1 bar and a specific volume of 0.85 m^3 /kg, and leaving at 4.5 m/s with a pressure of 6.9 bar and a specific volume of 0.16 m^3 /kg. The internal energy of air leaving is 88 kJ/ kg greater than that of the air entering. Cooling water in a jacket surrounding the cylinder absorbs heat from the air at the rate of 59 kJ/s. Calculate the power required to drive the compressor and the inlet and outlet pipe cross-sectional areas. **10**

13. 1 m^3 of air is heated reversibly at constant pressure from 15°C to 300°C and is then cooled reversibly at constant volume back to the initial temperature. The initial pressure is 1.03 bar. Calculate the net heat flow and overall change of entropy and sketch the process on a T-s and P-V diagrams. 10

14. a) Explain why water is treated as a separate type of pure substance. How does it differ from other pure substances ? 5

    b) Derive Clausius Calpyron equation from fundamentals. What is its significance ? 5

15. Explain the working principle of Stirling Cycle using P-V and T-s diagrams. 10

16. A system receives 42 kJ of heat while expanding with volume change of 0.123 m^3 against an atmosphere of 12 N/cm^2. A mass of 80 kg in the surroundings in also lifted through a distance of 6 metres.

    i) Find the change in energy of the system.

    ii) The system is returned to its initial volume by an adiabatic process which requires 100 kJ of work. Find the change in energy of system during the process.

    iii) Determine the total change in energy of the system. 10

17. a) Derive Clausius Inequality relation. State its application. 5

    b) Differentiate between Otto and Diesel cycles. 5