Code No. 2065

FACULTY OF ENGINEERING

B.E. 2/4 (Mech./Prod.) II – Semester (Main) Examination, May 2013

Subject : Thermodynamics

Time : 3 hours **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Distinguish between extensive properties and intensive properties. Give one example each.
2. Calculate the mars and weight of air in a room of 6m x 4m x 3m dimensions at atmospheric conditions.
3. Compare heat and work.
4. State the first law of thermodynamics.
5. State the Kelvin-Planck statement of the second law of thermodynamics.
6. State the Clausius theorem.
7. Explain how the slope of an isobar in the mollier diagram is equal to the absolute temperature.
8. What is stoichimetric mixture?
9. Draw the Rankine cycle in h-s coordinates.
10. State the Dalton's law of partial pressures.

PART – B (50 Marks)

11.a) What is a reversible process? 2 ½
b) With the help of examples, explain the causes of irreversibility. 7 ½

12. Air flows steadily at the rate of 0.5 kg/s through an compressor, entering at 7 m/s velocity, 100 kPa pressure, and 0.95m^3/kg. volume and leaving at 5m/s, 700 kPa and 0.19 m^3/kg. The interval energy of the air leaving is 90 kJ/kg greater than that of the air entering cooling water in the compressor jacket absorbs heat from the air at the rate of 58 kW. a) compute the rate of shaft work input to air in kW b) Find the ratio of the inlet pipe diameter to outlet pipe diameter. 10

13. Which is the more effective way to increase the efficiency of carnot engine ; to increase T_{High} ; keeping T_{Low} constant; or to decrease T_{Low} keeping T_{High} constant, where the carnot efficiency is given by 10

$$\eta = 1 - \frac{T_{Low}}{T_{High}}$$

14. Three identical finite bodies of constant heat capacity are at temperatures of 300, 300 and 100k. If no work or heat is supplied from outside, what is the highest temperature to which one of the bodies can be raised by the operation of heat engines or refrigerators. 10

15.Steam at 1.5 MPa, 300^{0}C expands reversibly and adiabatically in a steam turbine to 40^{0}C. Determine the ideal work output of the turbine per kg of steam. (Solve the problem using steam tables only). 10

16.In an air standard Otto cycle, the compression ratio is 7, and compression begins at 35^{0}C, 0.1 MPa. The maximum temperature of the cycle is 1100^{0}C find a) the heat supplied b) network done per kg of air c) the m.e.p. of the cycle. 10

17.a) Derive four Maxwell's relations. 5
b) Compare Otto, diesel and dual cycles with the help of P-V and T-s diagrams. 5

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