Code No. 6068

FACULTY OF ENGINEERING

B.E. 2/4 (Auto-Engg.) II – Semester (Suppl.) Examination, December 2013

Subject : Thermal Engineering

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. What do you mean by a thermodynamic system? 2
2. Distinguish intensive property from extensive property with suitable examples. 3
3. Write the Kelvin-Plank statement of second law of thermodynamics. 2
4. Give the statement of Carnot's theorem. What does it mean? 3
5. Distinguish between Nozzle and Diffuser. 2
6. Draw the schematic diagram of a Rankine cycle. 3
7. Define Free air delivery. 2
8. Define the following terms 3
   a) Ton of refrigeration b) COP
9. State the Fourier's law of heat conduction. Write the S.I. units of all the terms. 2
10. Distinguish between parallel flow and counter flow heat exchanger. 3

PART – B (50 Marks)

11 a) What is perpetual motion of first kind (PMMI)? Why is it impossible. 4
   b) Air expands from 3 bar to 1 bar in a nozzle. The initial velocity is 90 m/s and the initial temperature is 150 °C. Determine the final velocity Assume adiabatic conditions and C_P = 1.005 kJ/kg/k. 6

12 a) Distinguish between a path function and a point function. 5
   b) Show that heat is a path function, not a state function. 5

13 a) Prove the equivalence of Kelvin plank and Clausius statements. 6
   b) Discuss the first law of thermodynamics. 4

14. With the help of a neat diagram explain the working principle of a reheat Brayton cycle and represent the cycle on T-S diagram. 10

15 a) Derive the equation for volumetric efficiency in terms of clearance ratio and pressure ratio. 5
   b) Discuss the advantages of multistage compression. 5

16 a) Discuss the advantages of vapour absorption refrigeration system over vapour compression refrigeration system. 6
   b) List the desirable properties of a refrigerant. 4

17 a) Derive the expression for overall heat transfer coefficient through composite wall of three layers. 5
   b) Prove that the mean temperature difference in a parallel-flow heat exchange is given by LMTD (t_m) = $\frac{t_1 - t_2}{\log_e \frac{t_1}{t_2}}$ 5

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