Registration No. : | | | | | | | | | | |

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B. Tech

PCME 4402

Seventh Semester Back Examination – 2014

REFRIGERATION AND AIR CONDITIONING

BRANCH : MECH

QUESTION CODE : L 150

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any ***five*** *from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) What is COP ? How does it differ from efficiency of engine ?

   (b) Draw the p-V and T-s diagrams for vapor compression cycle.

   (c) Why flash intercooling is used in vapor compression cycle ?

   (d) What are the different throttling devices used in refrigeration system ?

   (e) Mention the advantages of vapor absorption system over vapor compression system.

   (f) Mention the principles of working of thermo-electric refrigeration system.

   (g) Differentiate between humidity and relative humidity.

   (h) Show the adiabatic humidification on psychometric chart.

   (i) Differentiate between SHF and GSHF.

   (j) List down the property of good refrigerant.

2. (a) Derive an expression for the COP in case of a vapor absorption cycle. 5

   (b) Draw a neat sketch of Electrolux system and explain its working principle. 5

3. (a) Name six refrigerants used for refrigeration systems. 4

   (b) A vapor compression system having a capacity of 5TR uses R-12 as a refrigerant. The evaporator and condenser temperatures are –5°C and

P.T.O.

35°C respectively. Assuming isentropic compression, calculate the following : 6

(i) the mass of refrigerant flowing through the evaporator

(ii) the power required to drive the compressor

(iii) COP of the system.

4. It is required to design an summer air conditioning plant for a conference room.

Out door conditions = 35°C DBT and 60% RH

Inddor conditions = 20°C DBT and 10°C WBT

Amount of air circulation = 0.25m^3/min/person

Seating capacity of the office = 100

The required condition is achieved first by cooling and then by dehumidifying. Determine the following using psychometric chart : 10

(a) Cooling capacity of coil in kW and surface temperature required, if the bypass factor is 0.3

(b) Capacity of the dehumidifier.

5. (a) Define the following (i) DBT, (ii) WBT, (iii) DPT. 4

(b) The dry-bulb temperature and relative humidity of moist air at standard atmospheric pressure are 20°C and 30% respectively. Determine the humidity ratio, the degree of saturation, specific enthalpy and specific volume using moist air table and also by using the perfect gas relations. 6

6. (a) With neat sketch explain the winter air conditioning system. 5

(b) Explain different humidification techniques used in air conditioning systems. 5

7. (a) Write notes on different types of compressors used in refrigeration plants. 5

(b) Write down different green refrigerants used mentioning their properties. 5

8. Write short notes on any **two** : 5×2

(a) Degree of saturation

(b) Air craft cooling

(c) Comfort chart.