Registration No. :

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Seventh Semester (Special) Examination – 2013
REFRIGERATION AND AIR CONDITIONING
BRANCH : MECH
QUESTION CODE : D388
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 do you mean by TR ?

    (b) What is COP ? Compare the COP of a heat pump and a refrigerator.

    (c) Draw the h-S diagram for vapor compression system with multi evaporation.

    (d) Mention the effects of lubricants on refrigerants.

    (e) Mention the types of expansion devices used in refrigeration systems.

    (f) Write down the refrigerant and absorbents used in lithium bromide water vapor absorption system.

    (g) Write down the formula of COP used in vapor absorption system.

    (h) Draw the sensible heating a latent heating process on psychrometric chart.

    (i) What are the four main purposes of air conditioning system ?

    (j) Draw the reversed carnot cycle on p-V and T-s plot.

2. (a) What are the desirable properties of a good refrigerant ?   5

    (b) Name the types of refrigerants and also mention their applications and uses.   5

3. Draw a neat sketch of Aqua-Ammonia vapor absorption system and explain its working principle.   10

P.T.O.

4. A vapor compression system having a capacity of 10 TR uses R-12 as a refrigerant. The evaporator and condenser temperatures are $-10°C$ and $40°C$ respectively. The liquid refrigerant leaving the condenser is subcooled to $30°C$.

   Assuming isentropic compression, calculate the following :   10
   (a) the mass of refrigerant flowing through the evaporator
   (b) the power required to drive the compressor
   (c) COP of the system.

5. (a) With neat sketch, explain multistage compression system.   5
   (b) What are the advantages and disadvantages of centrifugal compressors over reciprocating compressors ?   5

6. (a) Explain a neat diagram, the summer air conditioning system.   5
   (b) Explain the following (i) humidity, (ii) relative humidity, (ii) dew point temperature.   5

7. It is required to design an air conditioning plant for an office room for full winter air conditions.

   Out door conditions $= 12°C$ DBT and $10°C$ WBT

   Required conditions $= 20°C$ DBT and 60% RH

   Amount of air circulation $= 0.3$ m³/min/person

   Seating capacity of the office $= 50$

   The required condition is achieved first by heating and then by adiabatic humidifying. Determine the following using psychrometric chart.   10
   (a) Heating capacity of coil in kW and surface temperature required, if the bypass factor is 0.2   5
   (b) Capacity of the humidifier.   5

8. Write short notes on any **two** :   5×2
   (a) Comfort chart
   (b) SHF and BPF
   (c) Merits and demerits of air refrigeration system
   (d) Effect of superheating and subccoling on performance of refrigerator.