Code No. : 31405 S

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (Mech. Engg.) III Year I-Semester Supplementary Examinations, May/June-2017

Refrigeration and Air Conditioning

Time: **3** hours   Max. Marks: **70**

Note: i) Answer ALL questions in Part-A and any FIVE from Part-B
ii) Use of Refrigeration and Air Conditioning tables and charts are permitted.

Part-A (10 × 2 = 20 Marks)

1. Mention different methods of Refrigeration.

2. Distinguish between Open and Dense Air refrigeration Systems.

3. What is a simple or Standard Vapour Compression Refrigeration Cycle?

4. With the help of a sketch distinguish between wet and dry compression.

5. What are the applications of Cryogenics?

6. Under what circumstances, Steam Jet Refrigeration System is more preferable?

7. Define DBT and WBT.

8. What is the effect of heat on work performance?

9. What is Infiltrated air?

10. What is the use of Grills and filters in Air conditioning system?

Part-B (5 × 10 = 50 Marks)

11. a) Explain about refrigerant nomenclature. [3]

    b) An air refrigerator works between pressure limits of 1 bar and 4 bar. The temperature of [7]
    the air entering the compressor is 15 ^{0}C and entering the expansion cylinder is 30 ^{0}C.
    The compression follows the law $pv^{1.35} = C$ and expansion follows the law $pv^{1.25} = C$.
    Determine   i) COP of the refrigeration cycle   and   ii) The refrigeration capacity
    of the system if the circulation of air through the system is 0.5 kg/s. Take $\gamma = 1.4$ and
    $C_p = 1.005$ kJ/kg-K.

12. a) What is use of water intercooler and flash chamber in Vapour Compression refrigeration [3]
    Systems?

    b) A standard vapor compression refrigerator using R-12 as the refrigerant operates between [7]
    the condenser pressure of 10 bar and the evaporator pressure of 1.5bar. The evaporator
    absorbs 75kJ/min of energy as heat and the vapour is dry saturated at exit of the
    compressor. Sketch the cycle on T-s Plane and determine i) mass flow rate of refrigerant
    ii) Power consumed   iii) COP. Use the following properties for the Refrigerant-12.

Pressure bar	Saturation temperature ^{0}C	Enthalpy(kJ/kg)		Entropy(kJ/kgK)	
		Liquid	vapour	Liquid	vapour
10	42	77	204		0.682
1.5	-20	18	179	0.073	0.709

13. a) Explain Seebeck Effect and Peltier Effect. [3]

    b) Explain the working principle of Lithium Bromide-H_2O VAR system with a neat sketch. [7]

14. a) What is a Psychrometric Chart? Explain its construction.   [4]

   b) A mixture of dry air and water vapour is at a temperature of 21^0C under a total pressure   [6]
      of 736 mm of Hg. The dew point temperature is 15^0C. Calculate   i) partial pressure of
      water vapour   ii) Specific humidity   iii) Relative humidity   iv) Specific enthalpy of
      mixture per kg of dry air and   v) Specific volume of air per kg of dry air.

15. a) Explain in detail the procedure for estimating the cooling load of a commercial building.   [5]

   b) A sample of atmospheric air having 15^0C DBT and 10^0C WBT is made to enter a   [5]
      heating coil whose surface temperature is 40^0C. Using the psychrometric chart
      determine   i) DBT, WBT and RH of air at exit from the heating coil.   ii) Heat added
      to the air. Take the bypass factor of the coil as 0.5.

16. a) Explain about future refrigerants.   [4]

   b) Explain the working of Cascade refrigeration System with the help of a neat Diagram.   [6]

17. Write short notes on any *two* of the following:

   a) Linde system used for Liquification of air.   [5]
   b) ASHRAE Comfort Chart.   [5]
   c) Packaged Air Conditioners.   [5]

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