6639

BOARD DIPLOMA EXAMINATION, (C-16)

MAY/JUNE—2023

DME - FIFTH SEMESTER EXAMINATION

REFRIGERATION AND AIR CONDITIONING

Time : 3 Hours]   [*Total Marks* : 80

PART—A   3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Psychometric Chart may be used wherever required.

1. Define COP of a refrigerating system.

2. What are the effects of suction pressure on performance of VCR system?

3. Represent subcooling of VCR system on T-s and p-H diagrams.

4. Write any three differences between vapour compression and vapour absorption systems.

5. Write the advantages of hermetic air compressor over open type compressor.

6. Write any three differences between water cooled and air cooled condensers.

7. List any six thermodynamic properties of refrigerants.

8. Write various human comfort conditions.

9. Classify air filters used in air-conditioning system.

10. Represent summer air-conditioning system on psychometric chart.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Psychometric Chart may be used wherever required.

11. Explain reversed Carnot cycle of air refrigeration with neat sketch and represent the same on p-V and T-s diagram. 3+3+2+2

12. A refrigerating plant works between temperature limits of – 5 °C and 25 °C. The working fluid ammonia has a dryness fraction of 0.62 at entry to compressor. If the machine has a relative efficiency of 55%, calculate the amount of ice formed during a period of 24 hours. The ice is to be formed at 0 °C from water at 15 °C and 6.4 kg of ammonia is circulated per minute. Specific heat of water is 4.187 kJ/kg and latent heat of ice is 335 kJ/kg. Properties of NH_3 are given in the table below :

10

Temperature °C	Liquid heat (kJ/kg)	Latent heat (kJ/kg)	Entropy of liquid s_f (kJ/kgK)
25	298.9	1167.1	1.124
–5	158.2	1280.8	0.630

13. A vapour absorption system works with the following data. Generator temperature = 87 °C. Absorber temperature = 37 °C. Evaporator temperature = –13 °C. Find the COP. If the evaporator temperature falls to –18 °C, what would be the generator temperature to operate the system with same COP. 10

14. How driers are classified? Explain the working principle of driers with neat sketches. 2+8

15. Explain the working principle of water cooler with a neat sketch. 5+5

16. List the types of fans of A/C systems and explain them with neat sketches. 10

17. Humid air at 25 °C DBT and 30% relative humidity having moisture content of 6 gm/kg of air is humidified without change in temperature by increasing moisture content to 12 gm/kg of air. Represent the process on psychometric chart and find *(a)* wet bulb temperature, *(b)* relative humidity and (c) enthalpy.　　10

18. Classify A/C systems and explain summer air-conditioning system with a neat sketch.　　2+4+4

★ ★ ★