



C20-M-505

7659

BOARD DIPLOMA EXAMINATION, (C-20)

OCTOBER / NOVEMBER—2024

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) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. List any three differences between open and closed air refrigeration cycles. 3
2. A Carnot refrigerator works between the temperature limits of -20°C and 30°C . Calculate its COP. 3
3. Write any three differences between wet and dry compression. 3
4. State any three differences between primary and secondary refrigerants. 3
5. State the function of condenser and classify the condensers. 1+2
6. What is the function of drier in refrigeration system? List out different types of driers. 1+2
7. Define the terms (a) humidity ratio, (b) dew point temperature and (c) wet bulb temperature. 1×3
8. List any six types of psychrometric processes. $\frac{1}{2}\times 6$
9. List any three advantages of forced draft cooling tower over natural draft cooling tower. 3
10. Classify ducts according to the manner of arrangement of ducts. 3

PART—B

8×5=40

- Instructions :** (1) Answer **all** questions.
(2) Each question carries **eight** marks.
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

- 11. (a)** The capacity of a refrigerator is 200TR when working between $-6\text{ }^{\circ}\text{C}$ and $30\text{ }^{\circ}\text{C}$. Determine the mass of ice produced per day from the water at $30\text{ }^{\circ}\text{C}$. And also find the power required to drive the system. Assume that the cycle operates on reversed Carnot cycle and latent heat of ice is 335 kJ/kg . Assume sp. heat of water as 4.2 kJ/kg K and sp. heat of ice as 2.1 kJ/kg K . 8

(OR)

- (b)** Explain steam jet refrigeration with a neat sketch. 4+4

- 12. (a)** An ammonia refrigerator produces 30 tonnes of ice from and at $0\text{ }^{\circ}\text{C}$ in a day. The cycle works between temperature limits of $25\text{ }^{\circ}\text{C}$ and $-15\text{ }^{\circ}\text{C}$. The vapour is dry saturated at the end of compression. Find *(i)* COP and *(ii)* power required to drive the compressor. The properties of refrigerant are given below. Take latent heat of ice as 335 kJ/kg K . 8

Sat Temp $^{\circ}\text{C}$	Enthalpy kJ/kg		Entropy kJ/kg	
	Liquid	Vapour	Liquid	Vapour
-15	-54.7	1310	-0.2142	5.0778
25	100.4	1324	0.3486	4.5024

(OR)

- (b)** Explain the working of electrolux refrigerator with a neat sketch. 4+4

- 13. (a)** Explain the working of water cooler with a neat sketch. 4+4

(OR)

- (b)** Explain the working of thermostatic expansion valve with neat sketch. 8

14. (a) On a particular day, the atmospheric air was found to have dry bulb temperature of 30 °C and wet bulb temperature of 20 °C. The barometric pressure is 740 mm of mercury. Using steam tables, determine (i) dew point temperature, (ii) relative humidity, (iii) degree of saturation and (iv) enthalpy of air per kg of dry air. 4×2=8

(OR)

- (b) Explain the following psychrometric processes with the help of psychrometric chart (i) cooling and humidification and (ii) sensible heating. 4+4

15. (a) Explain the working of winter air conditioning system with the help of neat sketch. 4+4

(OR)

- (b) Explain the working of window air-conditioner with a neat sketch. 4+4

PART—C

10×1=10

- Instructions :** (1) Answer the following question.
(2) The question carries **ten** marks.
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. What is the basic difference between a vapour absorption refrigeration system and a vapour compression system? Explain how, the function of the compressor in vapour compression system is achieved in a vapour absorption system, and by which components? Draw a neat sketch of a practical vapour absorption system and describe its working in brief. 2+2+6

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