C20-M-505

7659

BOARD DIPLOMA EXAMINATION, (C-20)

DECEMBER—2022

DME - FIFTH SEMESTER EXAMINATION

REFRIGERATION AND AIR CONDITIONING

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

PART—A

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. Define ton of refrigeration. Give its value. 2+1

2. Draw P-V and T-S diagram of Bell-Coleman cycle and indicate the processes. 1½+1½

3. State any three advantages of vapour compression refrigeration system over air refrigeration system. 1×3

4. State the functions of analyser and rectifier in a vapour absorption system. 1½+1½

5. What is the function of condenser? Classify the condensers. 1+2

6. State the advantages and limitations of centrifugal compressor over reciprocating compressor. 1½+1½

7. Define the term human comfort. Give the values of DBT and RH for human comfort. 3

8. Define *(a)* wet bulb temperature and *(b)* dry bulb temperature. 3

9. State the function of filter and classify the filters used in air condition system. 1+2

10. State any three advantages of unitary air conditioning system. 1×3

PART—B

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. Derive an expression for Coefficient of Performance (COP) of reversed Carnot refrigeration cycle. 8

(OR)

Refrigerator using Carnot cycle requires 1·25 kW per ton of refrigeration to maintain a temperature of –30 °C. Find *(a)* COP of Carnot refrigerator and *(b)* temperature at which heat is rejected. 8

12. Explain the effect of subcooling and superheating of refrigerant on COP of vapour compression system with the help of P-H diagram. 8

(OR)

Explain the working principle of simple vapour absorption refrigeration system with a neat sketch. 8

13. Explain the working principle of flooded type evaporator with a neat sketch. 8

(OR)

Describe the working principle of domestic refrigerator with a neat sketch. 8

14. Explain the aspirating psychrometer with a neat sketch. 8

(OR)

Explain the cooling with adiabatic humidification process on psychometric chart. 8

15. Explain the centrifugal dust collector with a neat sketch. 4+4

(OR)

Explain the winter air conditioning system with the help of 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. The ammonia refrigeration plant works between the temperature limits –15 °C and 30 °C. The working fluid ammonia is assumed to be dry, saturated at the end of compression. Calculate *(a)* refrigerating effect and *(b)* COP.

Properties of ammonia are as follows :

Temperature °C	Enthalpy kJ/kg		Entropy kJ/kg k	
	h_f	h_g	S_f	S_g
–15	112·17	1424·919	0·4564	5·5423
30	322·57	1468·09	1·2017	4·9809

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