

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/
COMMERCIAL PRACTICE - NOVEMBER-2021**

REFRIGERATION & AIR CONDITIONING

[Maximum marks: 75]

(Time: 2.15 Hours)

[Use of Psychrometric charts is permitted]

PART – A

Marks

I. Answer any *three* questions in one or two sentences. Each question carries 2 marks

1. Define the C.O.P of refrigerator.
2. List the processes of reversed Carnot cycle in proper order.
3. Name any two refrigerant – absorbent pair used in vapour absorption refrigeration system.
4. Define the term “Specific humidity”.
5. What is “Effective Temperature” (3 x 2 = 6)

PART – B

II. Answer any *four* of the following questions. Each question carries 6 marks

1. An ice cream unit must cool 1500 kg of milk received each day from 30°C to 3°C in 3 hours. What must be the capacity of refrigerating machine in “Ton of refrigeration”? Take the specific heat of milk as 3.92 kJ/kg.K.
2. Differentiate between open air refrigeration system and closed air refrigeration system.
3. Distinguish between primary refrigerants and secondary refrigerants with examples.
4. What are the differences between a hermetically sealed & semi-hermetically sealed compressor?
5. Explain the working of sling psychrometer.
6. Describe about two stage cascade refrigeration system.
7. Describe about various factors affecting human comfort. (4 x 6= 24)

PART – C

Answer *any of the three units* from the following. Each full question carries 15 marks

UNIT –I

- III. (a) Explain the working of air refrigeration system based on Bell-Coleman cycle with the help of flow diagram, P-V and T-S diagrams. (8)
- (b) A reversed Carnot refrigerator having capacity of 10TR when working between -10°C and 30°C. Determine (a) COP (b) rate of heat rejection. (7)

OR

- IV. (a) Explain the working of simple vapour compression refrigeration system with flow diagram, p-h diagram and T-s diagram. (8)
- (b) The atmospheric air at 1 bar and 10°C is drawn and is compressed to 5 bar. After the compression the air is cooled up to 15°C at constant temperature before expanding back to a pressure of 1 bar. Determine (i) theoretical COP (ii) Net refrigerating effect it is working on Bell-Coleman refrigeration cycle. Take $C_p = 1.005 \text{ kJ/kg K}$ and $C_v = 0.718 \text{ kJ/kg K}$ (7)

UNIT-II

- V. (a) Explain the working of a domestic refrigerator with the help of a diagram. (8)
- (b) Explain the working of simple vapour absorption refrigerator system with a flow diagram. (7)

OR

- VI. (a) Explain the working of a thermostatic expansion valve with the help of a diagram. (8)
- (b) Explain the working of flooded type evaporator. (7)

UNIT-III

- VII. (a) Atmospheric air at 15°C DBT and 30% Relative humidity passes through a furnace and through a humidifier, in such a way that the final DBT is 32°C and 40% Relative humidity. Determine heat and moisture added to air. (8)
- (b) With neat diagrams, explain the following psychrometric processes
(i) Sensible cooling (ii) Cooling & dehumidification. (7)

OR

- VIII. (a) 200 kg of air at 15°C DBT and 75% relative humidity is heated until it's temperature is 25°C. Find.
(i) Relative humidity of heated air
(ii) Wet bulb temperature of heated air
(iii) Heat added to air (7)
- (b) Describe about various applications of cryogenics (8)

UNIT-IV

- IX. (a) Explain the working of winter air-conditioning system. (8)
- (b) Define cooling load. Explain the components of cooling load. (7)

OR

- X (a) With a neat diagram, explain the working of window type air-conditioning system (7)
- (b) Explain the working of summer air-conditioning system. (8)
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