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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL – 2021

REFRIGERATION AND AIRCONDITIONING

[Maximum Marks: 75] [Time: 2.15 Hours]

[Note:- Use of steam table and psychrometric chart are permitted]

PART-A

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

I. 1. Mention the term COP of a refrigerator.

2. Define Refrigerant.

3. State Specific humidity.

4. Define Air Conditioning.

5. Define the term HVAC. (3 x 2 = 6)

PART-B

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

II 1. Derive COP of a Reversed Carnot Cycle.

2. List the advantage and disadvantage of Air Refrigeration System.

3. List the desirable properties of Refrigerant.

4. Compare Vapour Absorption system with Vapour Compression system.

5. Define (a) Dry Bulb Temperature (b) Dry Air (c) Dew Point Depression.

6. List the Advantage and Application of Cryogenic Refrigeration.

7. Explain the 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) Derive the COP of Bell-Coleman Cycle. (8)

(b) A refrigerating system operates on the reversed Carnot cycle. The higher temperature of the refrigerant in the system is 35^{o}C and the lower temperature is -15^{o}C. The capacity is to be 12 tonnes. Determine (i) COP (ii) Heat rejected from the system (iii) Power required. (7)

OR

IV (a) Explain the principle of working of Vapour Compression System. (8)

(b) A Vapour Compression refrigerator works between the pressure limits of 60 bar and 25 bar. The working fluid is just dry at the end of compression and there is no undercooling of the liquid before expansion. Determine COP of the cycle. (7)

Pressure (bar)	Saturated temperature (K)	Enthalpy (kj/kg)		Entropy (kj/kgK)	
		Liquid	Vapour	Liquid	Vapour
60	295	151.96	293.29	0.554	1.0332
25	261	56.32	322.58	0.226	1.2464

UNIT – II

V (a) Explain the working of Electrolux Refrigerator. (8)

(b) Explain the working of Cold Storage with sketch. (7)

OR

VI (a) Explain Thermostatic Expansion valve. (8)

(b) Explain working of Ice Plants with sketch. (7)

UNIT- III

VII (a) Atmospheric air having rate of volume 250m^3/min. at 25^oC DBT and 20^oC WBT is heated to 35^oC DBT. Estimate (i) Quantity of heat added (ii) Final Relative humidity (iii) WBT (iv) Final DPT. (8)

(b) Explain Two stage Cascade Refrigeration system. (7)

OR

VIII (a) Fresh air at the rate of 100m^3/min. having DBT 40^oC. and WBT 27^oC. is mixed with 600m^3/min. of second stream of air having DBT 23^oC. and RH 50%. Compute (i) DBT (ii) WBT (iii) Relative humidity (iv) Specific humidity. (8)

(b) Explain the Liquefaction of Hydrogen. (7)

UNIT - IV

IX (a) Explain the Summer Air conditioning with figure. (8)

(b) Describe the various heating loads taken into account while determining the capacity of a refrigerating machine. (7)

OR

X (a) Explain Winter Air conditioning with figure. (8)

(b) Explain the concept of Effective temperature. (7)
