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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER - 2024

REFRIGERATION AND AIR CONDITIONING

[**Note: -** 1. Steam tables, psychrometric tables & charts are permitted.
2. Missing data if any can be suitable assumed.]

[Maximum Marks: **100**] [Time: **3** Hours]

PART-A

[Maximum Marks: **10**]

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

1. State the second law of thermodynamics.
2. Define refrigerant.
3. Define relative humidity.
4. List two fields of applications of refrigeration.
5. Define air conditioning. (5 x 2 = 10)

PART-B

[Maximum Marks: **30**]

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

1. List the various types of heat transfer and explain them with examples.
2. List the advantages and disadvantages of air refrigeration system.
3. Explain the working of simple vapour absorption system with the help of a flow diagram.
4. Explain with simple sketch the working of a centrifugal compressor.
5. Define the following:
   (a) Dry bulb temperature (b) Wet bulb temperature (c) Wet bulb depression
6. List the various sources of heat loads in an air conditioning system.
7. Explain the concept of effective temperature. (5 x 6 = 30)

PART-C

[Maximum Marks: **60**]

(Answer ***one*** full question from each Unit. Each full question carries **15** marks)

UNIT – I

III. a. Derive COP of Bell-Coleman Cycle and show the cycle on P- V diagram. (8)

b. An air refrigeration plant working on reversed carnot cycle requires 6.2 kW. It works between temperature limits of 34°C and -10°c. Determine the capacity of the plant in tons of refrigeration. (7)

OR

IV. a. State the functions of accumulator and flash chamber in a vapour compression refrigeration system with a figure. (8)

b. An Ammonia refrigerator produces 30 tonnes of ice from and at 0^0C in 24 hours. The temperature range of compressor is from 25°C to -15°C. The vapour is dry saturated at the end of compression and an expansion valve is used. Assume a coefficient of performance to be 60% of the theoretical value. Calculate the power required to drive the compressor. Latent heat of ice = 335 kJ/kg. Properties of Ammonia are.

Temperature ^{0}C	Enthalpy kJ/kg		Entropy kJ/kg^{0}K	
	Liquid	Vapour	Liquid	Vapour
25	298.9	1465.84	1.1242	5.0391
-15	112.34	1426.54	0.4572	5.549

(7)

UNIT – II

V. a. Compare vapour compression system and vapour absorption system. (8)

b. Explain the working of shell and coil type water cooled condenser with diagram. (7)

OR

VI. a. Distinguish between primary and secondary refrigerant with examples. (8)

b. Illustrate the working of pressure type water cooler with suitable figure. (7)

UNIT- III

VII. a. Humid air at 30°C DBT and 21 °C WBT is cooled to 20°C without removal moisture. Find the RH and DPT in final stage. What is the change in enthalpy? Draw a rough sketch of the points and lines in a psychrometric chart. (8)

b. Explain the concept of sensible heat factor. (7)

OR

VIII. a. Draw and explain the working of Cascade refrigeration. (8)

b. Derive the expression for the efficiency of a heating coil with figure. (7)

UNIT - IV

IX. a. Explain the working of year round air conditioning with line diagram. (8)

b. List the classification of air conditioning systems on the basis of function, season and equipment arrangement. (7)

OR

X. a. Explain the working of window type air conditioning system with suitable figure. (8)

b. List the factors affecting human comfort and explain about air motion. (7)

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