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Reg.No.....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL-2022

REFRIGERATION AND AIR CONDITIONING

[Note:- 1. Steam table, psychrometric charts are permitted.
2. Missing data if any can be assumed suitably.]

[Maximum marks: 100] (Time: 3 Hours)

PART – A
Maximum marks : 10

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

1. Define saturation temperature.
2. State the purpose of refrigeration.
3. List the major components used in refrigeration system.
4. State Dalton's law of partial pressure.
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. Define (i) Sensible heat (ii) Latent heat (iii) Enthalpy
2. Explain air refrigerator working on reversed Carnot cycle with p-v and T-s diagram.
3. List the advantages of vapour absorption refrigeration system over vapour compression refrigeration system.
4. Explain the working of flooded type evaporator.
5. Define (i) Sensible heating (ii) Cooling and Dehumidification (iii) Sensible heat Factor
6. List the applications of cryogenic refrigeration.
7. List the factors affecting human comfort. (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) Explain the working of air refrigerator based on Bell-Coleman cycle with the help of flow diagram, p-v and T-s diagrams. (9)

(b) List the advantages and disadvantages of air refrigeration system. (6)

OR

IV.(a) In an ammonia vapour compression system, the pressure in the evaporator is 2 bar. Ammonia at exit is 0.85 dry and at entry its dryness fraction is 0.19. During compression, the workdone per kg of ammonia 150KJ. Calculate the C.O.P and the volume of vapour entering the compressor per minute, if the rate of ammonia circulation is 4.5kg/min. The latent heat and specific volume at 2 bar are 1325KJ/kg and 0.58m^3/kg respectively. (9)

(b) Differentiate heat engine, refrigerator and heat pump. (6)

UNIT-II

V. (a) Explain the working of simple vapour absorption system with a flow diagram. (9)

(b) Explain the working of air cooled condenser. (6)

OR

VI. (a) Explain with sketch the working of centrifugal compressor. (9)

(b) List the desirable properties of refrigerants. (6)

UNIT-III

VII. (a) A quantity of air having a volume of 300 m^3 at 30^0C dry bulb temperature and 25^0C wet bulb temperature is heated to 40^0C dry bulb temperature. Estimate the amount of heat added, final relative humidity and wet bulb temperature. The air pressure is 1.01325 bar. (9)

(b) Explain the construction and use of a psychrometer. (6)

OR

VIII.(a) Draw a typical psychrometric chart and explain various lines in the chart. (9)

(b) Explain cascade refrigeration system. (6)

UNIT-IV

IX. (a) Illustrate the working of summer air conditioning system with a line diagram. (9)

(b) List the equipments used in air conditioning system. (6)

OR

X. (a) A conference room of 60 seating capacity is to be air conditioned for comfort conditions of 22^0C dry bulb temperature and 55% relative humidity. The outdoor conditions are 32^0C dry bulb temperature and 22^0C wet bulb temperature. The quantity of air supplied is 0.5m^3/min/person. The comfort conditions are achieved first by chemical dehumidification and by cooling coil. Determine (i) Dry bulb temperature of air at exit of dehumidifier. (ii) Capacity of dehumidifier (iii) Capacity and surface temperature of cooling coil, if the by-pass factor is 0.30. (9)

(b) Classify air conditioning system on the basis of major function, season of the year and equipment arrangement. (6)

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