TED (15) – 6023

(REVISION — 2015)

Reg. No.....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

REFRIGERATION AND AIRCONDITIONING

[*Time* : 3 hours

(Maximum marks : 100)

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

PART — A

(Maximum marks : 10)

Marks

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

1. Define zeroth law of thermodynamics.
2. List the process of Reversed carnot cycle in proper order.
3. Define the function of an expansion device in refrigeration system.
4. State the Dalton's law of partial pressure.
5. Describe the term HVAC. (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. An ice plant having C O P of 4, produces 15 tonnes of ice at 0°C per day from water at 25°C. Calculate the power required by the compressor to run the plant. Assume Specific heat of water as 4.187 KJ/Kg K and Latent heat of ice as 335 KJ/Kg.
2. Briefly explain.
   (i) Saturation temperature (ii) Enthalpy (iii) Latent heat
3. Distinguish between Primary refrigerant and Secondary refrigerant with examples.
4. Explain the working of a cold storage with neat layout.
5. Explain the factors on which Bypass factor of a cooling coil depends upon.
6. Sketch the following psychrometric processess on a typical simple psychrometric chart.
   (i) Sensible cooling
   (ii) Heating and humidifying
   (iii) Cooling and De humidifying
7. List the equipments used in an air conditioning system. (5×6 = 30)

Marks

PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) A refrigerator system operating on a Reversed carnot cycle produces 400 Kg/hr of ice at -5°C from water at 30°C. Make calculations for

(i) the power required to drive the system

(ii) the heat rejected from the system

Assume Latent heat of freezing 335 KJ/KG, Sp. Heat of ice 2.1 KJ/KgK and Sp. Heat of water 4.186 KJ/KgK. 9

(b) Illustrate the effect of Sub cooling of refrigerant in Vapour compression refrigeration system with T - s and P - h diagrams. 6

OR

IV (a) In a Bell - coleman refrigeration cycle plant, air is compressed to 5 bar from 1 bar. Its initial temperature is 10°C. After compression the air is cooled upto 20°C in a cooler before expanding back to a pressure of 1 bar. Determine the theoretical C O P of the plant and net refrigerating effect.
Assume Cp = 1.005 KJ/KgK and Cv = 0.718KJ/KgK. 9

(b) List the advantages and disadvatages of vapour compression refrigeration system over air refrigeration system. 6

UNIT — II

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

(b) List the advantages of centrifugal compressor over reciprocating compressor. 6

OR

VI (a) Explain the working of a domestic refrigerator with the help of layout showing all major components. 9

(b) Explain Freeze drying. 6

UNIT — III

VII (a) Explain Two stage Cascade refrigerating system with schematic diagram. 9

(b) On a heating coil, moist air enters at 10°C, 50% RH and leaves at 30°C. Determine the sensible heat transfer, if mass flow rate of air is 100 Kg of dry air per second. 6

OR

VIII (a) Explain the process of liquifaction of Hydrogen with schematic diagram. 9

(b) Draw and explain a typical psychrometric chart. 6

UNIT — IV

IX (a) List the various sources of heat gains in cooling load estimation. 9

(b) List the factors affecting human comfort. 6

OR

X (a) Calculate infiltration heat load per hour when ambient and inside temperatures are 310 K and 290 K respectively for a room of dimensions 20×10×5 meters. Take number of air charge per 24 hours as 2.8 on the basis of long storage. 9

(b) Explain a summer airconditioning system with figure. 6
