

TED (10) – 4029
(Revision-2010)

Reg.No.....
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**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE - APRIL -2021**

REFRIGERATION AND AIRCONDITIONING

(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. Define refrigeration.
2. Name any two inorganic refrigerants.
3. Define psychrometry.
4. State Dalton’s law of partial pressure.
5. What is cryogenic.

(5 x 2=10)

PART – B

(Maximum marks: 30)

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

1. Analyse the reversed Carnot cycle with the help of P-V and T-S diagrams.
2. List any six advantages of Air refrigeration system.
3. Explain with a simple sketch the working of a reciprocating compressor.
4. Describe the working of a domestic refrigerator.
5. Explain cooling and dehumidifying.
6. Describe by-pass factor of heating coil.
7. Explain the construction of window type air conditioner.

(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) A vapour compression refrigerator system uses R-40 and operates between temperature limits of -10°C and 45°C. At entry to the compressor, the refrigerator is dry saturated and after compression it acquires a temperature of 60°C. Find the C.O.P of the refrigerator. The relevant properties of R-40 are as follows. (8)

Saturation temperature in °C	Enthalpy in kJ/kg		Entropy in kJ/kg K	
	Liquid	Vapour	Liquid	Vapour
-10	45.4	460.7	0.183	1.637
45	133.0	483.6	0.485	1.587

b) List any seven applications of refrigeration. (7)

OR

IV. a) Explain the working of air refrigerator based on Bell-Coleman cycle with the help of P-V and T-S diagrams. (8)

b) 500kg of fruits are supplied to a cold storage at 20°C. The cold storage is maintained at -5°C and the fruits get cooled to the storage temperature in 10 hours. The latent heat of freezing is 105 kJ/Kg K. Find the refrigeration capacity of the plant. (7)

UNIT-II

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

b) Explain with a layout, working of ice plants. (7)

OR

VI. a) Explain the working of Electrolux Refrigerator with the help of a flow diagram. (8)

b) List any seven properties of refrigerants. (7)

UNIT-III

VII. a) For a sample of air having 22°C DBT, relative humidity 30% at barometric pressure of 760 mm of Hg, calculate analytically: 1. Vapour pressure 2. Humidity ratio 3. Vapour density 4. Enthalpy. Saturation pressure corresponding to 22°DBT from steam table is 0.02642 bar. From steam table, dew point temperature corresponding to P_v is 3.8°C and latent heat of vaporization of water at this temperature is 2492.6 kJ/kg. Take P_b is 1.01308 and Gas constant of air is 287 J/kg K. (8)

b) Explain psychrometric process of heating and humidifying. (7)

OR

VIII. a) Construct a psychrometric chart and show the property lines. (8)

b) Humid air at 25°C DBT and 15°C WBT is heated to 35°C without addition of moisture. Find the change in RH and DPT. (7)

UNIT-IV

IX. a) Explain the factors affecting human comfort. (8)

b) Explain Cascade refrigeration. (7)

OR

X. The following data relates to a hotel air conditioning system for 30 dining people.

Employees serving the food	- 3
Outside design conditions	- 35°C DBT, 25°C WBT
Inside design conditions	- 26°C DBT, 50% RH
Sensible heat gain due to radiation	- 6700 kJ/hr
Latent heat gain per occupant	- 168 kJ
Sensible heat gain per occupant	- 210 kJ
Latent heat gain per serving person	- 270 kJ
Sensible heat gain per serving person	- 210 kJ
Latent heat gain per meal	- 20 kJ
Sensible heat gain per meal	- 12.5 kJ
Total heat flow from other sources	- 20000 kJ
Equipment latent heat gain	- 2000 kJ
Infiltration load	- 360 m ³ /hr
Find total room load and room sensible heat factor.	(15)
