

TED (15) – 6023
(Revision – 2015)

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**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – NOVEMBER – 2022**

REFRIGERATION AND AIR CONDITIONING

(Note:- Steam table and psychrometric charts are permitted)

(Maximum Marks : 100)

(Time : 3 hours)

PART – A

(Maximum Marks : 10)

Marks

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

1. Define the term “Ton of refrigeration”.
2. What is Coefficient of Performance of a Refrigerating machine.
3. Define primary and secondary refrigerant.
4. What do you mean by Psychrometry.
5. Define the term HVAC.

(5x2=10)

PART –B

(Maximum Marks : 30)

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

1. List the various methods of refrigeration.
2. Derive the expression for the COP of Reversed Carnot air refrigeration cycle.
3. List the desirable properties of an ideal refrigerant.
4. Explain the dairy refrigeration process.
5. Define the following psychrometric process (a) DPT (b) WBT (c) RH
6. Define Cryogenics. List the application of Cryogenics.
7. What are the factors affecting human comfort?

(5x6=30)

PART – C

(Maximum Marks : 60)

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

UNIT – I

- III.** (a) List the advantages and disadvantages of air refrigeration system. (7)
- (b) A refrigerating plant working on Bell – Coleman cycle, air is drawn in from the cold chamber at -5°C and 1.03 bar. The same air is compressed reversibly and adiabatically to 5.25 bar before cooled in the heat exchanger to 15°C . After the exchanger the air is expanded adiabatically and reversibly to cold chamber state. Take $C_p = 1.004 \text{ kJ/kg K}$ and $C_v = 0.717 \text{ kJ/kgK}$ for air. Determine (i) work done on the cycle per kg of air, (ii) the refrigerating effect produced in cold chamber. (iii) COP. (8)

OR

- IV.** (a) Explain the simple vapour compression refrigerating system with schematic diagram. (7)
- (b) A cold storage is to be maintained at -5°C while the surroundings are at 35°C . The heat leakage from the surroundings into the cold storage is estimated to be 29 kW. The actual COP of the refrigeration plant is one – third of an ideal plant working between the same temperatures. Find the power required to drive the plant. (8)

UNIT – II

- V.** (a) State the purpose of strainer, drier and muffler in a refrigeration system. (7)
- (b) Explain the working of a domestic refrigerator with the help of layout showing all major components. (8)

OR

- VI.** (a) Compare vapour compression system and vapour absorption system. (7)
- (b) Explain the working of Thermostatic expansion valve with a neat sketch. (8)

UNIT –III

- VII.** (a) Explain the two stage Cascade refrigeration system with a schematic diagram. (7)
- (b) Air at DBT 5°C and RH of 80% is to be heated and humidified to 24.5°C and 45% RH bypassing the air through heated water spray air washer. Determine (a) Total heating required (b) makeup water required in water spray in air washer. (8)

OR

- VIII.** (a) The air enters a duct at 10°C and 80% RH at the rate of 150m³/min and is heated to 30°C without adding or removing any moisture. The pressure remains constant at 1 atmosphere. Determine the relative humidity of air at exit from the duct and the rate of heat transfer. (7)
- (b) Explain the process of liquefaction of Hydrogen with schematic diagram. (8)

UNIT – IV

- IX.** (a) Explain effective temperature. (7)
- (b) Explain with a neat sketch of a year round air conditioning system. (8)

OR

- X.** (a) List the various sources of heat gains in cooling load estimation. (7)
- (b) Explain the working of window type air conditioner with neat sketch. (8)
