

CT Inst. of

Roll No.

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech (ME) (Sem.-6th)**REFRIGERATION AND AIR-CONDITIONING**

Subject Code : ME-304

Paper ID : [A0820]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**1. Answer briefly :**

- What is difference between boiling and evaporation?
- Draw vapour compression refrigeration cycle on T-S diagram for which super heat horn is zero.
- Can there happen any rise in temperature during throttling process, how?
- What are advantages of SO_2 as refrigerant?
- What is difference between flash intercooler and water intercooler?
- What is the working principle of thermoelectric refrigeration?
- What is significance of wet bulb depression?
- What is alignment circle?
- In sensible cooling of air what is the minimum temperature to which it can be cooled and why?
- List any three applications of cryogenic system.

SECTION-B

- An air refrigerator working on the principle of ... air enter into the compressor is at 1 atm at -10°C and cooled to 40°C at the same pressure ... 1 atm and discharged to take cooling load. The ... The isentropic efficiency of the compressor = 80% ... The isentropic efficiency of the expander = 90%

Find the following :

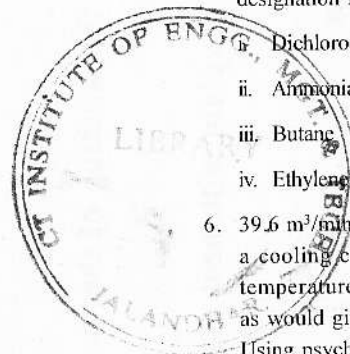
- Refrigeration capacity of the system
- C.O.P. of the system

Take $\gamma = 1.4$, $C_p = 1.00 \text{ kJ/kg}^\circ\text{C}$

- Derive an expression for volumetric efficiency for compressor. Using P-V diagram establish the possible suction pressure for a fixed discharge pressure factor and hence derive an expression for the ... pressure.
- Explain the need and working of three stage Cascade
- Describe the prescribed method of refrigerant designation for following refrigerants :

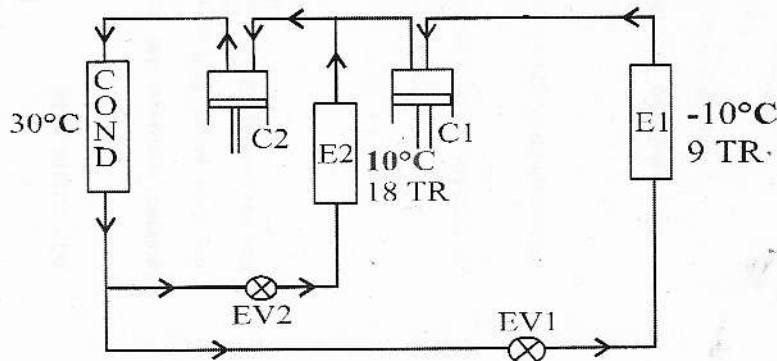
- Dichlorodifluoromethane
- Ammonia
- Butane
- Ethylene

- $39.6 \text{ m}^3/\text{min}$ of a mixture of re-circulated room air and fresh air is cooled by a cooling coil at 31°C DBT and 18.5°C WB. The surface temperature of the coil is 4.4°C . The surface area of the coil as would give 12.5 kW of refrigeration with the air leaving the coil and the coil by-pass factor



SECTION-C

7. A compound refrigeration system (as shown in figure) is used for multi load purposes. Freon-12 is used as a refrigerant. There is no under cooling and suction vapour to compressor C-1 is also dry & saturated. Using p-h chart determine; power required to run the system & COP of the combined system.



8. a) With the help of a neat sketch explain the working of thermostatic expansion valve.
- b) What is By-pass factor of cooling coil? Explain with neat diagram. Also give its significance.
9. Explain the following psychrometric processes :
- a) Cooling and Dehumidification
- b) Heating and Humidification.