

Total No. of Questions : 6]

SEAT No. :

**P509**

[Total No. of Pages : 3

**APR - 18/TE/Insem. - 108**

**T.E. (Mechanical)**

**REFRIGERATION & AIR CONDITION**

**(2015 Pattern) (Semester - II)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

- Q1)** a) Explain with neat sketch the working of domestic air conditioner. [4]  
b) Derive the ASHRAE designation for the refrigerants R22, R134a and Ammonia. [6]

OR

- Q2)** a) Explain with neat sketch the working of an ice plant. [6]  
b) Explain the recovery, recycling and reclaiming of refrigerant. [4]

- Q3)** a) Explain with diagram three fluid vapour absorption refrigeration system. [4]  
b) Simple saturated vapour compression cycle using ammonia has capacity of 25 TR. Evaporator and condenser temperatures are - 5°C and 40°C respectively. Calculate [6]  
i) mass flow rate of refrigerant.  
ii) COP.

Take  $C_{pv} = 2.1897 \text{ kJ/kgK}$ .

Sat. Temp	$h_f$	$h_g$	$s_f$	$s_g$
°C	kJ/kg	kJ/kg	kJ/kg.K	kJ/kg.K
-5	176.9	1456.1	0.9154	5.6856
40	390.6	1490.4	1.6437	5.1558

OR

**P.T.O.**

**Q4) a)** Explain effect of superheating and sub cooling on the performance of VCC. [4]

b) A vapour absorption cycle has generator temperature  $120^{\circ}\text{C}$ , evaporator temperature is  $-10^{\circ}\text{C}$  and ambient temperature is  $30^{\circ}\text{C}$ . Calculate COP. If the plant capacity is 100 TR, Calculate the fuel consumption of the plant. Take calorific value of fuel as 40 MJ/kg. [6]

**Q5)** A multi evaporator refrigeration system with individual compressors and an individual expansion valves using R-22 as the refrigerant as shown in Fig. 1 Neglecting undercooling of liquid and superheating of vapour refrigerant. Find [10]

i) Power required to run the system.

ii) COP.

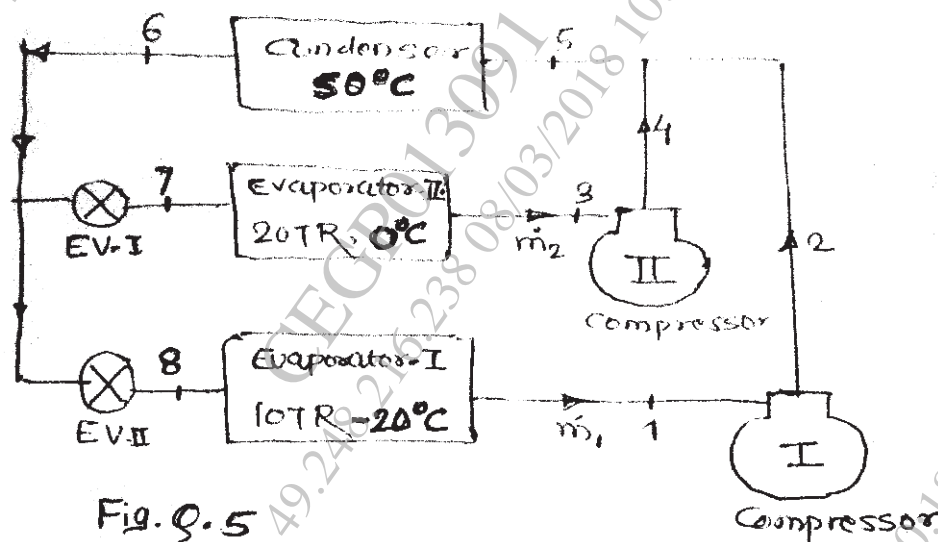


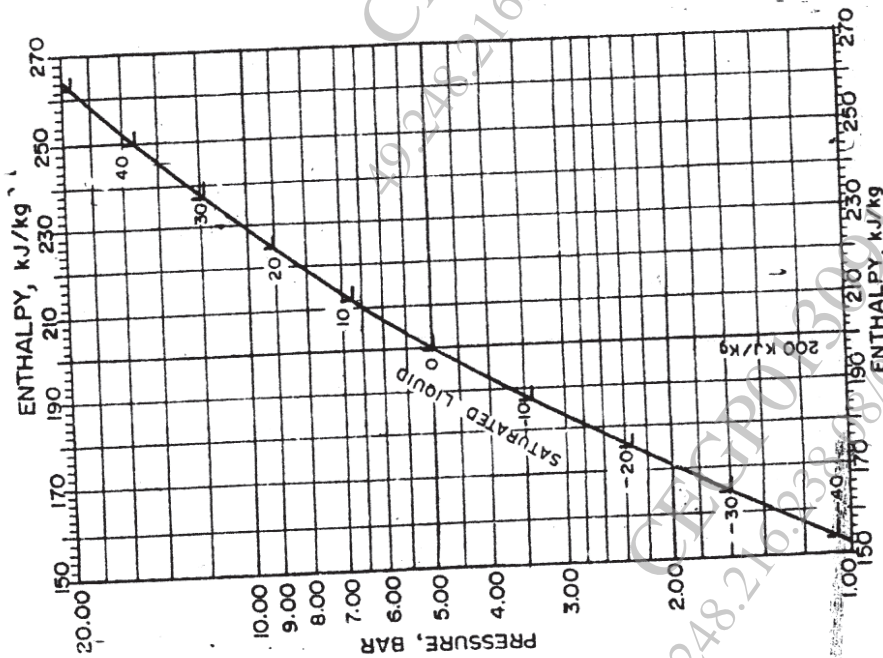
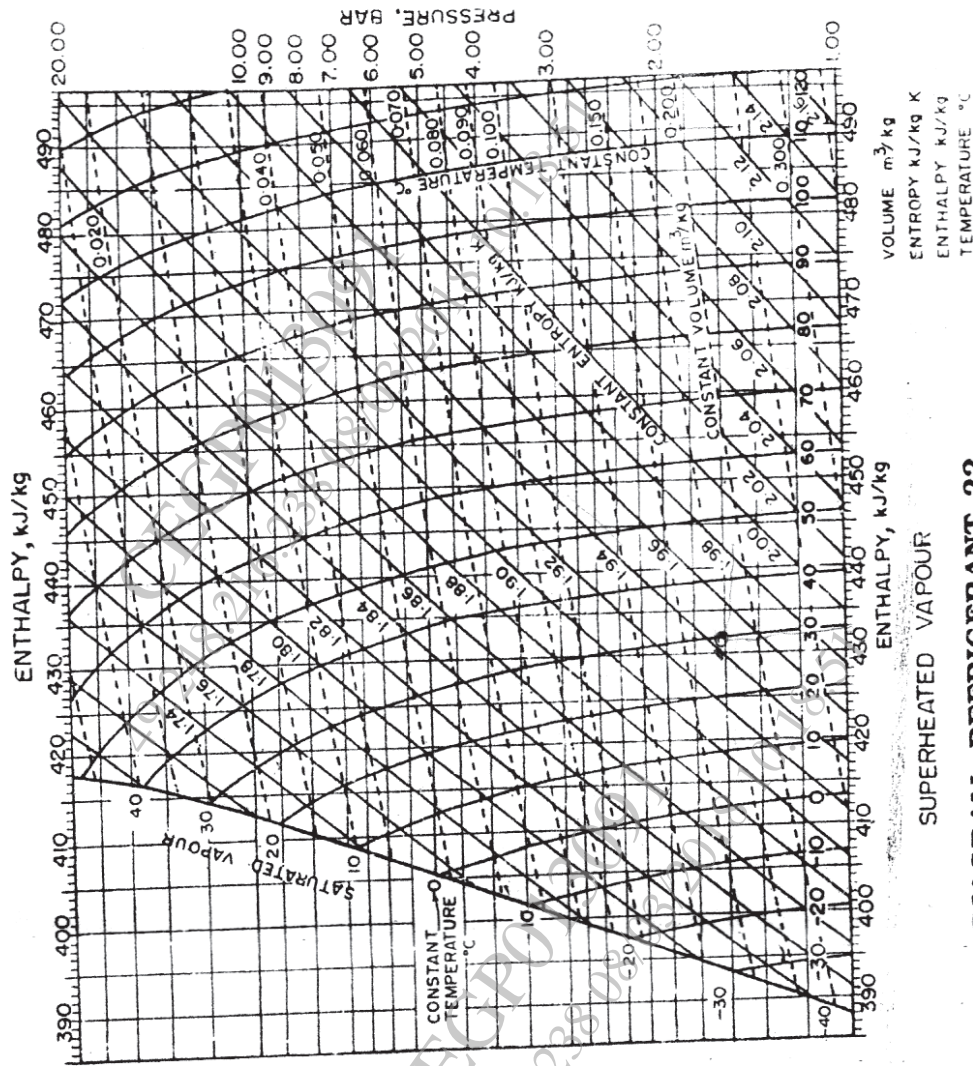
Fig. Q.5

Fig.1 for Q.5

OR

**Q6) a)** Explain Cascade refrigeration system with schematic and p-h diagram. [6]

b) Explain with p-h diagram a Linde-Hampson cycle. [4]



**REFRIGERANT 22**  
**ENTHALPY DIAGRAM. PRESSURE - ENTHALPY DIAGRAM.**

SUPERHEATED VAPOUR

VOLUME m<sup>3</sup>/kg  
 ENTROPY kJ/kg K  
 ENTHALPY kJ/kg  
 TEMPERATURE °C