

Refrigeration and Air Conditioning
(ME-304, DEC 2006)

Time: 3 Hrs
Max Marks: 60

Note: Section A is compulsory. Attempt any four questions from Section B and any two from Section C.

Section-A

1. a) Write any five applications of Refrigeration.
b) Difference between Heat engine and Heat pump.
c) Compare open cycle and closed cycle Refrigeration system.
d) What is the effect of sub cooling and superheating on Refrigeration work?
e) Draw the sketch of Electrolux Refrigeration system.
f) Write applications of steam jet Refrigeration and mention its limitations.
g) Define RSHF and Bypass factor.
h) Differentiate between split A.C system and window A.C system.
i) Differentiate between Ventilation load and Infiltration load.
j) Write the advantages of cooling towers used in Refrigeration Industry.

Section-B

2. A Bell-Coleman cycle works between 1 bar and 6 bar pressure limits. The compression and expansion indices are 1.25 and 1.3 respectively. Obtain COP and tonnage of the unit for an air flow rate of 0.5 kg/sec. Neglect clearance volume and take temperatures at the beginning of compression and expansion to be 7°C and 37°C respectively.
3. A 5 ton Freon-12 Refrigeration plant has saturated suction temperature of -5°C. The condensation takes place at 30°C and there is no under cooling of Refrigeration liquid. Assuming isentropic compression find (i) COP (ii) Mass flow rate of refrigerant (iii) Power required to derive the compression in kw takes the following properties of Freon-12 & $C_{pV} = 0.615$ kJ/kgk.

P (bar)	T (°C)	h_f (kJ / kg)	h_g (kJ / kg)	s_g (kJ / kgk)
8	30	130	265	1.55
3	-5	---	250	1.57

4. Draw the neat sketch of Linde and Claude cycles and compare both cycles in their construction.
5. Explain with a neat sketch the working of thermostatic expansion valve.
6. What are the various leak detection systems used in refrigeration industry and explain any one.

Section-C

7. a) Compare VAR system with VCR system.
b) Explain with a neat sketch of the working of $NH_3 - H_2O$ VAR system. Write its applications.
8. Write the detailed procedure for estimating the cooling load of a computer centre with 100 capacity.
9. a) Explain the importance of comfort chart.
b) Distinguish between water intercooling and Flash intercooling of a compound compression system.