

Total No. of Questions : 6]

P1437

SEAT No. :

[Total No. of Pages : 3

TE/Insem/APR-108
T.E. (Mechanical)
REFRIGERATION & AIR CONDITIONING
(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) Figures to the right side indicate full marks.

Q1) a) Explain with schematic refrigeration system for water cooler. [6]

b) Explain with example use of secondary refrigerants. [4]

OR

Q2) a) Explain with neat sketch working of evaporative cooler. [6]

b) Mention four names of inorganic refrigerants with refrigerant number. [4]

Q3) a) Explain the desirable properties of absorbent. [4]

- b) A vapour compression refrigerator of capacity 5 TR, uses methyl chloride (R40) operates between temperature limits of -10°C and 45°C . At entry to the compressor, the refrigerant is dry saturated and after compression it acquires a temperature of 60°C . There is no undercooling. Find i) COP of the refrigerator, ii) Power required to run the compressor. The relevant properties of methyl chloride are as follows: [6]

Take $C_{p_v} = 1.09 \text{ kJ/kgK}$

Sat. Temp $^{\circ}\text{C}$	h_f kJ/kg	h_g kJ/kg	s_r kJ/kg.K	s_g kJ/kg.K
-10	45.4	460.7	0.183	1.637
45	133.0	483.6	0485	1.587

P.T.O.

OR

Q4) a) Explain the effect of decreasing evaporator pressure on performance of VCC. [4]

- b) A vapour absorption system, heating in generator, cooling in condenser and refrigeration in evaporator takes place at 150°C , 30°C and -20°C respectively. Find theoretical COP. If generator temperature is increased to 190°C and evaporator temperature is decreased to -30°C . Condenser temperature is not changed. Find percent change in theoretical COP. [6]

Q5) A multi evaporator refrigeration system with individual compressors and an individual expansion valves use R-134a as a refrigerant. The refrigeration capacity is 5 TR of the high temperature evaporator operating at -10°C , while it is 10TR for the low temperature evaporator operating at -20°C . The condenser temperature is 40°C . Assume saturated conditions at the exit of both evaporators and there is no sub-cooling. Draw schematic of system. Draw P-h diagram of the system. Determine i) Mass flow rate of each evaporator ii) Total power iii) COP of system. [Use P-h Chart R-134a] [10]

OR

Q6) a) Explain with schematic and P-h diagram cascade refrigeration system. [6]

- b) What is cryogenics? Give any two applications of cryogenics. [4]

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