Total No. of Questions :6]

SEAT No. :

P203

[Total No. of Pages :2

Oct./ BE/ Insem. - 519

B.E. (Mechanical)

HEATING VENTILATION AND AIR - CONDITIONING

(2015 Course) (Semester - I) (402044C) (Elective - I)

Time : 1 Hour] *[Max. Marks :30*

Instructions to the candidates:

1) ***Answer three questions out of 6.***
2) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6.***
3) ***Draw diagrams wherever necessary.***
4) ***Use of scientific calculator is allowed.***
5) ***Assume suitable data where ever necessary.***

Q1) a) Explain ejector-expansion transcritical refrigeration cycle. **[5]**

b) Discuss ejector-refrigeration system with additional jet pump. **[5]**

OR

Q2) In HFC-134a ejector refrigeration system, the motive vapour is saturated at 100^0C & vapour generated in evaporator at 6^0C. The mass ratio of motive vapour to refrigerant vapour is 3.5. Find the quality of mixture before & after diffuser. The condensation of vapour in condenser is taken place at 30^0C . Also find cooling capacity & COP of system, when heat supplied in generator is 2 kW.

Take nozzle efficiency= 0.85, diffuser efficiency= 0.8, entrainment efficiency = 0.65. **[10]**

T_{sat} (^{o}C)	h_f (kJ/kg)	h_g (kJ/kg)	s_f (kJ/kg.K)	s_g (kJ/kg.K)
6	208.08	402.14	1.0291	1.7242
30	241.65	414.94	1.1432	1.7149
100	374.00	407.08	1.5207	1.6093

P.T.O.

Q3) Design a condenser for 100 kW refrigeration system, using R-717. The condenser temperature is 313 K. Enthalpy at the beginning and end of compression are 1320 kJ/kg & 1530 kJ/kg respectively. The refrigerant flow rate is 0.1 kg/s. The economic water velocity is 1.5 m/s & is related with the overall HTC on outer dia. $1/U = 0.13 + 0.5 /V^{0.8}$. **[10]**

Pipe dimensions are: d_i = 15 mm & d_o = 20 mm, pipe length not to exceed 3000 mm. The water temperature rise is 5 K with inlet temperature 303 K. Obtain the number of tubes & passes.

OR

Q4) a) Explain working of coil shed cooling tower with neat sketch. **[6]**

b) Write a short note on:- Hunting of Thermostatic Expansion Valve. **[4]**

Q5) a) Discuss the various methods of capacity controls of reciprocating compressor. **[6]**

b) What are the factors affecting size of copper tubing. **[4]**

OR

Q6) Explain the followings: **[10]**

a) Thermal overload protection for hermetic motors.

b) Motor over current protection.