

R09

Code No: 56018

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, October/November - 2016

REFRIGERATION AND AIR CONDITIONING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any five questions
All questions carry equal marks**

1. A Carnot refrigerator and a heat pump are supplied with equal amount of work. The refrigerator operates between -27°C and $+27^{\circ}\text{C}$ and the heat pump operates between $+45^{\circ}\text{C}$ and $+27^{\circ}\text{C}$. The refrigerator absorbs 4000 kJ/min at -27°C . The heat pump absorbs all the heat rejected by the refrigerator and supplies at 45°C . Compute (a) COP of refrigerator (b) COP of heat pump (c) Heat available at $+45^{\circ}\text{C}$ and (d) Work input to each unit. [15]
2. A simple saturation ammonia compression system has a high pressure of 1.35 MN/m^2 and low pressure of 0.19 MN/m^2 . Find per $400,000\text{ kJ/h}$ of refrigerating capacity the power consumption of the compressor and COP of the cycle. [15]
3. Name the two types of rotary compressors. Explain the working of anyone type of rotary compressor. [15]
4. Explain the working of thermostatic expansion valve with the help of a neat sketch. [15]
5. Determine the HCOP of a vapour absorption refrigeration system when the temperature of generator is 120°C , the temperature of the condenser is 30°C and the temperature of the evaporator is -20°C . What would be its COP if it were a Carnot? [15]
6. When do the DBT, WBT and DPT become equal? Why does the enthalpy of an air-vapour mixture remain constant during an adiabatic saturation process? [15]
7. $800\text{ m}^3/\text{min}$ of re-circulated air at 22°C (DBT) and 10° dew point temperature is to mixed with $300\text{ m}^3/\text{min}$ of fresh air at 30°C (DBT) and 50% RH. Determine the enthalpy, specific volume, humidity ratio and dew point temp of the resultant mixture. [15]
- 8.a) Differentiate between central and unitary air conditioning systems.
b) Write notes on Grills and Registers. [8+7]

---ooOoo---