

Code: ME6T4

III B.Tech - II Semester – Regular Examinations – May 2017

**REFRIGERATION & AIR CONDITIONING
(MECHANICAL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

- a) Distinguish refrigeration and air-conditioning.
- b) Write the equation for the power required per ton of refrigeration in terms of COP.
- c) List out the various methods of Refrigeration.
- d) What do you understand by the term cooling load?
- e) Draw the P-V and T-S diagram for Carnot refrigeration cycle, Vapour as refrigerant.
- f) Write the expression for COP of Bell-Coleman Cycle.
- g) Define the principle of steam Jet Refrigeration system.
- h) Draw a neat sketch of evaporative cooling system.
- i) Write the Difference between open air and closed air system of refrigeration.
- j) State the factors that determine Human comfort.
- k) Draw a neat Labeled diagram of a year round air conditioning system.

PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Explain the working of Carnot Air refrigeration cycle with neat sketch. 6 M
- b) An air refrigeration system is to be designed according to the following specifications
- Pressure of air at compressor inlet = 101 kPa
 - Pressure of work at compressor outlet = 404 kPa
 - Pressure loss in the inter cooler = 12 kPa
 - Pressure loss in the cold chamber = 3 kPa
 - Temperature of air at compressor inlet = 7°C
 - Temperature of air at turbine inlet = 27°C
 - Isentropic efficiency of compressor = 85%
 - Isentropic efficiency of turbine = 85%
- Determine i) C.O.P of cycle
ii) Power required to produce 1 ton of refrigeration. 10 M
3. a) Explain the working Principle of vapour compression refrigeration system with neat sketch. 6 M

b) A saturated vapour compression refrigeration cycle operates on simple saturation cycle at the following conditions: Refrigeration capacity 15TR

Condensing temperature 40°C

Evaporating temperature 5°C

Calculate:

i) Refrigeration circulation rate in kg/s

ii) Power required by the compressor in kW.

iii) Coefficient of performance

iv) Volume flow rate of the compressor at the suction.

10 M

4. a) Describe with a neat sketch about principles of operation of Electrolux refrigerator. 6 M

b) For NH_3 absorption cycle, we have:

Condenser pressure=14 bar

Evaporator pressure= 1.4 bar

Absorber temperature= 36°C

Generator temperature= 110°C

i) Find out if such a cycle is possible or not

ii) Check the evaporator pressure to 2.8 bar, check the possibility of cycle and find the COP of system if

temperature leaving evaporator is 5°C .

10 M

5. An air washer cools and dehumidifies 18,200 kg of dry air per hour from 41°C DBT and 24°C WBT. Chilled water enters the washer at 7°C with a flow of 18,500 kg per hour. The washer is 88 percent effective. What is the heat removed from air in kW. 16 M
6. a) Discuss about internal heat gains and system heat gains. 8 M
- b) Discuss about cooling coils. 8 M