Code: ME6T4

III B.Tech - II Semester – Regular Examinations – April 2016

REFRIGERATION & AIR CONDITIONING
(MECHANICAL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

Answer any FIVE questions.   All questions carry equal marks

1.

a) Define the following terms

    i) Refrigerator   2 M

    ii) Heat Pump   2 M

b) A refrigerator working on Bell – Coleman cycle operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10^0 C. Air coming out of compressor is cooled to 30^0 C before entering the expansion cylinder. Expansion and compression follow the law $pv^{1.35}$ = constant. Determine C.O.P of the system.   10 M

2.

a) List out the advantages of vapor refrigeration system over air refrigeration system.   6 M

b) Explain the construction of T-S and p-h diagrams of vapor refrigeration system and state why p-h diagram is more suitable for calculations over T-S diagram.   8 M

3.

a) What are the different types of compressors? Mention the fields for the use of each in refrigeration systems.　　6 M

b) What are the advantages of water cooled condensers over air cooled condensers?　　4 M

c) What are the essential properties of a good refrigerant?

4 M

4. In an absorption type refrigerator, the heat is supplied to NH_3 generator by condensing steam at 2 bar and 90% dry. The temperature to be maintained in the refrigerator is $-5^0 C$. The temperature of the atmosphere is $30^0 C$. Find the maximum C.O.P possible of the refrigerator. If the refrigerator load is 20 tons and actual C.O.P is 70% of maximum C.O.P, find the mass of steam required per hour.

14 M

5.

a) Under what circumstances, the steam jet refrigeration system is more preferable over the other systems?　　4 M

b) Explain the working principle of vortex tube and also explain that the energy exchange phenomenon in a vortex tube is not a violation of second law of thermodynamics.

10 M

6.

a) Explain the following:

   i) wet bulb temperature and dew point temperature

                                                                    2½ M

   ii) degree of saturation and relative humidity   2½ M

b) Define and write the expressions for the following:

   i) Room Sensible Heat Factor   3 M

   ii) Gross Sensible heat Factor   3 M

   iii)   Infiltration Load   3 M

7.

a) Define the "human comfort" and explain the factors which affect human comfort.   7 M

b) Explain how does the body attempt to compensate for a warm environment approaching body temperature?   7 M

8.

a) Discuss relative merits of central system with district system.   5 M

b) Explain the use of "heat pump" for heating and cooling cycle with neat diagram.   9 M