Code: ME6T4

III B.Tech - II Semester – Regular/Supplementary Examinations March 2018

REFRIGERATION AND 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) Define the term "Ton of refrigeration"

   b) A machine working in a carnot cycle operates between 305 K and 260 K. Determine the cop when it is operated as
   i) Refrigerating machine,   ii)A heat pump

   c) Sketch the Bell coleman cycle on P-V and T-S Diagrams.

   d) Mention the advantages of vapour compression refrigeration system over air refrigeration system.

   e) What are the essential properties of good refrigerant?

   f) Discuss the function of absorber in vapour absorption refrigeration system.

   g) What is the principle of a steam jet refrigeration system?

   h) Define the terms i) Specific humidity and ii) absolute humidity

   i) What do you understand by effective room sensible heat factor?

   j) State the factors that determine human comfort.

   k) Give the classification of fans.

PART – B

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

3 x 16 = 48 M

2. a) 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, compressed and then it is cooled to 30^0 C before entering the expansion cylinder. The expansion and compression follows the law $PV^{1.3}$ = Constant. Determine the theoretical COP of the system. 8 M

b) Explain the working of Reduced ambient Air cooling system used for air crafts with a neat sketch. 8 M

3. a) A vapour compression refrigerator uses methyl chloride (R-40) and operates between temperature limits of -10^0 C and 45^0 C. At entry to the compressor, the refrigerant is dry saturated and after compression, it acquires a temperature of 60^0 C. Find the COP of the refrigerator. The relevant properties of methyl chloride are as follows. 8 M

Saturation temperature in ^0C	Enthalpy in Kj/Kg		Entropy in KJ/Kg K	
	Liquid	Vapour	Liquid	Vapour
-10	45.4	460.7	0.183	1.637
45	133.0	483.6	0.485	1.587

b) Explain the working of Thermostatic expansion valve with a neat sketch.   8 M

4. a) Describe the working of Li Br – water absorption refrigeration system (two shell) with a neat diagram.   8 M

b) Explain principle and operation of Vortex tube.   8 M

5. a) Calculate:
   i) Dew point temperature
   ii) Relative humidity
   iii) Specific humidity
   iv) Degree of saturation
   v) Enthalpy of mixture per kg of air
   when the dry bulb temperature is 30^0 C, wet bulb temperature is 20^0 C and the barometer reads 740 mm of Hg.   8 M

b) Explain the procedure to draw a Grand sensible heat factor(GSHF) line on a psychrometry chart.   8 M

6. a) Explain the difference between winter air conditioning and summer air conditioning.   8 M

b) Describe a centrifugal fan with the help of a neat sketch.
                                                              8 M