Code: 15A03704

R15

B.Tech IV Year I Semester (R15) Regular Examinations November/December 2018

**REFRIGERATION & AIR CONDITIONING**

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) What is the difference between refrigeration and air conditioning?
(b) Draw the line diagram of VCR system.
(c) Explain the terms, refrigerating effect and wet bulb temperature.
(d) Classify air conditioning system.
(e) State desirable properties of ideal refrigerant.
(f) What are the various applications of thermo electric refrigerator?
(g) Carnot refrigerator has highest COP. Prove.
(h) What do you mean by de-humidification?
(i) Explain procedure to construct RSHF line one psychometric chart.
(j) Write functions of grills in air conditioning system.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

2 (a) Draw the schematic of a boot-strap cycle of air refrigeration system and show the cycle on T-s diagram.

(a) The atmospheric air at 30℃ dry bulb temperature and 75% relative humidity enters a cooling coil at the rate of 200 $m^3$/min. The coil dew point temperature is 14℃ and the by-pass factor of the coil is 0.1. Determine: (i) The temperature of air leaving the cooling coil. (ii) The capacity of the cooling coil in tonnes of refrigeration. (iii) The sensible heat factor for the process.

**OR**

3 (a) Explain air refrigeration system working on Bell-Coleman cycle with P-V and T-S diagrams.

(b) A Bell-Coleman refrigerator operates between pressure limits of 1 bar and 8 bar. Air is drawn from the cold chamber at 9℃, Compressed and then it is cooled to 29℃ before entering the expansion cylinder. Expansion and compression follows the law $PV^{1.35}$ = constant. Calculate the theoretical COP of the system. For air take $\gamma$ =1.4, Cp = 1.003 kJ/kg.K.

**UNIT – II**

4 (a) Explain Ozone depleting potential and global warming potential.

(b) State various evaporators in use. Compare flooded and DX (dry expansion) type evaporators.

**OR**

5 (a) Draw the vapour compression refrigeration cycle on T-s diagram when the refrigerant is dry and saturated at the end of compression and find an expression for the C.O.P in terms of: (i) Temperature and entropies. (ii) Enthalpy.

(b) Write short notes on: (i) Ozone layer depletion. (ii) Global warming.

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**UNIT – III**

6 (a) Explain working principle and components of thermo electric refrigerating system.
(b) Explain the working of Vortex tube refrigerator.

**OR**

7 (a) Explain steam jet refrigeration system with neat system diagram and T-S or P-H diagram.
(b) What are desirable characteristics of absorbent and absorbent refrigerant combination in vapour absorption refrigeration cycle?

**UNIT – IV**

8 (a) State and explain various heat loads to be considered for cooling load calculations of a typical building.
(b) Fan gives a static pressure of 290 Pa with a velocity of 800 m/min at its outlet while delivering a quantity of 120 $m^3$/min of air. The inlet static pressure and velocity are 200 Pa and 500 m/mm respectively. Calculate: (i) Total head developed.
(ii) Power required if fan mechanical efficiency = 75%.

**OR**

9 (a) Sketch the psychrometric hart and represent the different psychrometric properties on the same.
(b) Explain the concept of effective sensible heat factor for room to be air conditioned. How is it useful to find the ADP for fixed room design condition?

**UNIT – V**

10 (a) Describe a centrifugal fan with the help of neat sketch.
(b) Explain the case of heat pump for heating and cooling cycle with neat diagram.

**OR**

11 (a) Explain in detail about heat pump circuits.
(b) Suggest the different constructional features used in heat pump to improve the overall EPR.

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