G 736 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Automobile Engineering / Mechanical Engineering

AU 010 704 – REFRIGERATION AND AIR CONDITIONING (AU, ME)

(2010 Admissions)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Use of approved R and AC tables, charts and Steam tables are permitted.

Part A

Answer **all** *questions. Each question carries* 3 *marks.*

1. How is the effectiveness of a refrigeration system measured?
2. Discuss the advantages of dense air refrigeration system.
3. What are the major advantages of compound compression system with inter cooler?
4. List the desirable properties of a good refrigerant.
5. Describe the three distinct regimes of boiling process.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions. Each question carries* 5 *marks.*

6. Differentiate between Heat engine, Refrigerator and Heat pump.
7. Discuss the advantages of vapour compression refrigeration system over air refrigeration system.
8. What are the factors to be considered during selection of a refrigerant for a system?
9. What do you understand by hermetic sealed compressors? Give its advantages.
10. Discuss the operation of a capillary tube in a refrigeration system.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions. Each question carries* 12 *marks.*

11. Prove that the performance factor of a Bell-Coleman cycle refrigeration system is given by C.O.P = T2 / (T3–T2). Where T2 and T3 are temperature of air at the inlet and discharge of compressor respectively.

Or

Turn over

12. A refrigeration system working on Bell-Coleman cycle receives air from cold chamber at –5° C and compresses it from 1 bar to 4.5 bar. The compressed air is then cooled to a temperature of 37° C before it is expanded in the expander. Calculate the C.O.P of the system when compression and expansion are (i) Isentropic ; and (ii) Follow the law $pv^{1.25}$ = constant.

13. Sketch the T-s and p-h diagrams for the vapor compression cycles when the vapour after compression is (i) Dry saturated ; and (ii) Wet.

Or

14. A vapour compression system using ammonia works between the pressure limits of 1.9 bar and 12 bar. It is fitted with expansion valves and flash chambers such that the vapours are extracted at 3.98 bar and 8 bar. If the load is 1 TR, find the mass of refrigerant flowing through the condenser. Also determine the power required to drive the three compressors and compare the C.O.P of this system with that of a simple saturation cycle working within the same pressure limits.

15. Briefly discuss the physical and chemical properties of the refrigerants.

Or

16. An ice plant working on ammonia as refrigerant works between overall pressure limits of 2.5 bar and 15 bar. It is filled with expansion valve with vapour extraction at 5 bar and 10 bar. The load on the plan is 1 TR. Find the circulation of the refrigerant through the condenser and the power required to drive the three compressors. Use p-h chart.

17. Give a comparison of flooded and non-flooded shell and tube type evaporators based on the capacity, condition of the vapour leaving the evaporator, heat transfer effectiveness, construction and control.

Or

18. Explain the capacity control system for reciprocating and rotary compressors.

19. Draw the diagram of a winter air conditioning system and explain the working of the components in the circuit.

Or

20. The atmospheric air at 25° C dry bulb temperature and 12° C wet bulb temperature is flowing at the rate of 100 m^3 per minute through the duct. The dry saturated steam at 100° C is injected into the air stream at the rate of 72 kg / hr. Calculate the specific humidity and enthalpy of the leaving air. Also determine the dry bulb temperature, wet bulb temperature and relative humidity of the leaving air.

(5 × 12 = 60 marks)