



Reg. No. :

Name :

Seventh Semester B.Tech. Degree Examination, October 2014
(2008 Scheme)

08.704 : REFRIGERATION AND AIR CONDITIONING (M)

Time : 3 Hours

Max. Marks : 100

Instructions : 1) Use of Psychometric chart and refrigeration tables are permitted.

2) Answer **all** questions from Part A. **Each** carries 4 marks. And **one** full question from **each** Module of Part B. **Each** carries 20 marks.

PART – A

1. Explain Bell-Coleman cycle refrigeration system with T-s plot.
2. With a neat sketch explain any one type of air craft refrigeration system.
3. Show with the help of a diagram, differentiate theoretical and actual vapour compression cycle.
4. Discuss briefly the drawbacks of simple vapour absorption cycle.
5. Explain briefly the different types of compressors used in refrigerating equipments.
6. Compare Aqua Ammonia system and Electrolux system.
7. Explain briefly the application of Vortex Tube Refrigeration.
8. State the characteristics of a good lubricant.
9. Explain the process in summer air conditioning.
10. Write briefly about air distribution for an air conditioning system.



PART – B

Module – I

11. An air cooling system for an aircraft cockpit operates on a simple cycle. The cockpit is maintained at 26°C . The ambient conditions are 0.35 bar and -20°C . The pressure ratio of the compressor is 4. The speed of aircraft is 1200 km/hour. The pressure of the air leaving the cooling turbine is 1.1 bar and that in the cockpit is 1.01325 bar. The cockpit cooling load is 50 KW. Determine the following.

- 1) Stagnation pressure and temperature of air entering the compressor.
- 2) Mass flow of the air circulated.
- 3) Net power delivered by the engine to the refrigeration unit.
- 4) COP of the system.

12. A refrigerant 12 vapour compression system operating at a condenser temperature of 35°C and at an evaporator temperature of 0°C develops 15 tones of refrigeration.

Using p-h diagram for R12 determine

- a) The mass flow of refrigerant circulated.
- b) Theoretical piston displacement of the compressor and piston displacement per ton of refrigeration.
- c) The theoretical horse power of the compressor and horse power per ton of refrigeration.
- d) Heat rejected at the condenser.
- e) The Carnot COP and actual COP of the cycle.

Module – II

13. Explain with a neat sketch the working of Lithium Bromide water vapour absorption system.
14. What would be the necessary bore and stroke of single acting four cylinder 350 rpm ammonia compressor working on simple saturation cycle between 35°C condenser and -15°C evaporator temperature and developing 15 tons of refrigeration? For compressor, ratio of stroke to bore = 1 and volumetric efficiency 70%.



Module – III

15. a) Explain the processes in winter air conditioning with a neat diagram.
- b) Air at 15°C DBT and 90% RH is to be brought to 35°C DBT and 22.5°C WBT with the help of winter air conditioner. If the humidified air comes out of the humidifier at 90% RH, draw the various process involved in a psychometric chart and find.
- a) The temperature to which air should be pre heated and
 - b) Efficiency of air washer.
16. a) Briefly describe following components of cooling load in an air conditioning system for building.
- 1) Internal load
 - 2) Solar load
 - 3) Ventilation and infiltration
- b) 0.2 m³ of air at 30°C and 60% RH is cooled to 22 °C DBT maintaining specific humidity constant.

Find :

- 1) Heat removed from the air
- 2) RH of cooled air
- 3) WBT of cooled air.

