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Reg. No. :

Name :

**Seventh Semester B.Tech. Degree Examination, November 2017
(2013 Scheme)**

13.704 : REFRIGERATION AND AIRCONDITIONING (M)

Time : 3 Hours

Max. Marks : 100

Instruction : Use of Refrigeration and Air condition Table and Steam Table permitted.

PART – A

Answer **all** questions. **Each** question carries **2** marks.

1. Define COP and Tonnes of Refrigeration.
2. With the help of T-s and P-h diagrams explain the working of reversed Carnot cycle.
3. Describe the merits and demerits of air refrigeration system.
4. List out the advantages of vapour compression system over air refrigeration system.
5. What are eco-friendly refrigerants ? Explain.
6. Explain the advantages of multistage compression over single stage compression systems.
7. How does an absorption refrigeration system differ from a mechanical refrigeration system ?
8. Differentiate between comfort air conditioning and industrial air conditioning.
9. List and explain different refrigerant leak detection methods.
10. Explain adiabatic saturation process. (10×2=20 Marks)

P.T.O.



PART – B

Answer **any one** question from **each** module, **each** question carries **20** marks.

Module – I

11. a) Explain working of a reduced ambient refrigeration system and derive the expression for COP of the system.
b) With the help of neat sketches explain the working of a vortex tube refrigerator.

OR

12. a) A cold storage plant is required to store 20 tonnes of fish. The fish is supplied at a temperature of 30 °C. The specific heat of fish above freezing point is 2.93 kJ/kg K. The specific heat of fish below freezing point is 1.26 kJ/kg K. The fish is stored in cold storage which is maintained at – 8°C. The freezing point of fish is –4°C. The latent heat of fish is 235 kJ/kg. If the plant requires 75 kW to drive it find :
i) The capacity of the plant
ii) Time taken to achieve cooling.
Assume actual COP is 0.3 of Carnot COP.
b) Explain the history of refrigeration.

Module – II

13. a) Explain working of a vapour compression system with a liquid suction heat exchanger.
b) A vapour compression refrigeration system with R-12 as refrigerant has a capacity of 12 TR operating between – 28°C and 26 °C. The refrigerant is sub cooled by 4 °C and vapour is superheated by 5 °C before leaving the evaporator. The machine has 6 cylinders single acting compressor with stroke equal to 1.25 times the bore. Determine
i) Theoretical Power required
ii) COP
iii) Bore and stroke of the cylinder.

OR

14. a) Explain the desirable thermodynamic properties of a refrigerant.
b) Explain different types of condensers used in refrigeration practice.



Module – III

15. a) With the help of neat sketch explain the working of a steam jet refrigeration system.
b) Compare the working of a vapour compression system and vapour absorption system.

OR

16. a) Explain working of an ice plant.
b) Describe charging of refrigerant.

Module – IV

17. a) Discuss different types of heat loads to be considered to estimate total cooling load of a large restaurant for summer air-conditioning.
b) An Air-conditioning system is to take in outdoor air at 10°C and 30% relative humidity at a steady rate of 45 m³/min and to condition it to 25°C and 65% relative humidity. The outdoor air is first heated to 22°C in the heating section and then humidified by the injection of steam in the humidifying section. Assuming entire process takes place at a pressure of 1 bar. Determine.
i) Rate of heat supply in the heating section and
ii) Mass flow rate of steam required in the humidifying section.

OR

18. a) Explain different duct design methods.
b) Illustrate and explain working of a year round airconditioning system.

