

(Pages : 4)

M – 6695

Reg. No.

Name :



Seventh Semester B.Tech. Degree Examination, December 2021

08.704 : REFRIGERATION AND AIR CONDITIONING (M)

(2008 Scheme)

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. Define the term Refrigeration?
2. What are the advantages of cascading?
3. What is refrigerating effects? Can water be used as a Refrigerant?
4. Define Electrolux refrigerator.
5. Explain C.O.P.
6. Give some examples of mixed refrigerants,
7. What is an hygrometer?

P.T.O.



8. What are the basic elements of an air-conditioning system?
9. Define RSHF.
10. What is apparent dew point temperature?

(10 × 4 = 40 Marks)

PART – B

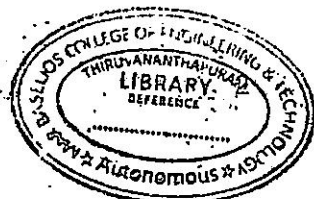
Module – 1

11. An ice plant working on a reversed Carnot cycle heat pump produces 15 tonnes of ice per day. The ice is formed from water at 0°C and the formed ice is maintained at 0°C. The heat is rejected to the atmosphere at 25°C. The heat pump used to run the ice plant is coupled to a Carnot engine which absorbs heat from a source which is maintained at 220°C by burning liquid fuel of 44500 kJ/kg calorific value and rejects the heat to the atmosphere. Determine
 - (i) Power developed by the engine;
 - (ii) Fuel consumed per hour.

Take enthalpy of fusion of ice = 334.5 kJ/kg.

12. A refrigerating plant works between temperature limits of –5°C and 25°C. The working fluid ammonia has a dryness fraction of 0.62 at entry to compressor. If the machine has a relative efficiency of 55%, calculate the amount of ice formed during period of 24 hours. The ice is to be formed at 0°C from water at 15°C and 6.4 kg of ammonia is circulated per minute. Specific heat of water is 4.187 kJ/kg and latent heat of ice is 335 kJ/kg. Properties of NH₃(datum –40°C)

Temperature (°C)	Liquid heat (kJ/Kg)	Latent heat (kJ/kg)	Entropy of Liquid (kJ/kgk)
25	298.9	1167.1	1.124
–5	158.2	1280.8	0.630



M – 6695

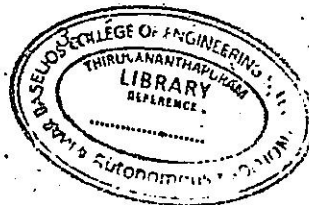


Module – 2

13. (a) Explain the simple vapor absorption system.
(b) What are the properties of Ideal Refrigerant- absorbent combination?
14. (a) Explain the working of steam jet Refrigeration system.
(b) What are the properties and uses of the following refrigerants?
- (i) Ammonia (R-717)
 - (ii) CO₂ (R-744)
 - (iii) Freon-12 (CCl₂F₂)

Module – 3

15. (a) Explain the air-conditioning cycle with a neat sketch.
(b) Air at 12°C DBT and 85% RH is to be brought to 36°C DBT and 23.2°C WBT with the help of winter air-conditioner. If the humidified air comes out of the humidifier at 85% RH, draw the various processes involved on a skelton psychrometric chart and determine:
- (i) Temperature to which air should be heated;
 - (ii) Efficiency of the air washer.
16. The following data relate to an air-conditioned space:
- Outer condition _____ 38°C DBT, 50% RH
- Room condition _____ 24°C DBT, 50% RH
- Sensible heat load _____ 24kW
- Least heat load _____ 6kW
- By-pass factor of the cooling coil _____ 0.16



M – 6695



If the ventilation requirement is such that on mass flow rate basis 20 percent of fresh air is introduced and 80 percent of supply air is recirculated, determine:

- (a) Supply air flow rate;
- (b) Outside air sensible heat;
- (c) Outside air latent heat;
- (d) Grand total heat;
- (e) Effective room sensible heat factor.

(3 × 20 = 60 Marks)

