



Reg. No. :

Name :

**Seventh Semester B.Tech. Degree Examination, May 2012
(2008 Scheme)**

08.704 : REFRIGERATION AND AIR CONDITIONING (M)

Time : 3 Hours

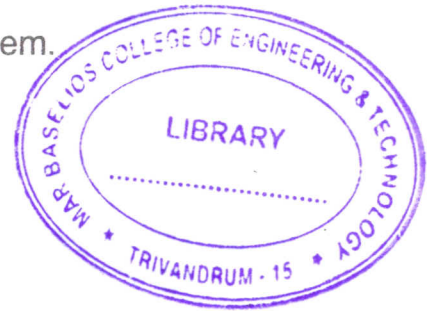
Max. Marks : 100

- Instructions :** 1) Use of Psychrometric Chart and Refrigeration Properties tables are **permitted**.
2) Answer **all** questions from Part **A** and **any one** question from **each** Module of Part **B**.

PART – A

1. Describe ice refrigeration.
2. What is the difference between Heat Pump and Refrigerator ?
3. Discuss the advantages of the dense air refrigerating system over an open air refrigerating system.
4. What is sub-cooling and super heating ? Explain with the help of T-S diagram.
5. What are the desirable properties of an ideal refrigerant ?
6. What is the function of a condenser in a Refrigeration System ?
7. Explain how leaks could be detected in R12 refrigeration system.
8. Define the following :
 - a) Absolute humidity
 - b) Dew point temperature and
 - c) Wet bulb temperature.
9. What is effective temperature ? What are the factors affect effective temperature ?
10. What are the different factors considered in cooling load estimation for comfort application ?

(10×4=40 Marks)



P.T.O.

**PART – B****Module – I**

11. a) Describe with a neat diagram the reduced ambient air cooling system. **10**
- b) A refrigerating 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 COP of the system when compression and expansion are (i) isentropic and (ii) follow the law $PV^{1.25} = \text{constant}$. **10**
12. a) Explain a cascade refrigeration system. **8**
- b) A two stage vapour compression refrigeration system using R12 working between pressure limits of 9.6 bar and 1.8 bar for saturation temperatures 38°C and -10°C . For a mass flow of 0.2 kg per second. Obtain the COP and the capacity. The intermediate pressure is 4.2 bar. **12**

Module – II

13. a) Explain with diagram the working of steam-jet refrigeration system. **10**
- b) What are the different methods used for food preservation ? Explain them. **10**
14. a) Discuss the advantages and disadvantages of centrifugal compressors over reciprocating compressors. **10**
- b) Discuss about charging of refrigerant. How would you ensure correct charge in the system ? **10**

Module – III

15. a) Discuss on Winter air conditioning. **8**
- b) The following data refer to air conditioning of a public hall: Out door conditions ; 40°C DBT, 20°C WBT; required comfort conditions : 20°C DBT, 50% RH; seating capacity of hall is 1000; amount of outdoor air supplied is $0.3\text{ m}^3/\text{min}/\text{person}$. If the required condition is achieved first by a diabatic humidifying and then cooling; Find (1) The capacity of the cooling coil and surface temperature of the coil if the by-pass factor is 0.25 and (2) The capacity of the humidifier and its efficiency. **12**



16. An air conditioning system is to be designed for a restaurant with the following data :

Outside design conditions = 40° C DBT, 28° C WBT

Inside design conditions = 25° C DBT, 50% RH

Solar heat gain through glass, occupants = 25 W

Sensible heat gain per person = 58 W

Latent heat gain per person = 58 W

Internal lighting load – 15 lamps of 100 W, 10 fluorescent tubes of 80 W.

Sensible heat gain from other sources = 11.63 kW

Infiltrated air = 15 m³/min. If 25% fresh air and 75% recirculated air is mixed and passed through the conditioner coil, find (a) the amount of total air required in m³/h (b) the dew point temperature of the coil (c) the condition of supply air to the room; and (d) the capacity of the conditioning plant.

Assume the by-pass factor equal to 0.2. Draw the schematic diagram of the system and show the system on skeleton of psychrometric chart and insert the temperature and enthalpy values at salient points. (4×5=20 Marks)

