



Code No. : 5196/M

**FACULTY OF ENGINEERING**  
**B.E. 3/4 (Mech./Prod.) II Semester (Main) Examination, May/June 2012**  
**REFRIGERATION AND AIR CONDITIONING**

Time: 3 Hours]

[Max. Marks : 75

**Note:** 1) Answer **all** questions of Part A.

2) Answer **five** questions from Part B.

**Note:** 1) **Use** of Psychrometric charts, Refrigeration tables and steam tables is **permitted**.

2) Missing data, if any, may **suitably** be assumed.

**PART – A**

**25 Marks**

1. Classify refrigerants. 2
2. Sketch T-S graph of regenerative cooling system. 3
3. Explain sub-cooling and super heating in vapour compression refrigeration system. 2
4. Draw the T-S and P-H diagram of vapour compression refrigeration system when the refrigerant after compression is dry and saturated and after condensation is saturated liquid. 3
5. List some of the desirable properties of refrigerants. 2
6. Define cryogenics and mention some applications. 2
7. Define :
  - i) Dry bulb temperature.
  - ii) Relative humidity. 2
8. Explain Vasomotor and Sodomotor control of human body defence mechanism. 3
9. Define :
  - i) Sensible Heat Factor
  - ii) Room Sensible Heat Factor.
  - iii) Grand Sensible Heat Factor. 3
10. Explain the types of Filters used in air conditioning systems. 3



11. Explain the working of simple air refrigeration system with the help of layout diagram and derive the expression for C.O.P. 10

12. A refrigerator works between  $-7^{\circ}\text{C}$  and  $27^{\circ}\text{C}$ . The vapour is dry at the end of adiabatic compression. There is no undercooling and the evaporation is by throttle valve.

Determine :

- i) C.O.P.
- ii) Power of the compressor to remove 180 kJ/min

The properties of refrigerant are as under

Temp $^{\circ}\text{C}$	Enthalpy		Entropy	
	Liquid	Latent	Liquid	Vapour
-7	-30	1298	-0.108	4.75
27	115	1173	427	4.33

13. a) Explain the working principle of electrolux refrigerator. 5

b) Discuss desirable properties of refrigerant and absorbents used in vapour absorption system 5

14. An air-water vapour mixture enters an adiabatic saturator at  $28^{\circ}\text{C}$  and leaves at  $18^{\circ}\text{C}$ , which is the adiabatic saturation temperature. The pressure remains constant at 1.0 bar. Determine the relative humidity and humidity ratio of the inlet mixture. 10

15. A hall is to be maintained at  $20^{\circ}\text{C}$  and 60 % RH. When outdoor design condition are  $40^{\circ}\text{C}$  DBT and  $26^{\circ}\text{C}$  WBT. The sensible heat load in the hall is 70,000 kJ/hr and latent heat load is 22,000 kJ/hr. The infiltrated air is  $30\text{ m}^3/\text{min}$ . 60 % of the total air required is recirculated and mixed with the conditioned air after the conditioner.





Find the following :

- i) The condition of air leaving the conditioner and before entering the hall.
- ii) Volume of fresh air passing through air conditioner.
- iii) By pass factor of conditioner coil.
- iv) Refrigeration load on conditioner coil in tons of refrigeration.
- v) Area of cooling coil required if the overall heat transfer coefficient is  $50 \text{ w/m}^2\text{°C}$

Take ADP of cooling coil =  $5^\circ \text{C}$ .

10

16. a) Explain the methods of food preservation. 4
- b) Explain the concept of by pass factor and define by pass factor for cooling and heating coil. 6
17. a) Explain the working principle of steam jet refrigeration system. 6
- b) Explain global warming. 4