KARUNYA UNIVERSITY

MODEL QUESTION PAPER

Subject Title: **REFRIGERATION AND AIR CONDITIONING**   Time : 3 hours

Subject Code: **09ME238**   Max. Marks: 100

(Use of Standard Psychometric Chart and Refrigerant Property Tables are permitted)

Answer ALL questions
PART – A (10 x 1 = 10 MARKS)

1.   What is the type of air cooling system using in air craft?
2.   How is the effectiveness of a refrigeration system measured?
3.   What is sub-cooling and superheating?
4.   What is an azeotrope Refrigerant?
5.   What do you understand by the term Psychometry?
6.   Define room sensible heat factor.
7.   What is effective temperature?
8.   What do you understand by the term cooling load?
9.   Why the ducts are used in an air conditioning system?
10. Explain the term heat rejection factor.

PART – B (5 x 3 = 15 MARKS)

11.   What is the difference between a refrigerator and a heat pump?
12.   What are the factors that affect the heat transfer capacity of an evaporator?
13.   Define the following:
   a. Specific humidity   b.   Relative humidity   c.   Dew point temperature
14.   Write a short note on by-pass factor cooling coils.
15.   Write short note on the factors affecting comfort air-conditioning.

PART – C (5 x 15 = 75 MARKS)

16. An ammonia ice plants operates between a condenser temperature of $35^{\circ}C$ and an evaporator temperature of $-15^{\circ}C$. It produces 10 tons of ice per day from water at $30^{\circ}C$ to ice at $-5^{\circ}C$. Assume simple saturation cycle. Using only tables of properties for Ammonia, determine:
   a. the capacity of the refrigerant plant,
   b. the mass flow rate of refrigerant,
   c. the discharge temperature,
   d.   The compressor cylinder diameter and stroke if its volumetric efficiency is η_v=0.65, rpm N=1200 and stroke/bore ratio L/D=1.2
   e.   the horsepower of the compressor motor if the adiabatic efficiency of the compressor η_a=0.85 and mechanical efficiency η_m=0.95 and
   f.   the theoretical and actual COP.

                                        (OR)
17.   Describe with a sketch a boot-strap cycle of air refrigeration system.

18. Describe with neat sketches the working of
    a. Shell and coil condenser   b.   Shell and tube condenser.

(OR)

19. Explain the following terms: (5 X 3)
    a. Inorganic refrigerants   b.   Hydro carbon refrigerants
    c. Azeotrope refrigerants   d.   Zeotrope refrigerants
    e. Secondary refrigerants

20. Show the following processes on the Psychometric chart: (2 X 7.5)
    a. Cooling and humidification   b.   Heating and Humidification.

(OR)

21. A sample of moist air has a dry bulb temperature of 25°C and a relative humidity of 50%. The barometric pressure is 740 mm of Hg. Calculate: (3 x 5)
    a. Partial pressure of water vapour and dry air
    b. Dew point temperature and specific humidity of air.
    c. Enthalpy of air/air of dry air.

22. State the factors that determine in load estimation for comfort conditioning. Explain in detail.

(OR)

23. Draw a neat diagram of a year round air conditioning system.

24. Explain the working principle of a air washer with neat sketch.

(OR)

25. Describe the different methods of air conditioning duct design.