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 $PART - A (10 \times 1 = 10 MARKS)$

- 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.

$\underline{PART - B \ (5 \times 3 = 15 \text{ MARKS})}$

- 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°C and an evaporator temperature of -15°C. It produces 10 tons of ice per day from water at 30°C to ice at -5°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.

- 20. Show the following processes on the Psychometric chart:
 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.