

2063

B.E. (Mechanical Engineering)

Seventh Semester

MEC-701: Refrigeration and Air Conditioning

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section. All questions carry equal marks.

x-x-x

1. Write short answers
 - a) Write any five applications of Refrigeration.
 - b) Differentiate between Refrigerator and Heat pump.
 - c) Compare open cycle and closed cycle Refrigeration system.
 - d) What is the effect of sub cooling and superheating on Refrigeration work?
 - e) Draw the sketch of Electrolux Refrigeration system.
 - f) What is the chemical formula and Number of Tetrafluoroethane..
 - g) Define RSHF and Bypass factor.
 - h) Differentiate between split A.C system and window A.C system.
 - i) Differentiate between Ventilation load and Infiltration load.
 - j) Write the advantages of cooling towers used in Refrigeration Industry.

Section - A

- 2 A two-stage R 22 plant with flash intercooler for food freezing has two 45 mm bore and 40 mm stroke compressors as follows: LP Compressor (Number of cylinders 6, rpm 1000, volumetric efficiency 75%), HP Compressor (Number of cylinders 4, rpm 800, Volumetric efficiency 69%). Find the refrigerating capacity of the plant when operating at a condenser temperature of 40°C and evaporator temperature of -40°C. Also, find the inter-stage pressure.
- 3 An aircraft is cruising with a speed of 900 km/hr at an altitude of 11000 metre where the ambient conditions are 0.3 bar and -30°C. Assuming the compression ratio 5, cabin pressure 0.8 and air leaving the cabin at 27°C, obtain the power for pressurisation and refrigeration and COP. The flow rate through the system is 1.0 kg/s.
- 4 Explain in detail the working of three fluid system. Compare vapour compression and vapour absorption systems

Section - B

- 5 A retail shop located in a city at 30°N latitude has the following loads. RSH: 58.15 kW, RLH: 14.54 kW. The summer outside and inside design conditions are: Outside-40°C DBT, 27°C WBT, Inside: 25°C DBT, 50% RH.70 cmm of ventilation air is used. Determine the following: Ventilation load, GTH, Effective sensible heat factor, ADP, Dehumidified air quantity, Condition of air entering and leaving apparatus. Assume suitable bypass factor of the cooling coil.
- 6 Explain in brief which refrigerant/s would you choose for each of the following applications and why? (a) A cold storage of 100 TR capacity using reciprocating compressor, (b) A 800 TR air conditioning plant using centrifugal compressor/s, (c) A small capacity frozen food cabinet to maintain -30°C temperature.

(2)

- 7 A building has the following calculated cooling loads: RSH gain = 310 KW, RLH gain=100 kW. The space is maintained at the following conditions: Room DBT=25°C, Room RH=50%. Outside air is at 28°C and 50% RH. And 10% by mass of air supplied to the building is outdoor air. If the air supplied to the space is not to be at a temperature lower than 18°C, find: (a) Minimum amount of air supplied to space in m³/s, (b) Volume flow rate of return (recirculated room) air, exhaust air, and outdoor air, (c) State and volume flow rate of air entering the cooling coil, (d) Capacity, ADP, BPF and SHF of the cooling coil.

x-x-x