

1169

April 2025

Time - Three hours
(Maximum Marks: 100)

- (N.B. 1. Answer all questions under Part-A. Each question carries 3 marks.
2. Answer all the questions either (a) or (b) in Part-B. Each question carries 14 marks.]

PART - A

1. Define COP of heat pump.
2. What is hermetically sealed compressor?
3. Draw the T-s diagram of vapour compression refrigeration cycle.
4. Define sub-cooling in vapour compression refrigeration system.
5. Write any three properties of sulphur dioxide refrigerant.
6. What is meant by quick freezing?
7. Define relative humidity.
8. Define bypass factor.
9. List the uses of wet filters.
10. Define latent heat load.

PART - B

11. (a) (i) A refrigerating system operates on the reversed Carnot cycle. The higher temperature of the refrigerant in the system is 35°C and the lower temperature is -15°C . The capacity is to be 12 tonnes. Determine: (1) COP (2) Heat rejected from the system per hour (3) Power required. (9)
(ii) Write the principle of working of open air system of refrigeration. (5)
(Or)
(b) Explain the working and construction of water cooled condenser with neat sketch.

12. (a) An ammonia vapour compression refrigerator has an effective swept volume of 0.308m^3 per minute. Condensation and evaporation takes place at 20°C respectively. There is no under cooling and the gas temperature after compression is 50°C . Assuming C_p for the superheated vapour as 2.933, determine

- (i) The dryness fraction of the vapour as it enters the compressor
- (ii) The rate of circulation of ammonia in kg per minute
- (iii) The rate of extraction of heat in kJ/min
- (iv) The heat rejected in the condenser per minute.

(Or)

(b) Explain about solar absorption system with neat sketch.

13. (a) Explain the evaporator pressure regulator with neat sketch.

(Or)

(b) Describe the dairy refrigeration with neat sketch.

14. (a) Explain about cooling and adiabatic humidification process with help of psychrometric chart.

(Or)

(b) The air at 75% RH and 30°C DBT enters a cooling coil at the rate of $100\text{ m}^3/\text{min}$. The coil dew point temperature is 14°C and its BPF is 0.1. Find the following:

- (i) Temperature of air leaving the cooling coil
- (ii) Amount of water vapour removed per min
- (iii) Capacity of the cooling coil in TR and kW
- (iv) SHF for the process.

15. (a) Discuss the procedure of installation, servicing and maintenance of R & AC systems.

(Or)

(b) An air conditioned room is maintained at 27°C DBT and 50% RH when ambient conditions are 40°C DBT and 27°C WBT. The room sensible heat gain is 14 kW. The air enters the conditioned hall at 7°C DBT and saturated. Find the following:

- (i) Volume of moist air supplied to the space in m^3/min
- (ii) Latent heat gain in the room in kW
- (iii) Cooling load of the air washer in kW if 30% of the air supplied to the room is fresh air and the remaining 70% is recirculated.
