

B. Tech 7th Semester Examination
Refrigeration & Air Conditioning (NS)

ME-414

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

- Note :** (i) Attempt five questions in all selecting one question from each section A, B, C & D. Section E is compulsory.
(ii) Use of refrigeration table, psychrometric chart & calculator is allowed.

SECTION - A

1. (a) How the refrigerants are classified? What are the essential properties of good refrigerants? (10)
(b) How can leakage of refrigerants be detected? (10)
2. A Bell Coleman refrigeration cycle works between 1 bar and 5 bar. The adiabatic efficiency of compression is 85% and expansion is 90%. Find out COP of system and its tonnage, when the air flow rate is 1kg/sec. the ambient temp is 27°C and refrigerator temp is 0°C. (20)

SECTION - B

3. Derive the equation for the bypass factor (For both heating and as well as cooling coils). Also give the expression for Efficiency of heating and cooling coils. (20)
4. (a) Describe the mechanism of a simple vapour compression refrigeration system with the help of neat schematic, P-H and T-S diagrams. (10)

- (b) Compare the Vapour compression refrigeration system with Vapour Absorption refrigeration systems. (10)

SECTION - C

5. A cascade refrigeration system is designed to supply 10 tonnes of refrigeration at an evaporator temperature of -60°C and a condenser temperature of 25°C . The load at -60°C is absorbed by a unit using R-22 as the refrigerant and is rejected to a cascade condenser at -20°C . The cascade condenser is cooled by a unit using R-12 as the refrigerant and operating between -30°C evaporating temperature and 25°C condenser temperature. The refrigerant leaving the R-12 condenser is subcooled at 20°C , but there is no subcooling of R-22 refrigerant. The gas leaving both the evaporators is dry and saturated and the compressions are isentropic. Neglecting losses. Determine:
 - (i) Compression ratio of each unit.
 - (ii) Quantity refrigerant circulated per minute for each unit.
 - (iii) C.O.P for each unit.
 - (iv) C.O.P of the whole system.
 - (v) Theoretical power required to run the system. (20)
6. Draw a neat labeled diagram of Lithium Bromide water Absorption system. Explain its working and principle. List the major field of applications of this system. (20)

SECTION - D

7. Discuss in detail the role of ducts, dampers and air filters in air conditioning system. Also explain the various losses in the ducts of air conditioning system. (20)

8. What do you understand by hermetic sealed compressor? Give its advantages. Compare the performance of reciprocating and centrifugal compressors with the help of performance curves.
(20)

SECTION - E

9. (a) What are the different methods of Refrigeration?
(b) How air conditioning differ from refrigeration?
(c) Why it is necessary to keep refrigerants free from moisture?
(d) "Reverse Carnot cycle is not practical". Is this statement true or false? Why?
(e) What is superheat horn? Explain briefly.
(f) What is Cooling tower? Give its utility.
(g) Write the important psychometric properties of air. Discuss any two.
(h) What do you mean by EER?
(i) What is the effect of subcooling on refrigeration work?
(j) What is sensible heat factor? (2×10=20)