

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Fifth Semester

Agricultural Engineering

AI3001 - Refrigeration and Cold Storage

(Steam tables, Refrigeration and Air conditioning table and Psychrometry chart can be Permitted)

Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

PART - A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Why are hydrocarbon refrigerants considered eco-friendly alternatives to CFCs? List one benefit of hydrocarbon refrigerants.	AP	1	2
2.	Compare the thermostatic and capillary tube expansion devices.	UN	1	2
3.	Explain why ammonia is often used as a refrigerant in vapor absorption systems.	RE	2	2
4.	How does the condenser function in a vapor compression system?	RE	2	2
5.	Define psychrometry and explain its significance in HVAC applications.	UN	3	2
6.	Explain the term "room sensible heat factor" and its importance in cooling load calculations.	UN	3	2
7.	What is a central air conditioning system, and how does it differ from a unitary system?	UN	4	2
8.	How does a freezer differ from a refrigerator in terms of temperature settings and functionality?	UN	4	2
9.	Discuss the potential health risks associated with inadequate refrigeration of poultry products.	EV	5	2
10.	What temperature range is recommended for the storage of leafy vegetables?	UN	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a How is the refrigeration effect achieved in a refrigeration system, and what role does the compressor play? Why is this effect important in refrigeration applications?	AN	1	13
	Or			
	b Describe how the coefficient of performance (COP) changes with variations in evaporator and condenser temperatures in a refrigeration system. Provide an example to illustrate your answer.	AN	1	13
12.	a Explain the simple vapor compression cycle using a T-S diagram and p-h chart.	UN	2	13
	Or			
	b Describe the construction, working principles, and operation of a practical vapor absorption system.	UN	2	13

13.	a	It is required to design an air-conditioning plant for a small office room for following winter conditions: Outdoor conditions : 14°C DBT and 10°C WBT Required conditions: 20°C DBT and 60% R.H. Amount of air circulation 0.30 m³/min./person. Seating capacity of office 60. The required condition is achieved first by heating i.e., and then by adiabatic humidifying. Determine the following: (i) Heating capacity of the coil in kW and the surface temperature required if the by-pass factor of coil is 0.4. (ii) The capacity of the humidifier. Solve the problem by using psychrometric chart. Or	AP	3	13
	b	The sling psychrometer in a laboratory test recorded the following readings: Dry bulb temperature = 35°C Wet bulb temperature = 25°C. Calculate the following: (i) Specific humidity (ii) Relative humidity (iii) Vapour density in air (iv) Dew point temperature (v) Enthalpy of mixture per kg of dry air Take atmospheric pressure = 1.0132 bar.	AP	3	13
14.	a	How do winter, summer, and year-round air conditioning systems differ in terms of their operational requirements? Or	AP	4	13
	b	Explain the process of ice manufacture in refrigeration systems and its importance in both residential and industrial applications.	AP	4	13
15.	a i	How do sensors enhance cold storage management for food preservation?	AP	5	7
	ii	What are the specific cold storage requirements for milk, and why are they critical for maintaining quality?	UN	5	6
		Or			
	b i	Describe the challenges faced in refrigerated transport and their impact on food safety.	AP	5	7
	ii	Outline the refrigeration needs for storing meat. How do these requirements differ from those for storing fruits?	UN	5	6

*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>		<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a	Investigate the maintenance needs of electrolux refrigerators in contrast to compressor-based refrigerators. How does the lack of moving parts influence reliability?	EV	2	15
		Or			
	b	How does ambient humidity affect the performance of a lithium bromide absorption system, and what design solutions can help reduce its impact?	EV	2	15