Question Paper Code: R18A32ME01

R18

ANURAG Engineering College

(An Autonomous Institution)

III B.Tech II Semester Supplementary Examinations, Dec–2023/Jan-2024

REFRIGERATION AND AIR CONDITIONING

(MECHANICAL ENGINEERING)

Time: 3 Hours **Max.Marks:75**

Section – A (Short Answer type questions) (25 Marks)

Answer All Questions		Course Outcome	B.T Level	Marks
1.	Briefly explain the necessity and importance of refrigeration.	CO1	L2	2M
2.	Define the concept of Unit of Refrigeration and its significance in the field of refrigeration.	CO1	L1	3M
3.	Explain the working principle of a vapor compression refrigeration system.	CO2	L2	2M
4.	Draw the T-S and p-h diagrams of a vapor compression refrigeration cycle and explain the significance of subcooling and superheating in the cycle.	CO2	L2	3M
5.	Explain the working of the NH3-water system in the Vapour Absorption Refrigeration (VAR) system.	CO3	L2	2M
6.	A Li Br-water Vapour Absorption Refrigeration (VAR) system has a maximum COP of 0.8. If the generator temperature is 100°C and the condenser temperature is 40°C, calculate the evaporator temperature.	CO3	L2	3M
7.	Define the term psychrometry and explain the concept of sensible and latent heat loads in air conditioning.	CO4	L1	2M
8.	Explain the working principle of an air cooler or evaporative cooling system.	CO4	L2	3M
9.	Explain the concept of effective temperature and its significance in human comfort.	CO5	L2	2M
10.	A heat pump has a coefficient of performance of 3.5. If the heat pump is used to extract heat from a source at 10°C and deliver it to a space at 25°C, determine the work required to drive the pump.	CO5	L2	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 x 10M = 50M)**

11. A)	Explain the different methods of air refrigeration with their ideal and actual cycles.	CO1	L3	10M
	OR			
B)	Describe the Bell-Coleman cycle in air refrigeration and compare the ideal and actual cycles.	CO1	L3	10M
12. A)	Draw and explain the basic cycle of the Vapour Compression Refrigeration (VCR) system on T-S and p-h charts.	CO2	L3	10M
	OR			
B)	Describe the different types of refrigerants used in refrigeration and air conditioning systems. Explain their desirable properties and the impact of ozone depletion and global warming.	CO2	L3	10M

13. A)	Describe the Li-Br water system in the Vapour Absorption Refrigeration (VAR) system and calculate the maximum COP.	CO3	L3	10M
	OR			
B)	Explain the principle and operation of the Three-Fluid Absorption Refrigeration System.	CO3	L3	10M
14. A)	Define psychrometric properties and processes and characterize sensible and latent heat loads.	CO4	L3	10M
	OR			
B)	A room is to be air-conditioned to maintain a dry-bulb temperature of 25°C and a relative humidity of 50%. The room has a heat gain of 20 kW. The supply air is to be at a dry-bulb temperature of 14°C and a dew point temperature of 8°C. Determine the mass flow rate of the air required to meet the cooling load, assuming that the air is conditioned using a window air conditioning unit.	CO4	L3	10M
15. A)	Define the term 'effective temperature' and explain its importance in air conditioning system. Describe the factors which affect effective temperature?	CO5	L3	10M
	OR			
B)	What are the different Heat pump circuits? Explain any one of them with the help of neat sketch.	CO5	L3	10M