R18

ANURAG Engineering College
(An Autonomous Institution)
III B.Tech II Semester Regular/Supplementary Examinations, June/July-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.	Distinguish between Engine and Refrigerator.	CO1	L1	2M
2.	Discuss the advantages of dense air refrigerating systems over open air refrigerating systems.	CO1	L2	3M
3.	Give the designation for Dichloro-tetrafluro-ethane refrigerant.	CO2	L1	2M
4.	Discuss the effect of sub -cooling on COP. Would you desire large sub-cooling and why?	CO2	L2	3M
5.	Discuss the function of absorber in vapor absorption refrigeration system.	CO3	L1	2M
6.	Under what situation in steam jet refrigeration system recommended? What are its limitations?	CO3	L2	3M
7.	What is the meaning of air conditioning?	CO4	L1	2M
8.	With the help of psychrometric chart, explain sensible heating and sensible cooling process.	CO4	L2	3M
9.	Write the difference between fans and blowers.	CO5	L1	2M
10.	Explain the advantages and disadvantages of viscous filters over dry filters.	CO5	L2	3M

Section B (Essay Questions)
Answer all questions, each question carries equal marks. (5 X 10M = 50M)

11. A)	Derive an expression of COP of Bell-Coleman cycle with p-V and T-s diagrams and write the advantages and disadvantages.	CO1	L3	10M

OR

B)	A refrigerator working on Bell – Coleman cycle operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at $10\,^0C$. Air coming out of compressor is cooled to $30\,^0C$ before entering the expansion cylinder. Expansion and compression follow the law $pV^{1.35}$ = constant. Determine C.O.P. of the system. Take $\gamma = 1.4$ and $C_p = 1$ kJ/kg –k for air.	CO1	L3	10M

12. A)	Write the working principle of simple vapour compression refrigeration system with a neat diagram and Mention various positions of refrigerant on p-H and T-s diagrams.	CO2	L3	10M

OR

B)	A R-12 refrigerating machine works on vapor compression cycle. The temperature of refrigerant in the evaporator is -20^0C. The vapour is dry saturated when it enters the compressor and leaves it in a superheated condition. The condenser temperature is 30^0C. Assuming specific heat at constant pressure for R-12 in the superheated condition as 1.884 kJ/kg K, determine: i) Condition of vapor at the entrance to the condenser ii) Condition of vapor at the entrance to the evaporator and iii) Theoretical COP of the machine.		CO2	L3	10M
13. A)	Draw a neat line diagram of Electrolux refrigerator and explain its working principles. What is the important role of hydrogen in this refrigeration system?		CO3	L3	10M
	OR				
B)	Explain the various components of steam jet refrigeration system and clearly discuss the function of each component; compare the system with vapor compression refrigeration system.		CO3	L3	10M
14. A)	Air at 30^0C DBT and 60% RH is passed through a cooling coil at the rate of 250 m³/min. The air leaves the cooling coil at 14^0C DBT. If the by-pass factor of the cooling coil is 0.1. Find i) Surface temperature of the cooling coil or ADP ii) Relative humidity of the air leaving the cooling coil iii) Capacity of the cooling coil in kW iv) Sensible heat factor		CO4	L3	10M
	OR				
B)	Differentiate between Central, District and Unitary air-conditioning systems.		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)	Draw the heat pump circuits and heat sources involved and explain air to air working details.		CO5	L3	10M