Course Code: 1970343 Roll No: **MLRS-R19**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

IV B.Tech I Sem Regular End Examination, November 2022

Refrigeration & Air Conditioning

(MECH)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1.	a)	What are unconventional refrigeration systems?	2M	CO1	BL1
	b)	Draw a P-V and T-S diagrams of Bell Coleman cycle.	2M	CO1	BL1
	c)	What are the components of simple vapour compression refrigeration cycle? Write their functions in brief.	2M	CO2	BL1
	d)	Sketch the T-S and P-H diagrams for the vapour compression cycles when the vapour after compression is (i) dry saturated (ii) wet.	2M	CO2	BL1
	e)	Give the chemical formula and names of the refrigerants R-22 and R-114.	2M	CO3	BL1
	f)	What do you mean by a primary refrigerant?	2M	CO3	BL1
	g)	What is the function of analyzer in a vapour absorption system?	2M	CO4	BL1
	h)	What are the components of steam jet refrigeration system? Write the list.	2M	CO4	BL1
	i)	What is the use of deodorants in refrigeration system?	2M	CO5	BL1
	j)	Define DBT, WBT and DPT.	2M	CO5	BL1

PART- B

(10*5 Marks = 50 Marks)

2		In a Bell Coleman refrigerating machine, the air is drawn from the cold chamber at a pressure of 1.03 bar and temperature of -10^{0}C and compressed isentropically to 6.18 bar. The same is cooled to 25^{0}C. It is then expanded in the expansion cylinder following the law $pv^{1.3} = C$ and discharged back to the cold chamber. Assume c_p = 1.004 kJ/kg and c_v = 0.717 kJ/kg K for the air throughout the cycle. Determine, (a) work input to the cycle per kg of air (b) refrigeration produced in the cold chamber (c) COP of the cycle	10M	CO1	BL3

OR

3	a)	Explain the working of simple air evaporative cooling system used for aircrafts?	5M	CO1	BL4
	b)	Compare and contrast between open air and dense air refrigeration system.	5M	CO1	BL2

4		A refrigeration system operates with R12 and produces 1 ton refrigerating effect at the evaporator and condenser temperatures of -5^{0}C and 40^{0}C, respectively. If the liquid is sub cooled from 40^{0}C to 30^{0}C in the condenser, then calculate for the simple compression cycle and sub cooled cycle the following: (i) Refrigerating effect, (ii) Mass flow rate, (iii) Volume of vapour handled by the compressor, (iv) Power requirement, and (v) COP.	5M	CO2	BL3
		OR			
5	a)	Explain the simple vapour compression cycle with the help of T-s and p-h charts.	5M	CO2	BL4
	b)	Derive the expression for COP of vapour compression cycle from T-s chart when the refrigerant is dry saturated before compression.	5M	CO2	BL6
6	a)	Compare Air-cooled condensers with water cooled condensers.	5M	CO3	BL2
	b)	Explain the working of a automatic expansion valve with the help of a neat sketch.	5M	CO3	BL4
		OR			
7	a)	Describe the working of shell and tube type and shell and coil type evaporators.	5M	CO3	BL2
	b)	Name three refrigerants that are suitable for ice plants giving their relative merits and demerits.	5M	CO3	BL1
8	a)	Explain how the pressure and temp of refrigerant is increased in vapour absorption system.	5M	CO4	BL4
	b)	Explain the principle of steam jet refrigeration system.	5M	CO4	BL4
		OR			
9	a)	Draw a neat compact diagram of lithium bromide water absorption refrigeration system and explain its working.	5M	CO4	BL4
	b)	Explain the working principle of a vortex tube with a suitable sketch. What are the advantages of vortex tube over other refrigeration systems?	5M	CO4	BL4
10		For outdoor conditions of 48^0 C DBT and 24^0 C WBT to the capacity of 1200 m^3 volume, air conditioned to be maintained at 20^0 C DBT and 50%RH. The sensible heat load 25kW, 22% fresh air is supplied. ADP of the coil is 12^{0}C and BPF is 0.18. Calculate the condition and mass flow rate of supply air and total refrigerating plant load.	10M	CO5	BL3
		OR			
11	a)	Explain the comfort chart with the help of neat sketch	5M	CO5	BL4
	b)	Using Psychrometric chart, explain the method of cooling and dehumidification process and how do you get them practically?	5M	CO5	BL4

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CO-Course Outcome **BL - Blooms Taxonomy Levels**