ESE Winter 2023-24

Roll No:

G H Raisoni Institute of Engineering and Business Management, Jalgaon

(An Autonomous Institute affiliated to Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon)
Accredited by NAAC with 'A' Grade

Department of Mechanical Engineering

End Semester Examination Winter-2023-24

Program Name: B.Tech (Mechanical) **Semester: VII**

Subject Name: Refrigeration & Air conditioning **Subject Code: UMEL427**

[Time: 02hrs.] **[Max. Marks: 50]**

Course Outcomes (COs):

At the end of the course the student should be able to:

CO1. llustrate the fundamental principles and applications of refrigeration and air conditioning.

CO2. Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems.

CO3: Present the properties, applications and environmental issues of different refrigerants.

CO4. Operate, analyze and calculate cooling load for refrigeration and air conditioning systems.

CO5. Design of Air distribution system for air conditioning applications.

Instructions:

1) Attempt any Two from each question
2) Each question carries equal marks
3) Use of non-programmable scientific calculator, Steam Table, Psychrometric Chart are permitted.
4) Do not write anything on question paper except Roll No

<table>
<tr><th>Q. No.</th><th></th><th>Questions</th><th>Marks</th><th>COs</th><th>BL</th></tr>
<tr><td>1</td><td>A</td><td>Discuss application of Refrigeration and Air conditioning in Hospitals.</td><td>5</td><td>1</td><td>2</td></tr>
<tr><td></td><td>B</td><td>Explain the terms: COP, SEER, IPLV, EER, NPLV</td><td>5</td><td>1</td><td>2</td></tr>
<tr><td></td><td>C</td><td>Discuss Human Comfort and Effective Temperature.</td><td>5</td><td>1</td><td>2</td></tr>
<tr><td>2</td><td>A</td><td>Compare Vapor Compression Cycle & Vapor Absorption Cycle.</td><td>5</td><td>2</td><td>2</td></tr>
<tr><td></td><td>B</td><td>The temperature limits of an ammonia refrigeration system are 25°C and -10°C. If the gas is dry at the end of a compression. Calculate COP of the cycle assuming no undercooling of the liquid ammonia. Use property chart of ammonia as follows.
<table>
<tr><th>Temperature °C</th><th>h_f (kJ/kg)</th><th>h_{fg} (kJ/kg)</th><th>s_f (kJ/kg K)</th></tr>
<tr><td>25</td><td>298.90</td><td>1166.94</td><td>1.1242</td></tr>
<tr><td>-10</td><td>135.37</td><td>1297.68</td><td>0.5443</td></tr>
</table></td><td>5</td><td>2</td><td>3</td></tr>
<tr><td></td><td>C</td><td>Explain any two methods to improve COP of Vapor Compression Refrigeration cycle with P-h diagram.</td><td>5</td><td>2</td><td>2</td></tr>
<tr><td>3</td><td>A</td><td>Classify various types of refrigerants.</td><td>5</td><td>3</td><td>4</td></tr>
<tr><td></td><td>B</td><td>Differentiate Montreal Protocol & Kyoto Protocol.</td><td>5</td><td>3</td><td>2</td></tr>
<tr><td></td><td>C</td><td>Explain Secondary Refrigerants and Anti-Freeze Solutions with examples.</td><td>5</td><td>3</td><td>2</td></tr>
<tr><td>4</td><td>A</td><td>WBT and DBT of air are 18°C and 30°C. Calculate specific humidity, relative humidity, and DPT of air using steam table. The barometric pressure was observed to be 756 mm of Hg.</td><td>5</td><td>4</td><td>3</td></tr>
</table>

	B	Discuss “Evaporative Cooling” process in desert cooler. Draw process on psychrometric chart.	5	4	2
	C	Discuss (i) Wet Bulb Temperature (ii) Dew Point Temperature (iii) Relative Humidity (iv) Bypass Factor (v) ADP	5	4	2
5	A	Discuss various types of fans used in Air conditioning systems.	5	5	2
	B	Explain (i) Diffusers (ii) Grills & Register (iii) Floor Outlet	5	5	2
	C	Discuss any one method of Duct Design.	5	5	2

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