The Assam Royal Global University, Guwahati

Royal School of Engineering & Technology
B.Tech. Mechanical Engineering, 8th Semester
Semester End Examination, August 2021
Course Title : Refrigeration and Air-Conditioning
Course Code : MEE022C801

Time: 3 Hours **Maximum Marks: 70**

Note: Attempt all questions as per instructions given.
The figures in the right-hand margin indicate marks.

Section – A

1. Attempt **all questions**. (Maximum word limit 50) **2 x 8**

a. State the necessities of refrigeration.
b. Define one ton of refrigeration.
c. Classify refrigerants.
d. Name the principal parts of a simple vapor compression system.
e. Define psychrometry.
f. State Dalton's law of partial pressure.
g. What is the function of an evaporator?
h. What is year-round air conditioning?

2. Attempt **any two** of the following: **6 x 2**

a. Explain how refrigerants are designated. Illustrate with examples.

b. A refrigerator maintains a temperature of -5OC by consuming power of 125W. The ambient temperature is 37OC in the summer. What is the refrigeration effect? In winter, the temperature falls to 18OC and if the refrigerator maintains same refrigeration effect, what is the power consumed?
c. With the help of a labelled schematic and a T-s, explain the simple Bell-Coleman cycle. If the maximum and minimum pressures in the cycle are 5.2 bar and 1.01 bar respectively, calculate the COP of the cycle.

3. Attempt **any two** of the following: **7 x 2**

a. Explain how various parameters affect the performance of a simple vapor compression cycle.
b. A simple VCR system producing a refrigerating effect of 8 TR is operating at a condenser temperature of 45OC and an evaporator temperature of -10OC using R134a refrigerant. Determine, mass flow rate of the refrigerant, power consumption and COP of the system.
c. With the help of a schematic, explain the practical NH3-H2O vapor absorption system.

The Assam Royal Global University, Guwahati

Royal School of Engineering & Technology
B.Tech. Mechanical Engineering, 8th Semester
Semester End Examination, August 2021
Course Title : Refrigeration and Air-Conditioning
Course Code : MEE022C801

Time: 3 Hours **Maximum Marks: 70**

Note: Attempt all questions as per instructions given.
The figures in the right-hand margin indicate marks.

Section – B

4. Attempt **any two** of the following: **7 x 2**

a. A psychrometer show readings of dry bulb temperature as 35°C and wet bulb temperature as 28°C. Calculate wet-bulb depression, humidity ratio, relative humidity, and enthalpy of moist air using psychrometric equations.

b. Explain the various psychrometric processes. Illustrate these processes on a psychrometric chart.

c. What are factors that affect the thermal comfort of humans? Explain the term 'comfort zone'.

5.

Attempt **any two** of the following: **7 x 2**

a. Describe two types of expansion devices used in VCR systems.

b. How are air-conditioning duct classified? Compare a 50 cm diameter round duct to equivalent rectangular duct considering an air flow rate of 150 cmm.

c. Describe the all-water, two-pipe, multi zone air conditioning system. State its advantages and disadvantages.