BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – B.Tech.(ME)-2021
Course Name – Refrigeration and Air Conditioning
Course Code - PEC-ME601A
(Semester VI)

Full Marks : 60   **Time : 2:30 Hours**
[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question)   1 x 15=15

1. *Choose the correct alternative from the following :*

(i) The coefficient of performance of Heat Pump is always _____ one.

a) Equal   b) Less than
c) Greater than   d) None of these

(ii) Identify the desirable properties of Refrigerants.

a) Low evaporator pressure   b) High condensing pressure
c) Low latent heat of vaporization   d) None of these

(iii) Waste heat can be effectively used in _____ refrigeration systems.

a) vapor compression refrigeration cycle   b) air refrigeration cycle
c) vapor absorption refrigeration cycle   d) vortex refrigeration cycle

(iv) Accumulator is provided for _____.

a) Exchange of heat   b) storing of un vaporized liquid
c) condensing gas   d) Storing of liquid refrigerant

(v) Choose the boiling point of ammonia.

a) -10.5°C   b) -30°C
c) -33.3°C   d) none of these

(vi) Identify the correct option for under cooling in a refrigeration cycle.

a) Increases C.O.P   b) Decreases C.O.P
c) C.O.P remains unaltered   d) Other factors decide C.O.P

(vii) Identify the function of the evaporator in a refrigeration system.

a) To transfer heat to the surroundings   b) To transfer heat from the space being cooled
c) To compress the refrigerant   d) To expand the refrigerant

(viii) Identify the following that is NOT a component of a refrigeration system.

a) Condenser   b) Evaporator
c) Expansion tank   d) Compressor

(ix) In a refrigeration system, where does the refrigerant change from a gas to a liquid

a) Evaporator

b) condenser

c) Expansion valve

d) Compressor

(x) Identify the component of a vapor compression refrigeration system that is responsible for regulating the flow of refrigerant.

a) Compressor

b) Condenser

c) Expansion valve

d) Evaporator

(xi) Choose the component of a vapor absorption refrigeration system that is responsible for generating the refrigerant vapor from the refrigerant-absorbent solution.

a) Absorber

b) Generator

c) Condenser

d) Evaporator

(xii) Select the property of a refrigerant is measured in units of kcal/kg.

a) Density

b) Specific volume

c) Enthalpy

d) Viscosity

(xiii) Select a property of a refrigerant describes its resistance to flow

a) Density

b) Specific volume

c) Viscosity

d) Enthalpy

(xiv) Choose the primary purpose of psychrometry.

a) Study of human behavior

b) Study of psychological disorders

c) Study of air and its properties

d) Study of soil properties

(xv) Identify the instrument is used to measure relative humidity.

a) Barometer

b) Hygrometer

c) Anemometer

d) Manometer

Group-B
(Short Answer Type Questions)
3 x 5=15

2. Define refrigeration effect. (3)
3. Define air conditioning and discuss its primary purpose. (3)
4. Draw a neat sketch of a Vapour Absorption refrigeration cycle. (3)

5. A refrigerating machine working on a reversed Carnot cycle takes out 2 kW of heat from the (3) system at 200 K while working between temperature limits of 300 K and 200 K. Estimate the C.O.P. and power consumed by the cycle.
6. Explain how dehumidification can be accomplished. (3)

OR

Explain the physical significance of of air conditioning. (3)

Group-C
(Long Answer Type Questions)
5 x 6=30

7. A refrigerator works on reversed Carnot cycle producing a temperature of – 40 degree C. (5) Work done per TR is 700 kJ per ten minutes. Estimate the value of its COP.
8. In an ideal vapour compression refrigeration cycle, the enthalpy of the refrigerant before (5) and after the evaporator are respectively 75 kJ/kg and 180 kJ/kg. Estimate the circulation rate of the refrigerant for each ton of refrigeration.
9. In an ideal vapour compression refrigeration cycle, the enthalpy of the refrigerant at exit (5) from the condenser, compressor and evaporator is 80 kJ/kg, 200 kJ/kg and 180 kJ/kg respectively.Estimate the coefficient of performance of the cycle.
10. In a vapour compressor refrigeration system, the compressor capacity is 420 kJ/min and (5) refrigerating effect is 2100 kJ/minute and heat rejection factor is 1.2. Determine the heat rejected from the condenser and COP.

11. A refrigerating machine working on reversed Carnot cycle consumes 6 kW for producing   (5)
    refrigerating effect of 1000 kJ/min for maintaining a region at – 40 degree C. Determine the
    higher temperature (in degree centigrade) of the cycle.
12. Explain the following psychrometric terms:- (i) Absolute humidity (ii) Specific humidity   (5)

    OR

    Explain the following terms:- i) Effective temperature with reference to human comfort ii)   (5)
    Applications of air conditioning.

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