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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Tech.(ME)-2021/B.Tech.(ME)-2023

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 correct type of valve is used in a reciprocating refrigeration compressor.
 - a) Rotary valve
 - b) Poppet valve
 - c) Glob valve
 - d) None of these
- (iii) Identify the correct for the COP of a reversed Carnot cycle refrigerator working between higher temperature T_2 and lower temperature T_1 .
 - a) will decrease with increase in T_1 keeping T_2 fixed
 - b) will increase with increase in T_1 keeping T_2 fixed
 - c) will first increase with increase in T_1 and then decrease with increase in T_1 keeping T_2 fixed
 - d) none of these
- (iv) A heat pump working on a reversed Carnot cycle has a C.O.P. of 5. It works as a refrigerator taking 1 kW of work input. Identify the correct refrigerating effect.
 - a) 1 kw
 - b) 2 kw
 - c) 3 kw
 - d) 4kw
- (v) In a refrigeration cycle, the flow of refrigerant is controlled by _____.
 - a) Compressor
 - b) Condenser
 - c) Expansion valve
 - d) Evaporator
- (vi) Identify the correct value for One ton refrigeration.
 - a) 50 kcal/ hr
 - b) 50 kcal/ min
 - c) 100 kcal/ min
 - d) 100 kcal/ hr
- (vii) Identify the option that happens to the refrigerant in the condenser.
 - a) It evaporates
 - b) It condenses
 - c) It expands
 - d) It compresses

- (viii) Choose the purpose of the condenser in a refrigeration system.
- To compress the refrigerant
 - To transfer heat to the surroundings
 - To expand the refrigerant
 - To absorb heat from the space being cooled
- (ix) Identify the option for a refrigeration system does to achieve cooling.
- by releasing heat into the space
 - By absorbing heat from the space
 - By increasing humidity
 - By decreasing humidity
- (x) Choose the purpose of refrigerant in a refrigeration system.
- To absorb heat
 - To release heat
 - To transfer pressure
 - To transfer humidity
- (xi) Choose the term for the ability of a refrigerant to dissolve or absorb other substances.
- Hygroscopicity
 - Solubility
 - Chemical stability
 - Superheat temperature
- (xii) Identify the purpose of the compressor in an air conditioning system.
- To release heat to the outside environment
 - To absorb heat from indoor air
 - To regulate the flow of refrigerant
 - To increase the pressure and temperature of the refrigerant
- (xiii) Identify the option that is NOT a primary psychrometric property.
- Dry bulb temperature
 - Wet bulb temperature
 - Relative humidity
 - Specific volume
- (xiv) Select that wet bulb temperature indicate in psychrometry.
- The maximum temperature air can reach
 - The temperature at which air must be cooled to reach saturation
 - The temperature measured with a dry thermometer
 - The temperature measured with a wet thermometer
- (xv) Choose the term "specific humidity" referred to in psychrometry.
- The ratio of the mass of water vapor to the mass of dry air
 - The ratio of the mass of dry air to the mass of water vapor
 - The volume of water vapor per unit volume of air
 - The pressure exerted by water vapor in the air

Group-B

(Short Answer Type Questions)

3 x 5=15

- Briefly discuss about the main components of a refrigeration system. (3)
- Explain the term coefficient of performance (COP) in refrigeration. (3)
- A refrigerating machine working on a reversed Carnot cycle takes out 2 kW of heat from the 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. (3)
- Write short notes on degree of saturation. (3)
- Differentiate between sensible heating and sensible cooling of air. (3)

OR

Differentiate between wet bulb temperature and thermodynamic wet bulb temperature. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

- A refrigerator works on reversed Carnot cycle producing a temperature of -40°C . Work done per TR is 700 kJ per ten minutes. Estimate the value of its COP. (5)
- A refrigerating machine having coefficient of performance equal to 2 is used to remove heat at the rate of 1200 kJ/min. Estimate the power required for this machine. (5)
- For simple vapour compression cycle, enthalpy at suction = 1600 kJ/kg, enthalpy at discharge from the compressor = 1800 kJ/kg, enthalpy at exit from condenser = 600 kJ/kg. Determine the COP for this refrigeration cycle. (5)

10. Draw a neat line diagram of Electrolux refrigerator and explain its working principles. (5)
11. Illustrate with a neat sketch a Lithium Bromide-Water Vapour Absorption Refrigeration System. (5)
12. Explain the following psychometric terms:- i) Dry bulb temperature ii) Wet bulb temperature. (5)
- OR**
- Explain the following psychometric terms:- i) Dew point temperature ii) Relative humidity. (5)

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