Uka Tarsadia University(Diwaliba Polytechnic)
Diploma in Chemical Engineering
Objective Type Questions (Chemical Engineering Thermodynamics)

UNIT 1
BASIC CONCEPT OF THERMODYNAMICS

1. A reversible process is performed in such a way that
a) at the conclusion of process, both system and surroundings can be restored to their initial states without producing any change
b) it should not leave any trace to show that the process had ever occurred
c) it is carried out infinitely slowly
d) all of the mentioned

2. A reversible process coincides with a quasi-static process.
a) true
b) false

3. Irreversibility of a process may be due to
a) lack of equilibrium during the process
b) involvement of dissipative effects
c) both of the mentioned
d) none of the mentioned

4. A heat transfer process approaches reversibility as the temperature difference between two bodies approaches
a) infinity
b) zero
c) -1
d) 1

5. All actual heat transfer processes are
a) irreversible
b) take place through a finite temperature difference
c) both of the mentioned
d) none of the mentioned

6. Free expansion is irreversible.
a) true
b) false

7. Which of the following can be a cause of irreversibility?
a) friction, viscosity
b) inelasticity
c) electrical resistance, magnetic hysteresis
d) all of the mentioned

8. The friction present in moving devices makes a process reversible.
a) true
b) false

9. A process will be reversible if it has
a) no dissipative effects
b) dissipative effects
c) depends on the given conditions
d) none of the mentioned

10. Irreversibility can be distinguished in how many types?
a) 0
b) 1
c) 2

11. When a body falls freely under gravity, then the work done by the gravity is _____
a) Positive
b) Negative
c) Zero
d) Infinity

12. When a gas filled in a cylinder fitted with a movable piston is allowed to expand, the work done by the gas is positive.
a) True
b) False

13. When a body is lifted, the work done by the gravitational force is positive.
a) True
b) False

14. For a body moving in a circular path, the work done by the centripetal force is _____
a) Negative
b) Positive
c) Constant
d) Zero

15. A gardener pushes a lawn roller through a distance of 20m. If he applies a force of 20kg weight in a direction inclined at 60° to the ground, find the work done by him. ($g=9.8m/s^2$)
a) 400J
b) 1960J
c) 250J
d) 2514J

16. A bullet fired from a gun can pierce a target due to its _____
a) Mechanical energy

b) Heat energy
c) Kinetic energy
d) Acceleration

17. Pressure acts _____ to the surface of the body.
a) Normal
b) Linear
c) Parallel
d) Coplanar

18. What is a collinear system of forces for the system of the fluid liquids?
a) The force system having all the forces parallel to each other
b) The force system having all the forces perpendicular to each other
c) The force system having all the forces emerging from a single point
d) Forces cannot form a collinear system of forces, it is not possible

19. Unit of pressure is
A) Pascal
B) N/m^2
C) Both A) and B)
D) None of these

20. What is not the condition for the equilibrium in the determination of the equations of the fluid pressures?
a) $\sum Fx=0$
b) $\sum Fy=0$
c) $\sum Fz=0$
d) $\sum F\neq 0$

21. Entropy is a
a) path function, intensive property
b) path function, extensive property
c) point function, intensive property
d) point function, extensive property

22. Volume of a system is
a) Intensive property
b) Extensive property
c) Neither intensive nor Extensive
d) None of the mentioned

23. A system that is open to interchange of mass with the surrounding is called
a) Open System
b) Closed System
c) Bounded System
d) None of the mentioned

24. A flow system is also known as
a) Open System
b) Closed System
c) Bounded System
d) None of the mentioned

25. A part of a system that is physically distinct and macroscopically homogeneous of fixed or variable composition is known as
a) Concentration
b) State
c) Phase
d) None of the mentioned

26. Which one is an example of a property?
a) Pressure
b) Temperature
c) Volume
d) All of the mentioned

27. The properties of a system are invariant in a state, called
a) Transition state
b) Steady state
c) Unsteady state
d) None of the mentioned

28. Everything outside a system boundary is
a) Surrounding
b) Boundary line
c) Open system
d) Closed system

29. The quantity of matter or region of space chosen for study is called
a) Boundary
b) Surrounding
c) System
d) None of the mentioned

30. System is enclosed by
a) Boundary
b) Surrounding
c) Layers
d) None of the mentioned

31. Unsteady state is also known as Transient state, the statement is
a) True
b) False

c) Applicable for some systems
d) None of the mentioned

32. A system that does not exchange heat with the surroundings during a process is
a) Adiabatic system
b) Isobaric system
c) Isochoric system
d) Isothermal system

33. Adiabatic system is a perfectly insulated system. The statement is
a) True
b) False
c) Applicable for some systems
d) None of the mentioned

34. A system in which the pressure is constant during a process is
a) Adiabatic system
b) Isobaric system
c) Isochoric system
d) Isothermal system

35. A system in which the volume is invariant during a process is
a) Adiabatic system
b) Isobaric system
c) Isochoric system
d) Isothermal system

36. What is Gibbs phase rule for general system?
a) $P = C - 1 - F$
b) $P = C + 1 - F$
c) $P + F = C - 2$
d) $P + F = C + 2$

37. The degree of freedom at a triple point in the unary diagram for water is_____
a) 2
b) 3
c) 0
d) 1

38. What is degree of freedom when two phases co – exist?
a) 2
b) 3
c) 0
d) 1

39. For single component system when degree of freedom is 1(one) then number of phases _____
a) 2

b) 3
c) 0
d) 1

40. What is/are the phenomenon involved in phase transformation?
a) Nucleation
b) Growth
c) Fission
d) Nucleation and growth

41. Which energy a substance possesses due to motion and configuration of its atoms, molecules?
a) Potential energy
b) Kinetic energy
c) Internal energy
d) Surface energy

42. The change in enthalpy of a system is called:
a) Heat of reaction
b) Standard heat of combustion
c) Heat absorbed
d) None of the mentioned

43. What takes place when reactants are in excess:
a) Equilibrium
b) Forward reaction
c) Backward reaction
d) None of the mentioned

44. How many dimensions of the world are there?
a) 7
b) 3
c) 2
d) 4

45. Which of the following is a dimensional constant?
a) e
b) Area
c) Specific gravity
d) Gravitational constant

46. If the unit of force is 1kN, unit of length 1km and the unit of time is 100s, what will be the unit of mass?
a) 1000 kg
b) 10^4 kg
c) 100 kg
d) 10^5 kg

47. All physical quantities have dimensions.
a) True
b) False

48. In a homogeneous reaction
A) Reactant and product are in same phase
B) Reactant and product are in different phase
C) Either A) or B)
D) None of these

49. In a heterogeneous reaction
A) Reactant and product are in same phase
B) Reactant and product are in different phase
C) Either A) or B)
D) None of these

50. The temperature at which a liquid will begin to boil at the standard atmospheric pressure is
a) Normal boiling point
b) Normal melting point
c) Normal freezing point
d) None of the mentioned

UNIT 2

FIRST LAW OF THERMODYNAMICS

1. First law of thermodynamics deals with _____
a) Conservation of mass
b) Conservation of momentum
c) Conservation of energy
d) Conservation of pressure

2. Equation of the first law of thermodynamics is _____
a) Internal Energy= Heat added into work done
b) Internal Energy= Heat rejected into work done
c) Internal Energy= Heat added divided by work done
d) Internal Energy=Heat added plus work done

3. During a fluid flow, the temperature is developed due to_____
a) Increase in density
b) Change in pressure
c) Translational Kinetic Energy
d) Fluid level

4. An increase in enthalpy leads to an increase in _____
a) Increase in pressure
b) Increase in volume

c) Increase in internal energy
d) Increase in mass

5. SI unit of enthalpy is_____
a) Joule/kgK
b) Joule/K
c) Joule/kg
d) K/kg

6. Which among this is not an exothermic reaction?
a) Combustion reaction
b) Neutralization reaction
c) Thermite reaction
d) Evaporating liquid water

7. The equation dQ=dE+dW holds good for
a) any process, reversible or irreversible
b) only reversible process
c) only irreversible process
d) none of the mentioned

8. The equation dQ=dU+pdW holds good for any process undergone by a closed stationary system.
a) true
b) false

9. The equation dQ=dU+pdV holds good for
a) open system
b) closed system
c) both of the mentioned
d) none of the mentioned

10. The internal energy change in a system that has absorbed 2kcal of heat and done 500 J of work is?
a) 6400 J
b) 5400 J
c) 7900 J
d) 8900 J

11. 110 J of heat is added to a gaseous system, whose internal energy increases by 40 J. Then the amount of external work done is?
150 J
70 J
110 J
40 J

12. The molar specific heat constant pressure of an ideal gas is 7R/2. The ratio of specific heat at constant pressure to that at constant volume is?

a) 9/7
b) 8/7
c) 7/5
d) 5/7

13. The change internal energy in a cyclic process is _____
a) Zero
b) Infinity
c) Constant
d) Unity

14. It is possible that the temperature of the body changes even without giving heat to it or taking heat from it.
a) True
b) False

15. The mechanical energy can be completely converted into heat energy but the whole of the heat energy cannot be converted into mechanical energy.
a) True
b) False

16. The latent heat of vaporisation of water is 2,240 J. If the work done in the process of vaporisation of 1g is 168 J, then the increase in internal energy is?
a) 2408 J
b) 2240 J
c) 2072 J
d) 1904 J

17. If the amount of heat given to a system is 35 J and the amount of work done by the system is -15J and the amount of work done by the system is -15J, then the change in the internal energy of the system is?
a) -50J
b) 20J
c) 30
d) 50J

18. Assertion: Reversible systems are difficult to find in the real world.
Reason: Most process is dissipative in nature.
a) Both assertion and reason are true and the reason is the correct explanation of the assertion
b) Both assertion and reason are true but the reason is not a correct explanation of the assertion
c) Assertion is true but the reason is false
d) Both assertion and reason are false

19. The change in internal energy, when a gas is cooled from 927° to 27° is?
a) 100%

b) 300%
c) 200%
d) 75%

20. Twp cylinders of equal size are filled with equal amount of ideal diatomic gas at room temperature. Both the cylinders are fitted with pistons. In cylinder A the piston is free to move, while in cylinder B the piston is fixed. When same amount of heat is added to cylinder A raises by 20 K. What will be the rise temperature of gas in cylinder B?
a) 28K
b) 20K
c) 15K
d) 10K

21. Out of solid, liquid and gas of the same mass and at the same temperature, which one has the greatest internal energy?
a) Solid
b) Liquid
c) Gas
d) All three have the same internal energy

22. Out of solid, liquid and gas of the same mass and at the same temperature, which one has the least internal energy?
a) Solid
b) Liquid
c) Gas
d) All three have the same internal energy

23. If C_p and C_v are the specific heats for a gas at constant pressure and at constant volume respectively, then the relation C_p-C_v=R is exact for?
a) Ideal and real gases at all pressures
b) Ideal gas at all pressures and real gas at a moderate pressure
c) Ideal gas and nearly true for real gases at high pressure
d) Ideal gas and nearly true for real gases at a moderate pressure

24. The complete conversion of heat into shaft-work is impossible.
a) true
b) false

25. The enthalpy of a substance(denoted by h), is defined as
a) h=u-pv
b) h=u+pv
c) h=-u+pv
d) h=-u-pv

26. In a constant volume process, internal energy change is equal to
a) heat transferred
b) work done

c) zero
d) none of the mentioned

27. For an ideal gas, enthalpy becomes
a) h=u-RT
b) h=-u-RT
c) h=u+RT
d) h=-u+RT

28. Enthalpy is an intensive property of a system.
a) true
b) false

29. Heat transferred at constant pressure _____ the enthalpy of a system.
a) decreases
b) increases
c) first decreases then increases
d) first increases then decreases

30. The enthalpy and internal energy are the function of temperature for
a) all gases
b) steam
c) water
d) ideal gas

31. Change in enthalpy of a system is due to heat supplied at
a) constant volume
b) constant pressure
c) both at constant volume and pressure
d) none of the mentioned

32. A quantity of heat required to change the unit mass of a solid substance, from solid state to liquid state, while the temperature remains constant, is known as _____
a) Latent heat
b) Sublimation
c) Hoar frost
d) Latent heat of fusion

33. If 1g of steam is mixed with 1g of ice, what is the resultant temperature of the mixture?
a) 270°c
b) 230°c
c) 100°c
d) 50°c

34. What is the change in internal energy for a process which has final and initial states are exactly similar?
a) Positive
b) Negative

c) Zero
d) Cannot say

35. What is the change in internal energy of 2 mole of air (C_v = 2.1 X 10^4 J/mole^{o}C), if its temperature changes from 10^{o}C to 20^{o}C?
a) 420 kJ
b) 540 kJ
c) 840 kJ
d) 1050 kJ

36. What is the change in internal energy of 1 mole of air ((C_v = 2.1 X 10^4 J/mole^{o}C), if its temperature changes from 10^{o}C to 5^{o}C?
a) 84 kJ
b) 105 kJ
c) – 84 kJ
d) – 105 kJ

37. Ratio of change in internal energy of a substance from 4^{o}C to T and from T to 10^{o}C is 2, what is T?
a) 5^{o}C
b) 6^{o}C
c) 7^{o}C
d) 8^{o}C

38. Total energy of the universe is always _____
a) Increasing
b) Decreasing
c) Constant
d) Cannot say

39. If temperature is constant, internal energy does not change.
a) true
b) false

40. If the temperature is constant, internal energy
a) changes with change in p
b) changes with change in V
c) changes with change in both p and V
d) does not change with change in p or V

41. The equation dU=Cv*dT holds good for
a) any process for an ideal gas, even when the volume changes
b) for other substances it is true only when the volume is constant
c) both of the mentioned
d) none of the mentioned

42. Work done by a system is taken to be
a) positive

b) negative
c) zero
d) varies according to situation

43. Work done on a system is taken to be
a) positive
b) negative
c) zero
d) varies according to situation

44. In the equation dV=(1/p)dW, (1/p) is known as
a) volume factor
b) pressure factor
c) differential factor
d) integration factor

45. Cyclic integral of a property is always
a) zero
b) one
c) infinite value
d) none of the mentioned

46. A piston cylinder has 1.5 kg of air at 300 K, 150 kPa. It is now heated up in a two step process. First constant volume to 1000 K (state 2) then followed by a constant pressure process to 1500 K, state 3. Find the work in the process.
a) 205.3 kJ
b) 215.3 kJ
c) 225.3 kJ
d) 235.3 kJ

47. A piston-cylinder contains 50 kg of water at 200 kPa with V=0.1 m^3. Stops in the cylinder restricts the enclosed volume to 0.5 m^3. The water is now heated to 200°C. Find the work done by the water.
a) 50 kJ
b) 60 kJ
c) 70 kJ
d) 80 kJ

48. A piston cylinder contains 3 kg of air at 20°C and 300 kPa. It is now heated at a constant pressure to 600 K. Find the work in the process.
a) 244.2 kJ
b) 254.2 kJ
c) 264.2 kJ
d) 274.2 kJ

49. Which of the following is true?
a) Q for reversible > Q for irreversible and work for reversible < work for irreversible

b) Q for reversible < Q for irreversible and work for reversible > work for irreversible
c) Q for reversible < Q for irreversible and work for reversible < work for irreversible
d) Q for reversible > Q for irreversible and work for reversible > work for irreversible

50. In an open system, for maximum work, the process must be entirely
a) irreversible
b) reversible
c) adiabatic
d) none of the mentioned

UNIT 3
PVT BEHAVIOUR

1. Which of the following is a property of a pure substance?
a) it has constant chemical composition throughout its mass
b) it is a one-component system
c) it may exist in one or more phases
d) all of the mentioned

2. For water, as temperature increases, volume always increases?
a) true
b) false

3. A saturation state is a state from which a change of phase may occur
a) without a change of pressure or temperature
b) with a change of pressure or temperature
c) both of the mentioned
d) none of the mentioned

4. In which of the following state does water exist?
a) saturated solid state
b) saturated liquid state
c) saturated vapour state
d) all of the mentioned

5. Which of the following exists in a p-V diagram for water?
a) saturated solid line
b) saturated liquid lines
c) saturated vapour line
d) all of the mentioned

6. The triple point is a line on the p-V diagram, where all the three phases, solid, liquid and gas exist.
a) true
b) false

7. At a pressure below the triple point line,
a) the substance cannot exist in the liquid phase
b) the substance when heated transforms from solid to vapour

c) both of the mentioned
d) none of the mentioned

8. Which of the following statement is true?
a) to the left of saturated solid line is the solid region
b) between saturated solid line and saturated liquid line with respect to solidification there exists the solid-liquid mixture region
c) between two saturated liquid lines is the compressed liquid region
d) all of the mentioned

9. The isotherm passing through the critical point is called the critical isotherm.
a) true
b) false

10. The greater the temperature, the ____ is the vapour pressure.
a) lower
b) higher
c) depends on the substance
d) none of the mentioned

11. Phase change occurs at
a) constant pressure
b) constant temperature
c) constant pressure and temperature
d) none of the mentioned

12. Which of the following statement is true?
a) saturation temperature is a function of pressure
b) saturation pressure is a function of temperature
c) both of the mentioned
d) none of the mentioned

13. At critical point, value of $Vg-V_f$ is
a) two
b) one
c) zero
d) infinity

14. Above the critical point, the isotherms are continuous curves.
a) true
b) false

15. At constant temperature the pressure of an ideal gas is doubled its density becomes
a) Half
b) Double
c) Same
d) None

16. For an ideal gas, incorrect statement is
a) Molecules do not occupy any space
b) No attractive force exist between the molecules
c) The gas molecules move in random, straight line motion
d) None of the mentioned

17. Correct statement is
a) Gases at low pressure or high temperature behave as an ideal gas
b) Gases at high pressure or low temperature behave as an ideal gas
c) Gases at high density behave as an ideal gas
d) None of the mentioned

18. What is the volume of 20 gms of Oxygen in Litre at standard conditions?
a) 10
b) 12
c) 14
d) 16

19. Usually while measuring the specific gravity of a gas, the reference gas that is taken is air.
The above given statement is-
a) False
b) True
c) Depends on the gas
d) None of the mentioned

20. 1 atm pressure and 0°C' condition is known as
a) Room temperature and pressure
b) Standard temperature and pressure
c) Atmospheric temperature and pressure
d) None of the mentioned

21. An ideal gas is one which obeys the law pv=RT at all pressures and temperatures.
a) true
b) false

22. A gas compression process is
a) adiabatic
b) involves heat transfer
c) both of the mentioned
d) none of the mentioned

23. A gas does work during adiabatic expansion. The source of mechanical energy so produced is the internal energy of the gas itself.
a) True
b) False

24. If C_p and C_v are the specific heats for a gas at constant pressure and at constant volume respectively, then the relation C_p-C_v=R is exact for?

a) Ideal and real gases at all pressures

b) Ideal gas at all pressures and real gas at a moderate pressure

c) Ideal gas and nearly true for real gases at high pressure

d) Ideal gas and nearly true for real gases at a moderate pressure

25. In an adiabatic process, the quantity which remains constant is _____

a) Volume

b) Pressure

c) Temperature

d) Total heat of the system

26. In an isothermal process, the quantity which remains constant is _____

a) Volume

b) Pressure

c) Temperature

d) Total heat of the system

27. What is the p-v-T equation of state?

a) Relationship between volume and temperature

b) Relationship between pressure, molar volume and temperature

c) Relationship between pressure and temperature

d) Relationship between pressure and molar volume

28. What does the ideal gas equation neglects?

a) Temperature of molecules

b) Friction between molecules

c) Volume occupied by the molecules

d) Pressure occupied by the molecules

29. What is the van der waal's equation of non-ideal gas?

a) $[P + a(n/v)^2](v/n - b) = RT$

b) $[P + a(n/v)^2] = RT$

c) $[P + (n/v)^2](v/n - b) = RT$

d) $[P + a(n/v)^2](v/n)$

30. What is the value of ω for symmetric molecules?

a) 1

b) 0.264

c) 0

d) 0.490

31. How can the compressibility factor be determined form generalized equation and Redich-kwong equation?

a) $Z^3 - Z^2 + (A\text{-}B\text{-}B^2)Z - AB = 0$

b) $Z^3 - Z^2 + (A\text{-}B\text{-}B^2) - AB = 0$

c) $Z^3 - Z^2 + (A-B- B^2)Z - A = 0$

d) $Z^3 - Z^2 + (A-B)Z - AB = 0$

32. If A =0.2724 and B= 0.05326 find the value of compressibility factor Z.

a) 0.7867

b) 0.7314

c) 0.8656

d) 10.435

33. If the volume of a gas doubled at constant temperature, what is the pressure now if it was P atm before the change?

a) P atm

b) 2P atm

c) P/2 atm

d) None of the mentioned

34. Which of the following parameters does not characterize the thermodynamic state of matter?

a) Temperature

b) Pressure

c) Work

d) Volume

35. Which of the following curves meet at triple point?

a) fusion curve and vaporization curve

b) fusion curve and sublimation curve

c) vaporization curve and sublimation curve

d) fusion curve and vaporization curve and sublimation curve

36. The slopes of sublimation and vaporization curves for all substances are

a) negative

b) positive

c) zero

d) none of the mentioned

37. The slope of the fusion curve for water is

a) negative

b) positive

c) zero

d) none of the mentioned

38. Which of the following statement is true?

a) the triple point of water is 273.16 K

b) the triple point of CO_2 is 216.55 K

c) when solid CO_2 is exposed to 1atm pressure, it gets transformed into vapour directly

d) all of the mentioned

39. Total volume of a liquid vapour mixture is given by

a) volume of the saturated liquid

b) volume of the saturated vapour

c) sum of volumes of saturated liquid and saturated vapour

d) none of the mentioned

40. Which of the following is not the equation of state?

a) Van der Waals Equation

b) Charles Equation

c) Holborn Equation

d) Peng Robinson Equation

41. Virial Equation is a _____

a) Arithmetic Progression

b) Geometric Progression

c) Harmonic Progression

d) None of the mentioned

42. If the vander waal equation has only one root, what is the relation between a and b?

a) $729a = pb^2$

b) $243a = pb^2$

c) $81a = pb^2$

d) $9a = pb^2$

43. A container has O_2 at 5 atm and molar volume 2 liter/mole, if a = 9.24 atm(liter/mole), b = 0.0907 liter/mole, what is the temperature of O_2? (Use vander waal equation)

a) 140 K

b) 150 K

c) 170 K

d) 190 K

44. What is the unit of 'b' in Peng Robinson equation?

a) Liter/mole

b) $Liter^2/mole^2$

c) Mole/Liter

d) $Mole^2/Liter^2$

45. For the ideal gas equation, what assumptions are made?

a) there is little or no attraction between the molecules of the gas

b) the volume occupied by the molecules is negligibly small compared to the volume of the gas

c) both of the mentioned

d) none of the mentioned

46. When does a real gas obey the ideal gas equation closely?

a) at high pressure and low temperature

b) at low pressure and high temperature

c) at low pressure and temperature
d) at high pressure and temperature

47. Which of the following statement is true about the correction terms?
a) the coefficient a was introduced to account for the existence of mutual attraction between the molecules
b) the term $a/(v^2)$ is called the force of cohesion
c) the coefficient b was introduced to account for the volumes of the molecules and is known as co-volume
d) all of the mentioned

48. The following also gave two-constant equations of state.
a) Berthelot
b) Dieterici
c) Redlich-Kwong
d) all of the mentioned

49. Compressibility factor Z is given by
a) RT/pv
b) pv/RT
c) $(RT/pv)^2$
d) $(pv/RT)^2$

50. For an ideal gas, Z has the value
a) 0
b) 2
c) 1
d) infinity

UNIT 4
HEAT EFFECTS

1. For exothermic reactions, what is the heat of reaction?
a) Positive
b) Negative
c) Zero
d) Cannot Say

2. For endothermic reactions, what is the heat of reaction?
a) Positive
b) Negative
c) Zero
d) Cannot Say

3. Enthalpy of reactants is 15 J/Kg and enthalpy of products is 40 J/Kg, what is the heat of reaction?
a) -10 J/Kg

b) 10 J/Kg
c) -25 J/Kg
d) 25 J/Kg

4. Enthalpy of reactants is 50 J/Kg and enthalpy of products is 25 J/Kg, what is the heat of reaction?
a) -10 J/Kg
b) 10 J/Kg
c) -25 J/Kg
d) 25 J/Kg

5. Enthalpy of reactants is 30 J/Kg and enthalpy of products is 10 J/Kg, what is the heat of reaction?
a) -20 J/Kg
b) 20 J/Kg
c) -10 J/Kg
d) 10 J/Kg

6. Heat of formations of A, B, C, and D, are 5 J, 10 J, 15 J, and 20 J respectively, what is the heat of reaction A + 4B -> 3C + D?
a) 10 J
b) 20 J
c) 35 J
d) 45 J

7. Heat of formations of A, B, C, and D, are 5 J, 10 J, 15 J, and 20 J respectively, what is the heat of reaction A + 4B -> 3C + D?
a) 10 J
b) 20 J
c) 35 J
d) 45 J

8. Heat of formations of A, B, C, and D, are 1 J, 2 J, 3 J, and 4 J respectively, what is the heat of reaction 3A + 4B -> 2C + D?
a) -1 J
b) 1 J
c) 3 J
d) 6 J

9. Heat of formations of A, B, C, and D, are 2 J, 5 J, 3 J, and 10 J respectively, what is the heat of reaction 4A + 5B -> 2C + 2D?
a) -10 J
b) -7 J
c) -5 J
d) 0

10. Heat of formations of A, B, C, and D, are 3 J, 5 J, 4 J, and 8 J respectively, what is the heat of reaction 2A + 2B -> 2C + D?

a) -5 J
b) 0
c) 5 J
d) 8 J

11. In the reaction $C + O_2 \rightarrow CO_2$, if the heat liberated is 10 J, what is the heat of formation of CO_2?

a) -10 J
b) 10 J
c) 0
d) Cannot be determined

12. In the reaction $2H_2 + O_2 \rightarrow 2H_2O$, if the heat liberated is 50 J, what is the heat of formation of H_2O?

a) -25 J
b) 25 J
c) -50 J
d) 50 J

13. In the reaction $2N \rightarrow N_2$, if the heat liberated is 6 J, what is the heat of formation of N_2?

a) – 6 J
b) 6 J
c) 0
d) Cannot be determined

14. In the reaction $2C + O_2 \rightarrow 2CO$, if the heat liberated is 10 J, what is the heat of formation of CO?

a) -5 J
b) 5 J
c) -10 J
d) 10 J

15. In the reaction $C + 2H_2 \rightarrow CH_4$, if the heat liberated is -5 J, what is the heat of formation of CH_4?

a) -5J
b) 5 J
c) 0 J
d) Cannot be determined

16. The standard heat of reaction is a heat of reaction for how many moles of compound?

a) 0
b) 1
c) 2
d) 3

17. What is the heat of reaction for $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$, if heat of formation of CH_4, O_2, CO_2 and H_2O are 10 J, 5 J, 6 J, and 12 J respectively?

a) -10 J
b) 10 J
c) -20 J
d) 20 J

18. What is the heat of reaction for $2H_2 + O_2 \rightarrow 2H_2O$, if heat of formation of H_2, O_2, and H_2O are 2 J, 5 J, and 10 J respectively?

a) 2 J
b) 5 J
c) 8 J
d) 11 J

19. What is the heat of reaction for $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$, if heat of formation of C_2H_4, O_2, CO_2, and H_2O are 10 J, 5 J, 6 J and 2 J respectively?

a) -4 J
b) -2 J
c) 0
d) 4 J

20. What is the heat of reaction for $C_6H_6 + 3H_2 \rightarrow C_6H_{12}$, if heat of formation of C_6H_6, H_2, and C_6H_{12} are 25 J, 5 J and 50 J respectively?

a) 10 J
b) 20 J
c) 30 J
d) 35 J

21. What is the enthalpy of reaction for $C + O_2 \rightarrow CO_2$, if the conversion of C is 50%, and heat of formation of C, O_2, and CO_2 are 0, 0 and 10 J.

a) 5 J
b) 10 J
c) 15 J
d) 20 J

22. What is the enthalpy of reaction for $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$, if the conversion of CH_4 is 50%, and heat of formation of CH_4, O_2, CO_2, and H_2O are 10 J, 0, 6 J and 4 J?

a) 0
b) 2 J
c) 5 J
d) 10 J

23. What is the enthalpy of reaction for $CO_2 + 4H_2 \rightarrow 2H_2O + CH_4$, if the conversion of CO_2 is 50%, and heat of formation of CO_2, H_2, H_2O, and CH_4 are 6 J, 0, 4 J and 10 J?

a) 2 J
b) 5 J

c) 6 J
d) 9 J

24. What is the enthalpy of reaction forC_6H_6 -> $3C_2H_2$, if the conversion of C_6H_6 is 80%, and heat of formation of C_6H_6, and C_2H_2 are 24 J, and 8 J?
a) 0
b) 2.4 J
c) 4.8 J
d) 5.6 J

25. What is the enthalpy change of a reaction at 45^{o}C, if the enthalpy of reactant at 45^{o}C and 25^{o}C are 10 J and 6 J, and enthalpy of product at 45^{o}C and 25^{o}C are 15 J and 8 J, and the enthalpy change of reaction at 25^{o}C is 10 J?
a) 14 J
b) 21 J
c) 27 J
d) 34 J

26. What is the enthalpy change of a reaction at 35^{o}C, if the enthalpy of reactant at 35^{o}C and 25^{o}C are 18 J and 10 J, and enthalpy of product at 35^{o}C and 25^{o}C are 12 J and 8 J, and the enthalpy change of reaction at 25^{o}C is 15 J?
a) 9 J
b) 14 J
c) 22 J
d) 27 J

27. What is the enthalpy change of a reaction at 35^{o}C, if the enthalpy of reactant at 35^{o}C and 25^{o}C are 22 J and 15 J, and enthalpy of product at 35^{o}C and 25^{o}C are 10 J and 5 J, and the enthalpy change of reaction at 25^{o}C is 36 J?
a) 12 J
b) 24 J
c) 36 J
d) 48 J

28. . What is the enthalpy change of a reaction at 30^{o}C, if the enthalpy of reactant at 30^{o}C and 25^{o}C are 18 J and 15 J, and enthalpy of product at 30^{o}C and 25^{o}C are 10 J and 8 J, and the enthalpy change of reaction at 25^{o}C is 45 J?
a) 10 J
b) 25 J
c) 50 J
d) 100 J

29. What is the enthalpy change of a reaction at 90^{o}C, if the enthalpy of reactant at 90^{o}C and 25^{o}C are 60 J and 25 J, and enthalpy of product at 90^{o}C and 25^{o}C are 80 J and 10 J, and the enthalpy change of reaction at 25^{o}C is 5 J?
a) 10 J

b) 50 J
c) 110 J
d) 150 J

30. How are enthalpies of streams calculated?
a) Relative to the reference state
b) Absolutely
c) Depends on the reaction
d) None of the mentioned

31. What is the enthalpy of a reaction, if the standard heat of formation of a compound is 10 J and sensible heat of the compound is 5 J?
a) 0
b) 5 J
c) 10 J
d) 15 J

32. What is the enthalpy of a reaction, if the standard heat of formation of a compound is 15 J and sensible heat of the compound is 25 J?
a) 15 J
b) 25 J
c) 40 J
d) 50 J

33. What is the enthalpy of a reaction, if the standard heat of formation of a compound is 15 J, sensible heat of the compound is 25 J, and latent heat of the compound is 10 J?
a) 25 J
b) 40 J
c) 50 J
d) 65 J

34. What is the enthalpy of a reaction, if the standard heat of formation of a compound is 10 J, sensible heat of the compound is 30 J, and latent heat of the compound is 20 J?
a) 10 J
b) 30 J
c) 40 J
d) 60 J

35. What is the enthalpy of the reaction from $25^{o}C$ to $40^{o}C$ if C_P = 10 J/^{o}C, and the reference enthalpy is 10 J?
a) 80 J
b) 120 J
c) 160 J
d) 200 J

36. What is the enthalpy of the reaction from $10^{o}C$ to $15^{o}C$ if C_P = 5 J/^{o}C, and the reference enthalpy is 25 J?

a) 25 J
b) 50 J
c) 75 J
d) 100 J

37. What is the enthalpy of the reaction from $10^{o}C$ to $15^{o}C$ if $C_P = 5$ J/^{o}C, and the reference enthalpy is 25 J?
a) 25 J
b) 50 J
c) 75 J
d) 100 J

38. What is the heat transferred to the system if the enthalpy of the output is 10 J and input is 6 J?
a) 4 J
b) 5 J
c) 6 J
d) 8 J

39. What is the heat transferred to the system if the enthalpy of the output is 14 J and input is 8 J?
a) 4 J
b) 6 J
c) 8 J
d) 10 J

40. What is the heat transferred to the system if the enthalpy of the output is 15 J and input is 10 J?
a) 1 J
b) 2 J
c) 4 J
d) 5 J

41. What is the heat of reaction if the heat of combustion of products is 10 J and heat of combustion of reactants is 5 J?
a) -5 J
b) 5 J
c) 10 J
d) Cannot be determined

42. What is the heat of reaction if the heat of combustion of products is 10 J and heat of combustion of reactants is 15 J?
a) -5 J
b) 5 J
c) 10 J
d) Cannot say

43. What is the heat of reaction if the heat of combustion of products is 40 J and heat of combustion of reactants is 25 J?

a) 5 J
b) 10 J
c) 15 J
d) -15 J

44. What is the heat of reaction if the heat of combustion of products is 25 J and heat of combustion of reactants is 15 J?

a) -5 J
b) 5 J
c) -10 J
d) 10 J

45. What is the heat of reaction if the heat of combustion of products is 2 J and heat of combustion of reactants is 10 J?

a) 8 J
b) -8 J
c) 4 J
d) -4 J

46. What is the sensible heat of a reaction if the enthalpy of outputs is 15 J, and enthalpy of inputs is 5 J?

a) 3 J
b) 5 J
c) 10 J
d) 15 J

47. What is the sensible heat of a reaction if the enthalpy of outputs is 5 J, and enthalpy of inputs is 10 J?

a) -5 J
b) 5 J
c) -10 J
d) 10 J

48. How long would it take for a reversible process to complete?

a) Instant
b) Infinite
c) Depends on the process
d) None of the mentioned

49. A mixture contains 20% of A with Heat Capacity 25 J/^{o}C, 30% of B with Heat Capacity 20 J/^{o}C, and 50% of C with Heat Capacity 10 J/^{o}C, what is the Heat Capacity of mixture?

a) 10 J/^{o}C
b) 14 J/^{o}C

c) 16 J/^{o}C
d) 20 J/^{o}C

50. What is the heat of solution in the energy balance?
a) Heat of dissolution
b) Heat of reaction
c) Heat of formation
d) None of the mentioned

UNIT 5
SECOND LAW OF THERMODYNAMICS

1. The equation TdS=dU+pdV is obtained from which law?
a) first law
b) second law
c) both of the mentioned
d) none of the mentioned

2. Which of the following equation is true?
a) TdS=dH+Vdp
b) TdS=dH-Vdp
c) TdS=-dH-Vdp
d) TdS=-dH+Vdp

3. The equation dQ=dE+dW holds good for
a) any process, reversible or irreversible
b) only reversible process
c) only irreversible process
d) none of the mentioned

4. The equation TdS=dU+pdV holds good for
a) reversible process
b) reversible process
c) both of the mentioned
d) none of the mentioned

5. The equation dQ=TdS is true only for a reversible process.
a) true
b) false

6. The equation TdS=dH-Vdp
a) relates only the properties of a system
b) there is no path function term in the equation
c) the equation holds good for any process
d) all of the mentioned

7. The equation $W=\int vdp$ holds good for
a) work-producing machine like an engine or turbine
b) work-absorbing machine like a pump or a compressor
c) both of the mentioned
d) none of the mentioned

8. Only those processes are possible in nature which would give an entropy ____ for the system and the surroundings together.
a) decrease
b) increase
c) remains same
d) none of the mentioned(B)

9. A process always occurs in such a direction as to cause an increase in the entropy of the universe.
a) true
b) false

10. When the potential gradient is ____, the entropy change of the universe is ____
a) large, zero
b) infinitesimal, zero
c) infinitesimal, negative
d) none of the mentioned

11. At equilibrium, the isolated system exists at the peak of the entropy-hill and
a) dS=-1
b) dS=1
c) dS=infinity
d) dS=0

12. Which of the following is true?
a) the KE of a gas is due to the coordinated motion of of all the molecules with same average velocity in same direction
b) the PE is due to the displacement of molecules from their normal positions
c) heat energy is due to the random thermal motion of molecules in a disorderly fashion
d) all of the mentioned

13. Orderly energy can be easily converted into disorderly energy.
a) true
b) false

14. When work is dissipated into internal energy, what is the change in the disorderly motion of molecules.
a) decreases
b) increases
c) remains same
d) none of the mentioned

15. When heat is imparted to a system,

a) the disorderly motion of molecules increases

b) the entropy of the system increases

c) both of the mentioned

d) none of the mentioned

16. Which of the following relation is correct?

a) S=lnK/W

b) S=K/lnW

c) S=lnK*W

d) S=K*lnW

17. In the reversible adiabatic expansion of a gas the increase in disorder due to an increase in volume is compensated by the decrease in disorder due to a decrease in temperature.

a) true

b) false

18. When does the entropy of a system become zero?

a) W=0

b) W=1

c) W=-1

d) none of the mentioned

19. According to the Boltzmann,

a) he introduced the thermodynamic probability with each state

b) increase in entropy implies that the system proceeds by itself towards a state of higher thermodynamic probability

c) an irreversible process goes on happening until the most probable is achieved

d) all of the mentioned

20. When W=1, we get S=0 which can occur only at T=0K. This is the Nernst-Simon statement of third law of thermodynamics.

a) true

b) false

21. The first law of thermodynamics doesn't tell us whether a thermodynamic process is feasible or not.

a) true

b) false

22. According to Joule's experiments,

a) heat can be completely converted into work

b) work can be completely converted into heat

c) both heat and work are completely interchangeable

d) all of the mentioned

23. Which of the following is true?

a) work is a high grade energy

b) heat is a low grade energy

c) complete conversion of low grade energy into high grade energy in a cycle is impossible

d) all of the mentioned

24. In a cyclic heat engine there is

a) net heat transfer to the system and net work transfer from the system

b) net heat transfer from the system and net work transfer to the system

c) depends on the conditions of cycle

d) none of the mentioned

25. . Boiler, turbine, condenser and pump together constitute a heat engine.

a) true

b) false

26. In a heat engine cycle, which of the following process occurs?

a) heat is transferred from furnace to boiler

b) work is produced in turbine rotor

c) steam is condensed in condenser

d) all of the mentioned

27. The function of a heat engine cycle is to _____ continuously at the expense of _____ to the system.

a) heat input, produce work

b) produce work, heat input

c) can be both of the mentioned

d) none of the mentioned

28. Efficiency of a heat engine is defined as

a) total heat output / net work input

b) total heat input / net work output

c) net work output / total heat input

d) net work input / total heat output

29. A thermal energy reservoir is a large body of

a) small heat capacity

b) large heat capacity

c) infinite heat capacity

d) none of the mentioned

30. . Processes inside a thermal energy reservoir are quasi-static.

a) true

b) false

31. A TER which transfers heat to system is called ____ and one which receives heat is called ____

a) source, sink

b) sink, source

c) sink, sink
d) source, source

32. Which if the following statements are true for a mechanical energy reservoir(MER)?
a) it is a large body enclosed by an adiabatic impermeable wall
b) stores work as KE or PE
c) all processes within an MER are quasi-static
d) all of the mentioned

33. According to Kelvin-Planck statement, it is ____ for a heat engine to produce net work in a complete cycle if it exchanges heat only with bodies at ____
a) impossible, single fixed temperature
b) possible, changing temperature
c) impossible, changing temperature
d) possible, single fixed temperature

34. If heat rejected from the system Q2 is zero, then
a) net work=Q1 and efficiency=1.00
b) heat is exchanged only with one reservoir
c) it violates the Kelvin-Planck statement
d) all of the mentioned(D)

35. The Kelvin temperature is numerically equal to the _____ and may be measured by means of a _____
a) gas temperature, liquid thermometer
b) ideal gas temperature, gas thermometer
c) ideal gas temperature, liquid thermometer
d) none of the mentioned

36. A heat engine has to exchange heat with ___ energy reservoir at ___ different temperatures to produce net work in a complete cycle.
a) one, one
b) one, two
c) two, two
d) none of the mentioned

37. The second law is not a deduction of the first law.
a) true
b) false

38. Which of the following is true?
a) heat always from a high temperature body to a low temperature body
b) heat always from a low temperature body to a high temperature body
c) heat can flow from both low to high and high to low temperature body
d) none of the mentioned

39. According to Clausius statement
a) it is impossible to construct a device than can transfer heat from a cooler body to a

hotter body without any effect

b) it is impossible to construct a device than can transfer heat from a hotter body to a cooler body without any effect

c) it is possible to construct a device than can transfer heat from a cooler body to a hotter body without any effect

d) none of the mentioned

40. If the second law were not true

a) a ship could be driven by extracting heat from the ocean

b) run a power plant by extracting heat from the air

c) both of the mentioned

d) none of the mentioned

41. It is necessary to have a temperature difference to obtain work of any cycle.

a) true

b) false

42. The absolute thermodynamic temperature scale is also known as

a) celsius scale

b) kelvin scale

c) fahrenheit scale

d) none of the mentioned

43. In defining the temperature scale, the standard reference point is taken as

a) zero kelvin

b) boiling point of water

c) triple point of water

d) none of the mentioned

44. When the heat transferred isothermally between the given _____ decreases, the temperature ____

a) isotherms, increases

b) isotherms, decreases

c) adiabatics, increases

d) adiabatics, decreases

45. A definite zero point ___ on the absolute temperature scale but this point ___ be reached ___ violation of the second law.

a) doesnot, can, without

b) exists, cannot, without

c) exists, can, with

d) none of the mentioned

46. The first TdS equation is

a) $TdS=Cv*dT + T(\partial T/\partial p)dV$

b) $TdS=Cv*dT - T(\partial p/\partial T)dV$

c) $TdS=Cv*dT + T(\partial p/\partial T)dV$

d) $TdS=Cv*dT - T(\partial T/\partial p)dV$

47. . For getting TdS equations, we assume entropy to be a function of T and V and also of T and p.

a) true

b) false

48. When do we have the condition Cp=Cv?

a) as T approaches 0K, Cp tends to approach Cv

b) when $(\partial V/\partial T)=0$, Cp=Cv

c) both of the mentioned are correct

d) none of the mentioned are correct

49. At constant entropy, the two TdS equations give us the relation

a) Cp+Cv = 0

b) Cp=Cv

c) Cp-Cv = mR

d) Cp/Cv = ɣ

50. The slope of an isentrope is ____ the slope of an isotherm on p-v diagram.

a) less than

b) greater than

c) equal to

d) less than or equal to

UNIT 6
REFREIGERATION AND HEAT PUMP

1. Which device maintains a body at a temperature lower than the temperature of the surroundings?

a) PMM1

b) PMM2

c) refrigerator

d) heat pump

2. What does a refrigerant do?

a) absorbs the heat leakage into body from surroundings

b) evaporates in the evaporator

c) absorbs latent heat of vaporization form the body which is cooled

d) all of the mentioned

3. Coefficient of performance(COP) is defined as

a) heat leakage/work input

b) work input/heat leakage

c) latent heat of condensation/work input

d) work input/latent heat of condensation

4. Which device maintains a body at a temperature higher than the temperature of the surroundings?
a) PMM1
b) PMM2
c) refrigerator
d) heat pump

5. In a heat pump, there is heat leakage from the body to the surroundings.
a) true
b) false

6. What is the relation between COP of heat pump and refrigerator?
a) COP of pump=COP of refrigerator – 1
b) COP of pump=COP of refrigerator + 1
c) COP of pump=COP of refrigerator – 2
d) COP of pump=COP of refrigerator + 2

7. Heat leakage from a heat pump to surroundings is always greater than work done on pump.
a) true
b) false

8. Which of the following statements are true?
a) a heat pump provides a thermodynamic advantage over direct heating
b) COP for both refrigerator and pump cannot be infinity
c) work input for both refrigerator and pump is greater than zero
d) all of the mentioned

9. If one of the Kelvin-Planck's or Clausius' statement is violated, then other is also violated.
a) true
b) false

10. In a carnot cycle, the working medium receives heat at a _____ temperature.
a) lower
b) higher
c) constant
d) none of the mentioned

11. In a carnot cycle, the working medium rejects heat at a _____ temperature.
a) lower
b) higher
c) constant
d) none of the mentioned

12. In a carnot cycle, the working fluid is
a) a real gas
b) an ideal gas

c) a natural gas
d) none of the mentioned

13. The isothermal process of a carnot cycle needs very _____ motion of the piston to maintain constant temperature.
a) slow
b) fast
c) medium
d) none of the mentioned

14. The adiabatic process of a carnot cycle needs very _____ motion to complete the adiabatic process.
a) slow
b) fast
c) medium
d) none of the mentioned

15. For a given temperature T_1, as the difference between T_1 and T_2 increases, the COP of a carnot heat pump
a) increases
b) decreases
c) first increases, then decreases
d) none of the mentioned(B)

16. A carnot heat pump is used to heat a house. The outside temperature is -3ºC and the indoor temperature is 27ºC. If the heat loss from the house is 40kW, the power required to operate the heat pump is
a) 1kW
b) 2kW
c) 3kW
d) 4kW

17. A carnot cycle is to be designed to attain efficiency of 0.75. if temperature of high temperature reservoir is 727ºC, then low temperature reservoir will have to be maintained at
a) 23ºC
b) 181ºC
c) -23ºC
d) -181ºC

18. A cyclic heat engine does 50kJ of work per cycle. If efficiency of engine is 75%, the heat rejected per cycle will be
a) 60.6kJ
b) 16.6kJ
c) 66.6kJ
d) 200kJ

19. A carnot cycle refrigerator operates between 250ºK and 300ºK. What is the value of COP?

a) 10
b) 20
c) 25
d) 5

20. Based on the external fluid/cooling medium, condensers can be divided into three parts. Which one of the following is not one of them?

a) Air cooled condensers
b) Water cooled condensers
c) Evaporative condensers
d) Sub-cooled liquid condensers

21. In traditional Refrigerators in home appliances, what is the type of condenser used?

a) Natural convection type
b) Forced convection type
c) Furnace Type
d) Rotary condensers

22. In absorption refrigeration cycle, which of the following is used?

a) refrigerant
b) absorbent
c) both of the mentioned
d) none of the mentioned

23. In absorption system, compressor in vapour compression cycle is replaced by absorber-generator assembly.

a) true
b) false

24. In the aqua-ammonia absorption system,

a) water is the refrigerant and ammonia is the absorbent
b) ammonia is the refrigerant and water is the absorbent
c) both ammonia and water can be used as refrigerant or absorbent
d) none of the mentioned

25. Which of the following statement is true?

a) ammonia vapour is absorbed in water
b) boiling point of ammonia is more than that of water
c) both of the mentioned
d) none of the mentioned

26. why is an analyser-rectifier combination is used in absorption refrigeration cycle?

a) to increase the amount of water vapour in ammonia vapour
b) to decrease the amount of water vapour in ammonia vapour

c) to eliminate the water vapour from ammonia vapour
d) all of the mentioned

27. Lithium bromide-water vapour is another absorption refrigeration system.
a) true
b) false

28. Water is used as a ____ in air conditioning units.
a) absorbent
b) refrigerant
c) absorbent and refrigerant
d) none of the mentioned

29. The COP of absorption refrigeration system is
a) low
b) high
c) equal to that of vapour compression refrigeration system
d) none of the mentioned

30. The vapour going to condenser is ____ in temperature and ____ in ammonia.
a) higher, less
b) higher, richer
c) lower, less
d) lower, richer

31. For an expansion device, which of the following is true?
a) it increases the pressure of refrigerant
b) it regulates the flow of refrigerant to evaporator
c) both of the mentioned
d) none of the mentioned

32. Which of the following is a type of expansion device?
a) capillary tubes
b) throttle valves
c) both of the mentioned
d) none of the mentioned

33. Types of compressor include
a) reciprocating
b) centrifugal
c) rotary
d) all of the mentioned

34. Throttle valves are used in ____
a) small units
b) larger units
c) both of the mentioned
d) none of the mentioned

35. Capillary tubes are used in ____
a) small units
b) larger units
c) both of the mentioned
d) none of the mentioned

36. When volume flow rate of refrigerant is large, which compressor is used?
a) reciprocating
b) centrifugal
c) rotary
d) all of the mentioned

37. When volume flow rate of refrigerant is large, which compressor is used?
a) reciprocating
b) centrifugal
c) rotary
d) all of the mentioned

38. In reciprocating compressors, actual volume of gas drawn in cylinder is ____ the volume displaced by piston.
a) less than
b) more than
c) equal to
d) none of the mentioned

39. Why is multistage compression with intercooling adopted?
a) using a single stage with high pressure ratio decreases volumetric efficiency
b) high pressure ratio with dry compression gives high compressor discharge temperature
c) the refrigerant is damaged
d) all of the mentioned

40. The most widely used refrigerants are
a) freon
b) genetron
c) arcton
d) all of the mentioned

41. Why is ammonia used in food refrigeration?
a) high COP
b) low cost
c) lower energy cost
d) all of the mentioned

42. Compression can be
a) dry compression
b) wet compression

c) both of the mentioned
d) none of the mentioned

43. The expansion process is
a) isentropic
b) reversible
c) adiabatic
d) all of the mentioned

44. We divide the temperature/enthalpy diagram into a number of zones such that the curves of both the condensing stream and the coolant can be regarded as being reasonably linear.
a) True
b) False

45. Fog formation in a condenser can occur when the temperature of the vapour-gas mixture _____ the local saturation temperature during the condensation process.
a) Falls below
b) Goes above
c) Becomes equal to
d) Goes considerably high

46. Which of the following can be used to transfer heat to the refrigerant passing through evaporator?
a) outside air
b) water from rivers
c) the ground
d) all of the mentioned

47. An air-air heat pump can be used for
a) heating during winter
b) cooling during summer
c) both of the mentioned
d) none of the mentioned

48. The COP of gas-cycle refrigeration cycle is very high.
a) true
b) false

49. A gas-cycle refrigeration system is used in
a) aircrafts
b) missiles
c) both of the mentioned
d) none of the mentioned

50. The evaporation process is a
a) constant volume reversible process
b) constant pressure reversible process

c) adiabatic throttling process
d) reversible adiabatic process