

**15. What do you understand by equilibrium of a system?**

Ans: When a system remains in equilibrium state, it should not undergo any changes to its own accord.

**16. What is meant by thermodynamic equilibrium? (MU – Apr'98; MSU – Apr'96)**

Ans: When a system is in thermodynamic equilibrium, it should satisfy the following three conditions.

- (a) Mechanical Equilibrium :- Pressure remains constant
- (b) Thermal equilibrium :- Temperature remains constant
- (c) Chemical equilibrium : There is no chemical reaction.

**17. State the First law of thermodynamics (MU – Apr'95)**

Ans: First of thermodynamics states that when system undergoes a cyclic process the net heat transfer is equal to work transfer.

**18. Define: PMM of first kind**

Ans: PMM of first kind delivers work continuously without any input. It violates first law of thermodynamics, It is impossible to construct an engine working with this principle.

**19. Define the term process (MKU – Nov'96)**

Ans: It is defined as the change of state undergone by a gas due to energy flow.

**20. Define the term Cycle: (MKU – Nov'96)**

Ans: When a system undergoes a series of processes and return to its initial condition, it is known as cycle.

**21. What is meant by open and closed cycle.**

Ans: In a closed cycle, the same working substance will recirculate again and again.

In an open cycle, the same working substance will be exhausted to the surroundings after expansion.

**22. What is meant by reversible and irreversible process. (MU – Apr'2001; BNU – Nov'94)**

Ans: A process is said to be reversible, it should trace the same path in the reverse direction when the process is reversed. It is possible only when the system passes through a continuous series of equilibrium state.

If a system does not pass through continuous equilibrium state, then the process is said to be irreversible.

**23. What is meant by Point and Path function? (Mu – Oct'2000; MKU – Nov'94)**

Ans: The quantities which is independent on the process or path followed by the system is known as point functions.

Ans: Energy can neither be created nor destroyed, but it can be transferred from one form to another.

**32. Define entropy of a pure substance. (MU – Oct'2000; MKU – Nov'96; BRU – Nov'95)**

Ans: Entropy is an important thermodynamic property, which increases with addition of heat and decreases with its removal. Entropy is a function of temperature only. It is an unavailability of energy during energy transfer.

**33. Define an isentropic process. (MU – Oct'99)**

Ans: Isentropic process is also called as reversible adiabatic process. It is a process which follows the law of  $pV^{\gamma} = C$  is known as isentropic process. During this process entropy remains constant and no heat enters or leaves the gas.

**34. Explain the throttling process.**

Ans: When a gas or vapour expands and flows through an aperture of small size, the process is called as throttling process.

**35. Work done in a free expansion process is \_\_\_\_\_ (MU – Apr'97)**

Ans: Zero

**36. Define free expansion process.**

Ans: When a gas expands suddenly into a vacuum through a large orifice is known as free expansion process.

**37. Which property is constant during throttling? (MU – Oct'98, Oct'2000)**

Ans: Enthalpy

**38. If in the equation  $PV^n = C$ , the value of  $n = 0$  then the process is called \_\_\_\_\_**

Ans: Constant Volume process

**39. The polytropic index (n) is given by \_\_\_\_\_ (MU – Apr'95 & 96)**

Ans:  $n = \log (P_2/P_1) / \log (V_1/V_2)$

**40. Work transfer is equal to heat transfer in case of \_\_\_\_\_ process. (MU – Nov'94)**

Ans: Isothermal process.

**41. Write down the characteristic gas equation.**

Ans: Characteristic gas equation is  $pV = mRT$

Where,

p = pressure

V = Volume

R = Characteristic gas constant

T = Temperature.

**42. What is meant by steady flow process? (BNU – Nov'96)**

Ans: During the process the rate of flow of mass and energy across the boundary remains constant, is known as steady flow process.

**43. What is the difference between steady flow and non – flow process?**

Ans: During the steady flow process the rate of flow of mass and energy across the boundary remains constant.

In case of non – flow across the system and boundary.

**44. State the Kelvin – Plank statement of second law of thermodynamics**

Ans: Kelvin – Plank states that it is impossible to construct a heat engine working on cyclic process, whose only purpose is to convert all the heat energy given to it into an equal amount of work.

**45. State Clausius statement of second law of thermodynamics.**

Ans: It states that heat can flow from hot body to cold without any external aid but heat cannot flow from cold body to hot body without any external aid.

**46. State Carnot’s theorem.**

Ans: No heat engine operating in a cyclic process between two fixed temperature can be more efficient than a reversible engine operating between the same temperature limits.

**47. What are the Corollaries of Carnot theorem.**

Ans: (i) In all the reversible engine operating between the two given thermal reservoirs with fixed temperature have the same efficiency.

(ii) The efficiency of any reversible engine operating between two reservoirs is independent of the nature of the working fluid and depends only on the temperature of the reservoirs.

**48. Define – PMM of second kind.**

Ans: Perpetual motion machine of second kind draws heat continuously from single reservoir and converts it into equivalent amount of work. Thus it gives 100% efficiency.

**49. What is the difference between a heat pump and a refrigerator?**

Ans: Heat pump is a device which operating in cyclic process, maintains the temperature of a hot body at a temperature higher than the temperature of surroundings.

A refrigerator is a device which operating in a cyclic process, maintains the temperature of a cold body at a temperature lower than the temperature of the surroundings.

**50. What is meant by heat engine?**

Ans: A heat engine is a device which is used to convert the thermal energy into mechanical energy.