**Basic Thermodynamics**

**Department of Mechanical Engineering**

**1. Based on the first law of thermodynamics, which one of the following is correct?**

(A) For an isothermal process, q = +w

(B) For an isochoric process, ΔU = -q

(C) For an adiabatic process, ΔU = -w

(D) For a cyclic process, q = -w

Answer: C

**2. Third law of thermodynamics provides a method to evaluate which property?**

(A) Absolute Energy

(B) Absolute Enthalpy

(C) Absolute Entropy

(D) Absolute Free Energy

Answer: C

**3. Thermodynamics mainly deals with**

(A) Interrelation of various forms of energy and their transformation from one form to another.

(B) The system in equilibrium state or moving from one equilibrium state to another equilibrium state.

C. Both of these

D. None of these

Answer: C

**4. Thermodynamics is not concerned about\_\_\_\_\_\_.**

(A) energy changes involved in a chemical reaction.

(B) the extent to which a chemical reaction proceeds.

(C) the rate at which a reaction proceeds.

(D) the feasibility of a chemical reaction.

Answer: C

**5. Choose the correct answer. A thermodynamic state function is a quantity**

(A) used to determine heat changes

(B) whose value is independent of path

(C) used to determine pressure volume work

(D) whose value depends on temperature only.

Answer: B

**6. Which thermodynamic function accounts automatically for enthalpy and entropy both?**

(A) Helmholtz Free Energy (A)

(B) Internal Energy (E)

(C) Work Function

(D) Gibbs Free Energy

Answer: D

**7. The entropy change can be calculated by using the expression ∆S = qrev/T When water freezes in a glass beaker, choose the correct statement amongst the following**

(A) ∆S (system) decreases but ∆S (surroundings) remains the same.

(B) ∆S (system) increases but ∆S (surroundings) decreases.

(C) ∆S (system) decreases but ∆S (surroundings) increases.

(D) ∆S (system) decreases and ∆S (surroundings) also decreases.

Answer: C

**8. In an adiabatic process, no transfer of heat takes place between system and surroundings. Choose the correct option for free expansion of an ideal gas under adiabatic condition from the following.**

(A) q = 0, ∆T ≠ 0, w = 0

(B) q ≠ 0, ∆T = 0, w = 0

(C) q = 0, ∆T = 0, w = 0

(D) q = 0, ∆T < 0, w ≠ 0

Answer: B

**9. The volume of gas is reduced to half from its original volume. The specific heat will be \_\_\_\_\_\_.**

(A) reduce to half

(B) be doubled

(C) remain constant

(D) increase four times

Answer: C

**10. In which of the following process, a maximum increase in entropy is observed?**

(A) Dissolution of Salt in Water

(B) Condensation of Water

(C) Sublimation of Naphthalene

(D) Melting of Ice

Answer: C

**11. A system absorb 10 kJ of heat at constant volume and its temperature rises from 270℃ to 370℃. The value of ∆U is-**

(A) 100 kJ

(B) 10 kJ

(C) 0 kJ

(D) 1 kJ

Answer: B

**12. An ideal gas is allowed to expand both reversibly and irreversibly in an isolated system. If Ti is the initial temperature and Tf is the final temperature, which of the following statements is correct?**

(A) (Tf)irrev > (Tf)rev

(B) Tf > Ti for reversible process but Tf = Ti for irreversible process

(C) (Tf)rev = (Tf)irrev

(D) Tf = Ti for both reversible and irreversible processes

Answer: A

**13. Which of the following is an intensive property?**

(A) temperature

(B) surface tension

(C) viscosity

(D) all of these

Answer: D

**14. In a reversible process the system absorbs 600 kJ heat and performs 250 kJ work on the surroundings. What is the increase in the internal energy of the system?**

(A) 850 kJ

(B) 600 kJ

(C) 350 kJ

(D) 250 kJ

Answer: C

**15. One mole of which of the following has the highest entropy?**

(A) Liquid Nitrogen

(B) Hydrogen Gas

(C) Mercury

(D) Diamond

Answer: B

**16. The enthalpy and internal energy are the function of temperature for**

(A) all gases

(B) steam

(C) water

(D) ideal gas

Answer: D

**17. Which of the following properties describe entropy?**  
(A) point function, intensive property  
(B) point function, extensive property  
(C) path function, extensive property  
(D) path function, intensive property

Answer: B

**18. The entropy of an isolated system can never \_\_\_\_**  
(A) decrease  
(B) be zero  
(C) increase  
(D) none of the mentioned

Answer: A

**19. A Carnot engine work between the temperature of 227 and 127. If work output of the engine is 104 J the amount of heat rejected to the sink will be-**

1. 1×104 J
2. 2×104 J
3. 4×104 J
4. 5×104 J

Answer: C

**20. The internal energy of an isolated process**

(A) Increase

(B) Decrease

(C) Constant

(D) Increase or decrease

Answer: C

**21. Entropy of an isolated system can never**   
(A) Increase  
(B) Decrease  
(C) Zero  
(D) All

Answer: C

**22. In 2nd law of thermodynamics, the Kelvin-Planck statement agreements with**

(A) Conservation of heat

(B) Conservation of work

(C) Conversion of heat into work

(D) Conversion of work into heat

Answer: C

**23. At triple point of water entropy is**

(A) Zero  
(B) Less than zero  
(C) More than zero  
(D) None of the above

Answer: A

**24. Otto cycle is a**

(A) Constant P cycle

(B) Constant V cycle

(C) Constant T cycle

(D) Constant S cycle

Answer: B

**25. At triple point of water entropy is—**

(A) 0

(B) < 0

(C) > 0

(D) None of the above

Answer: A

**26. For the same maximum P and T**

(A) Otto cycle is more efficient than the Diesel cycle

(B) Diesel cycle is more efficient than the Otto cycle

(C) Dual cycle is more efficient than Otto and Diesel cycles

(D) Dual cycle is less efficient than Otto and Diesel cycles

Answer: B

**27. The principle of entropy is…**

(A) The entropy of an isolated system can never decrease

(B) The entropy of a system remains constant only when the process is reversible

(C) The entropy of a system increases when the process is irreversible

(D) All of the above

Answer: D

**28. For the same compression ratio, the efficiency of the diesel cycle is ........ Otto cycle**

(A) More than

(B) Less than

(C) Equal to

(D) None of the above

Answer: B

**29. The thermal efficiency of the SI engine is**

(A) 15%  
(B) 30%

(C) 50%

(D) 70%

Answer: B

**30. The relation between compression ratio and the efficiency of the Otto cycle is--**

(A) Efficiency decreases with an increase in compression ratio

(B) Efficiency increases with an increase in compression ratio

(C) Efficiency does not affect by the change in compression ratio

(D) None of the above

Answer: B

**31. The efficiency of Rankine cycle is enhanced by**  
(A) Reheating of steam at the intermediate stage  
(B) Regeneration use of steam for heating Boiler feed water  
(C) Use of high pressures  
(D) All

Answer: D

**32. For the same Pmax and Temp**

(A) Otto cycle is more efficient than the Diesel cycle

(B) Diesel cycle is more efficient than the Otto cycle

(C) Dual cycle is more efficient than Otto and Diesel cycles

(D) Dual cycle is less efficient than Otto and Diesel cycles

Answer: B

**33. Efficiency of Rankine cycle of a good Steam Power Plant --**

(A) 15 to 20%

(B) 35 to 45%

(C) 70 to 80%

(D) 90 to 95%

Answer: B

**34. In Orsat’s apparatus, CO is absorbed by—**

(A) Potassium hydroxide

(B) Dilute potassium carbonate

(C) Cuprous chloride

(D) Alkaline pyrogallic solution

Answer: C