Objective type question:

EASY(30)

Q.1 In an isolated system, \_\_\_\_\_\_\_\_ can be transferred between the system and its surrounding.

a. only energy  
b. only mass  
c. both energy and mass  
d. neither energy nor mass

Ans-d

Optical method is adopted for measuring temperatures higher than the gold point?  
a) True  
b) False

A

Q.2 Which of the following is an extensive property?

a. Volume  
b. Pressure  
c. Viscosity  
d. All of the above

Ans-a

Q.3 How is absolute pressure measured?

a. Gauge pressure + Atmospheric pressure  
b. Gauge pressure – Atmospheric pressure  
c. Gauge pressure / Atmospheric pressure  
d. None of the above

Ans-a

A real gas behaves as an ideal gas when?  
a) Temperature approaches zero  
b) Pressure approaches zero  
c) Both temperature and pressure approaches zero  
d) None of the mentioned

B

Q.4 The extensive properties of a system, \_\_\_\_\_\_\_

a. are independent of the mass of the system  
b. depend upon temperature of the system  
c. depend upon the mass of the system  
d. none of the above

Ans-c

Q 5. An isobaric process, has constant \_\_\_\_\_

a. density  
b. pressure  
c. temperature  
d. volume

Ans-b

Which of the following is chosen as the standard thermometric substance?  
a) Gas  
b) Liquid  
c) Solid  
d) All of the mentioned

A

 Q-6 which of the following relations depict relation between Celsius and Fahrenheit scale?

a. (oC / 5) = (oF – 32) / 9  
b. (oC / 9) = (oF – 32) / 5  
c. (oC / 32) = (oF – 9) / 5  
d. None of the above

Ans-a

Q 7 A definite area or a place where some thermodynamic process takes place is known as

1. Thermodynamic system
2. Thermodynamic circle
3. Thermodynamic process
4. [Thermodynamic law](https://www.theengineerspost.com/laws-of-thermodynamics/)

Ans –a

The value of ratio of the steam point temperature to the ice point temperature is?  
a) 1.466  
b) 1.266  
c) 1.166  
d) 1.366

D

Q 8 The measurement of a thermodynamic property known as the temperature is based on

1. Zeroth law of thermodynamics
2. First law of thermodynamics
3. The second law of thermodynamics
4. None of these

Ans-a

Q 9 When two bodies are in thermal equilibrium with a third body, they are also in thermal equilibrium with each other. This statement is called.

1. [Zeroth law of thermodynamics](https://theengineerspost.com/laws-of-thermodynamics/)
2. First law of thermodynamics
3. The second law of thermodynamics
4. Kelvin Planck’s law

Ans-a

Q.10 The amount of heat required to raise the temperature of the unit mass of gas through one degree at constant volume is known as

1. Specific heat at volume
2. Specific heat at constant pressure
3. Kilo joule
4. None of these

Ans-a

What is the standard fixed point of thermometry?  
a) The ice point  
b) The steam point  
c) The triple point of water  
d) None of the mentioned

C

Q 11 An open system is one which

1. Heat and work crosses the boundary of the system, but the mass of the working substance does not cross the boundary of the system
2. Mass of the working substance crosses the boundary of the system but the heat and work does not cross the boundary of the system
3. Both the heat and work as well as mass of the working substance crosses the boundary of the system
4. Neither the heat and work nor the mass of the working substance crosses the boundary of the system

Ans-c

Q-12 The universal gas constant (or molar constant) of a gas is the product of

1. The molecular mass of the gas and constant
2. Atomic mass of the gas and the gas constant
3. The molecular mass of the gas and the specific heat at constant pressure
4. The molecular mass of the gas and the specific heat at constant volume

Ans-a

Q.13 Which of the following is an intensive property of a thermodynamic system?

1. Pressure
2. Volume
3. Temperature
4. Density

Ans-a,c,d

 The magnitude of mechanical work is the  
a) product of the force and distance travelled perpendicular to the force  
b) product of the force and distance travelled parallel to the force  
c) sum of the force and distance travelled perpendicular to the force  
d) sum of the force and distance travelled parallel to the force

B

Q-14 A process, in which the gas is heated or expanded in such a way that the product of its pressure and volume remains constant is known as

1. Isothermal process
2. Hyperbolic process
3. Adiabatic process
4. Polytropic process

Ans- a,b

Q15 An adiabatic process is one in which

1. No heat enters or leaves the gas
2. The temperature of the gas changes
3. The change in internal energy is equal to the mechanical work done
4. All of the above

Ans-d

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

A

Q 16 [Carnot cycle](https://www.theengineerspost.com/carnot-vapour-cycle/) consists of

1. Two constant volume and two isentropic processes
2. Two isothermal and two isentropic processes
3. Two constant pressure and two isentropic  processes
4. One constant volume one constant pressure and two isentropic processes

Ans-b

Q 17 during which of the following process does heat rejection take place in Carnot cycle?

a. Isothermal expansion

b. Isentropic expansion

c. Isothermal compression

d. Isentropic compression

Ans-c

Q-18 The isothermal and isentropic processes are reversible non-flow processes.

a. Agree

b. Disagree

c. none of the above

Ans-a

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

B

Q.19 The gas constant (*R*) is equal to the \_\_\_\_\_\_\_\_\_\_ of two specific heats.

a. Sum

b. difference

c. Product

d. ratio

ans- b

Q.20 What is the ratio of Cp/Cv for gas if the pressure of the gas is proportional to the cube of its temperature and the process is an adiabatic process?

1. 2
2. 3/2
3. 4/3
4. 5/3

Answer: (b)

Work is a  
a) point function  
b) path function  
c) depends on the state  
d) none of the mentioned

B

Q.21 A perfect black body has a unique characteristic feature as

1. a good absorber only
2. a good radiator
3. a good absorber and a good radiator
4. neither a radiator nor an absorber

Answer: (c)

Q.22 Chemical dissociation is

1. exothermic
2. reversible
3. endothermic
4. reversible and endothermic

Answer: (d)

Q.23 addition of heat at constant pressure to a gas results in

1. Raising its temperature
2. Raising its pressure
3. Raising its volume
4. Raising its temperature and doing external work

Ans d

Thermodynamic properties are  
a) point function  
b) path function  
c) depends on the state  
d) none of the mentioned

A

Q.24 which of the following items is not a path function

1. Heat
2. Work
3. Kinetic energy
4. Thermal conductivity

Ans d

The differentials of point functions are  
a) perfect differentials  
b) exact differentials  
c) all of the mentioned  
d) none of the mentioned

B

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

A

Q.25 [**An actual engine is to be designed having same efficiency as the Carnot cycle. Such a proposition is**](https://www.examveda.com/an-actual-engine-is-to-be-designed-having-same-efficiency-as-the-carnot-cycle-such-a-proposition-is-56530)

1. Feasible
2. Impossible
3. Possible
4. Possible, but with lot of sophistications

Ans d

Q.26 mix of ice and water form a

a. closed system

b. open system

c. isolated system

d. heterogeneous system

ans –d

Q.27 the entropy may be expressed as a function of

1. Pressure and temperature
2. Temperature and volume
3. Heat and work
4. All of these

Ans-a

Constant pressure process is also known as  
a) isopiestic process  
b) isobaric process  
c) all of the mentioned  
d) none of the mentioned

C

Q.28 Change an enthalpy of a system is the heat supplied at

1. Constant pressure
2. Constant temperature
3. Constant volume
4. Constant entropy

Ans-a

Q.29 during which of the following process does heat rejection takes place in carnot cycle?

1. Isothermal expansion
2. Isentropic expansion
3. Isothermal compression
4. Isentropic compression

Ans-c

Q 30. What is the thermometric property in the case of a thermocouple:

1. CURRENT
2. Emf
3. Resistance
4. Pressure

Moderate(10)

Q.1 energy can be neither created nor destroyed but can be converted in one form to other is inferred form

1. Zeroth low of thermodynamic
2. First law of thermodynamics
3. Second law to thermodynamics
4. Basic law of thermodynamics

Ans-b

Q.2 in an isothermal process, the internal energy of gas molecules

1. Increases
2. Decreases
3. Remain constant
4. May increase/decrease depending on the properties of gas

Ans-c

 Work done in a quasi-static process  
a) depends on the path followed  
b) independent of the path followed  
c) depends only on the initial and final states  
d) none of the mentioned

A

Q.3 for which of the following substances,the internal energy and enthalpy are the function of the temperature only

1. Any gas
2. Saturated steam
3. Water
4. Perfect gas

Ans d

Q.4 If gas is a heated against a pressure, keeping the volume constant, then work done will be equal to

1. +ve
2. -ve
3. Zero
4. Anywhere between zero and infinity

Ans –c

Which of the following represents the energy in storage?  
a) heat  
b) work  
c) internal energy  
d) none of the mentioned

C

Q.5 The specific heat of air increases with increase in

1. Temperature
2. Pressure
3. Both pressure and temperature
4. Variation of its constituents

Ans-a

Q-6 the efficiency of Stirling cycle is -------------Carnot cycle

1. Greater than
2. Less than
3. Equal to
4. None of these

Ans-c

By first law of thermodynamics,  
a) Q=ΔE-W  
b) Q=ΔE+W  
c) Q=-ΔE-W  
d) Q=-ΔE+W

B

Q.7 first law of thermodynamics is furnishes of relationship between

1. Heat and work
2. Heat, work and properties of the system
3. Various properties of the system
4. Various thermodynamic processes

Ans-b

Q.8 The measurement of a thermodynamic property known as a temperature is based on

1. First law of thermodynamics
2. Second law of thermodynamics
3. Zeroth law of thermodynamics
4. None of these

Ans –c

Which of the following can be considered as the definition of energy?  
a) Q=ΔE+W  
b) Q-W=ΔE  
c) first law of thermodynamics  
d) all of the mentioned

D

Q.9 for a thermodynamic process to be reversible, the temperature difference between hot body and working substance should be

1. Zero
2. Infinity
3. Maximum
4. Minimum

Ans –a

Heat flow into a system is taken to be \_\_\_\_, and heat flow out of the system is taken as \_\_\_\_  
a) positive, positive  
b) negative, negative  
c) negative, positive  
d) positive, negative

D

Q.10 properties of substance like pressure, temperature, and density in thermodynamics coordinates are

1. Path functions
2. Real functions
3. Cyclic functions
4. Point functions

Ans-d

High(10)

Q.1 Entropy changes depends upon

1. Heat transfer
2. Mass transfer
3. Change of temperature
4. Thermodynamic state

Ans-a

Q.2 Which of the following law of thermodynamics was invented most recently:

a. Zeroth Law

b. First law of thermodynamics

c. Second law of thermodynamics

d. None

Ans: a

For solids and liquids, specific heat  
a) depends on the process  
b) is independent of the process  
c) may or may not depend on the process  
d) none of the mentioned

**B**

Q.3 Carnot cycle is having:

a. 2 adiabatic processes, 2 isothermal processes

b. 2 Reversible Adiabatic processes, 2 Reversible isothermal processes

c. 2 Reversible Isochoric processes, 2 Reversible isothermal processes

d. 2 Reversible Adiabatic processes, 2 Reversible isobaric processes

Ans: b

Q. 4 Which of the following set corresponds to intensive properties:

a. Pressure, Viscosity, Temperature, Volume

b. Pressure, Viscosity, Temperature, Density

c. Mass, Volume, Energy, Entropy

d. None of these

Ans: b

Heat and work are  
a) path functions  
b) inexact differentials  
c) depend upon the path followed  
d) all of the mentioned

D

Q.5: Which of the following are true for continuum

a. The system dimensions must be much larger than Mean free path of the matter, the system should have matter distributed in a continuous manner, It is a must for Classical Thermodynamics.

b. The system dimensions must be much smaller than Mean free path of the matter, the system should have matter distributed in a continuous manner, It is a must for Statistical Thermodynamics.

c. The system may contain voids and spaces in the matter.

d. None

Ans a

Q. 6 Which of the following is true for Fahrenheit(F) and Rankine(R) scale:

1. F =460 +R
2. R= 460+ F
3. R= 273.15 + F
4. F= 80 + R

Ans b

Q. 7: Which of the following corresponds to the reference points used before 1954 and after 1954 respectively?

a. Melting point and Boiling Point of water (before), Boiling Point of water (after)

b. Boiling Point of water (after), Melting point and Boiling Point of water (before)

c. Melting point and Boiling Point of water (before), Triple Point of water (after)

d. Only Triple point, for both before and after

Ans c

Q. 8: Which of the following is an example of a reversible process?

a. Frictionless quasi static process

b. Flow through a nozzle

c. Flow through a turbine

d. All of the above

Ans a

Q.9: A system undergoing change in state from A to B along path ‘X’ receives 100 J heat and does 40 J work. It returns to state A from B along path ‘Y’ with work input of 30 J. Calculate the heat transfer involved along the path ‘Y’.  
a) – 60 J  
b) 60 J  
c) – 90 J  
d) 90 J

Ans: c

Q. 10: All gases and vapours approach ideal gas behaviour at?  
a) High pressure and high density  
b) Low pressure and low density  
c) High pressure and low density  
d) Low pressure and high density

Ans: b

Which of the following is correct?  
  
a. Work done by the system is taken positive

b.  Work done by the system is taken negative

c. Heat transferred to the system is taken as negative

d. None

Ans a

Multiple Choice Questions(Moderate)

Q. 1: Temperature of the triple point of water is ?  
a) 273.16 K  
b) 0.00 C  
c) 0.01 C  
d) 273.01 K

Ans: a,c

Q.2: The work done during a quasi static process can be calculated by:

a. ∫ P.dV

b. ∫ V.dP

c. Calculating the area under the P- V diagram

d. All of the above

Ans: a,c

Q.3: The work done during an isothermal process(1-2) is given by:

a. P1.V1 ln(V2/V1)

b. m.R.T1.ln(V2/V1)

c. P1.V1. ln(P1/P2)

d. None

Ans: a,b,c

Q.4: Which of the following statement/s is/are correct?

a. Adiabatic curve is steeper than isothermal curve

b. In case of close system, energy transfer takes place only in the form of heat transfer

c. Turbine is the example of a closed system

d. Pump is an example of an open system.

Ans: a,b,d

Q. 4: Which of the following is/are in line with I law of thermodynamics:

a. Conservation of energy

b. For a thermodynamic cycle: ∑Q= ∑W

c. Thermometry

d. None

Ans: a,b

Q.5: Which of the points regarding energy is/ are correct:

a. It is a property of system

b. It is an exact differential

c. It is a point function

d. It depends on the thermodynamic path

Ans: a,b,c

Q.6: In a flow process, the work transfer may be of which type?  
a) External work  
b) Flow work  
c) Both above  
d) none of the mentioned

Ans: a,b,c

Q.7: Which of the following represents the steady flow energy equation?

a) Q+W=(h2-h1)-(V2-V1)(V2+V1)/2+g(Z2-Z1)  
b) Q+W=(h2-h1)+(V2-V1)(V2+V1)/2+g(Z2-Z1)  
c) Q-W=(h2-h1)-(V2-V1)(V2+V1)/2+g(Z2-Z1)  
d) Q-W=(h2-h1)+(V2-V1)(V2+V1)/2+g(Z2-Z1)

Ans: d

Q. 8: Which of the following statements are correct?

a) Refrigerator is a work producing device, used to maintain a particular space at a temperature lower than that of surroundings.

b) Refrigerator is a work consuming device, used to maintain a particular space at a temperature lower than that of surroundings.

c) Engine is used to convert thermal energy into mechanical energy

d) No Engine can have efficiency more than corresponding Carnot engine.

Ans: b,c, d

Multiple type question (More than one option are correct)

Moderate (10) of 02 marks each

Short answer

Easy/ Moderate (7 Q of 02 marks)

Q.1: Define zeroth law of thermodynamics.

Q.2: Define ideal gas with its equation.

Q.3: Define thermodynamic equilibrium.

Q.4: The temperature T on a thermometric scale is defined as T=a.lnK+b where a & b are constants. The values of K are found to be 1.83 and 6.78 at 0°C and 100°C respectively. Calculate the temperature for a value of K = 2.42.

Q.5: What do you mean by PMM1?

Q.6: What are the limitations of 1st law of thermodynamics?

Q.7: The work done when a gas is compressed in a cylinder is 820 J. At the same time, the system lost 320 J of heat to the surrounding. What is the energy change of this system?

**Sol:** Here the gas is the system. First you must decide the signs of ‘W’ and ‘Q’ using the convention discussed earlier. Work is done on the system, so W = + 820 J and heat is lost by the system, so Q = - 320 J.

Therefore ∆E = Q + W = - 320 J + 820 J = **500 J**

This result indicates that the energy of the gas is increased by 500 J. This implies, at the end of the process the gas has more energy than it had in the beginning.

High (7 Q of 03 marks )

Q.1: Define Adiabatic process. A fluid at a pressure of 3 bar and specific volume of 0.18 m3/kg contained in a cylinder behind a piston expands reversibly to a pressure of 0.6 bar, according to a law P=C/V2 , where C is a constant. Calculate the work done by the fluid on the piston.

Q.2: An engine cylinder has a piston of area 0.12m3 and contained gas at a pressure of 1.5MPa.The gas expands according to a process which represented by inclined straight line on P-V diagram. The final pressure is 0.15MPa. Calculate the work done by the gas on the piston if the stroke length is 0.30m.

Q.3: Define intensive properties with three examples.

Q.4: The readings tA and tB of two thermometer of A and B agree at ice point and steam point and related by equation tA= m tB +n tB2 + L between these temperature where L, m and n are constant both are immersed in oil A reads 51°C and B reads 50°C. Determine the reading on A, When B reads 25°C. Discuss which thermometer is correct.

Q.5: Write the favorable conditions for ideal gas behavior. Also write the relation between universal gas constant and Characteristic gas constant.

Q.6: Describe second law of thermodynamics.