## 11.49: SOLVED MCQs OF PAPERS:

### YEAR (2012):

(i) The maximum work done is possible in this process:
* Isoboric * Isochoric * ***Isothermal*** * Adiabatic

(ii) Absolute zero corresponds to this temperature on Fahrenheit scale:
* 32°F * −180°F * ***−460 °F*** * 212°F

### YEAR (2011):

(i) Kinetic Energy Per mole of an ideal gas is:
* $\frac{3}{2}$ KT * $\frac{2}{3}$ KT * $\frac{3}{2}$ ***RT*** * $\frac{3}{2}$ RT

(ii) **In Adiabatic expansion, The internal energy of the gas:**
* Remains the same * ***Decreases*** * Increases * Becomes zero

### YEAR (2010):

**Q.1(a)Choose the most appropriate answer for each from given options.**

(i) **Two steam engines A and B have their sources at 600°C and 400°C and their sinks at 300°C and 200°C respectively:**
* They are equally efficient * ***'A' is more efficient than 'B'***
* B is more efficient than A
* If their sinks are interchanged their efficiencies will not change

(ii) **On Fahrenheit scale the temperature of 50°C will be:**
* 40°F * 10°F * ***122 °F*** * 105°F

### YEAR (2009):

**Q.1(a)Choose the correct answer from given options.**

(i) **Heat energy cannot be measured in:** * J * B.T.U * ***Kelvin*** * Calorie

(ii) **Boyle's Law holds good for in ideal gas in process called:**
* Isobaric * Isochoric * ***Isothermal*** * Adiabatic

(iii) **According to the Second Law of Thermodynamics 100 per cent conversion of heat energy into work is:**
* Possible * ***Not possible***
* Possible when conditions are ideal * Possible when conditions are not ideal

**Q.2(a)Choose the correct answer from given options.**

(i) **If no heat flows into or out of a system, the process is called:**
* Isobaric * Isothermal * Isochoric * ***Adiabatic***

(ii) **The molar heat capacities of polyatomic gasses as compared to the monoatomic gasses are:** * ***Greater*** * Smaller * Equal * Infinite

(iii) **Thermostat is a device used to keep the:**
* ***Temperature constant*** * Entropy constant * Heat constant * Pressure constant

### YEAR (2008):

**Q.1(a)Choose the correct answer from given options.**

(i) **The kinetic energy per mole of a gas is:**
* 3/2 kT * 2/3 kT * ***3/2 RT*** * nRT

(ii) ***If the volume of a given mass of a gas is doubled without changing its temperature, the pressure of the gas is:***
* ***Reduced to ½ of the initial value*** * The same as the initial value
* Reduced to ¼ of the initial value * Double of the initial value

(iii) **A bimetallic thermostat works on the principle of:**
* ***Linear expansion*** * Bulk expansion * Differential linear expansion * All of these

**Q.2(a)Choose the correct answer from given options.**

(i) **The area bounded by an isothermal and an adiabatic curve in a PV diagram for a heat-engine represents:**
* Heat absorbed * Heat rejected * ***Work done*** * Total kinetic energy

(ii) **Entropy has been called the degree of disorder because:**
* The entropy of the universe remains constant
* ***The entropy of the universe always increases***
* The entropy of the universe always decreases * None of these

(iii) **A thermodynamic process in which the change in volume of the system is zero tells that:**
* The work done by the system is maximum
* ***The work done on and by the system is zero***
* The work done on the system is maximum * None of the above

## YEAR (2007):

**Q.1(a)Choose the correct answer from given options.**

(i) **Fahrenheit and Celsius scales of temperature coincide at:**
* 0° * 273° * –273° * ***–40°***

(ii) **The volume of a given gas at constant pressure becomes zero at:**
* 273 K * 273°C * –273 K * ***–273°C***

(iii) **According to the Kinetic Theory of gases the absolute temperature of a perfect gas is:**
* Inversely proportional to the K.E of the molecules
* Independent of kinetic energy of the molecules
* Equal to the kinetic energy of the molecules
* ***Directly proportional to the average translational kinetic energy of the molecules***

**Q.2(a)Choose the correct answer from given options.**

(i) **The bounded area of a Carnot cycle represents:**
* Energy loss due to leakage * Heat rejected * Heat absorbed * ***Useful work***

(ii) **Two ends "A" & "B" of a rod are at temperatures –10°C and –30°C. The heat will flow from:**
* –30°C to –10°C * Will not flow at all * ***–10°C to –30°C*** * None of the above

(iii) **273 K is equal to:**
* 0°F * –32°F * –273°F * ***32°F***

## YEAR (2006):

**Q.1(a)Choose the correct answer from given options.**

(i) **In Celsius scale 1°C in magnitude is equal to:** * 32° * 16F° * 0°F * ***1.8°F***

(ii) **The maximum work done can be measured in the process called:**
* Isobaric * Isochoric * ***Isothermal*** * Adiabatic

(iii) **The change in disorder of the system is equal to:**
* $\Delta S = \frac{\Delta T}{Q}$ * $\Delta S = \frac{\Delta Q}{T}$ * $\Delta S = \frac{\Delta Q}{\Delta T}$ * $\Delta S = \Delta Q.T$

**Q.2(a) Choose the correct answer from given options.**

(i) **One cubic metre volume is equal to:**
* $10^2\ cm^3$ * $10^3\ cm^3$ * ***$10^6\ cm^3$*** * $10^{-3}\ cm^3$

(ii) **In C.G.S. system one calorie of heat is equal to:**
* 11.184 J * 2.184 J * 3.184 J * ***4.184 J***

(iii) **The efficiency of a Carnot engine is given by:**
* $1-\frac{T_1}{T_2}$ * $\frac{T_1}{T_2}-1$ * $\frac{T_2}{T_1}-1$ * ***None of these***

## YEAR (2005):

**Q.1(a)Choose the correct answer from given options.**

(i) **RMS velocity of a gas molecule at absolute zero temperature is:**
* $9 \times 10^6$ m/sec * $3 \times 10^3$ m/sec * 273 m/sec * ***Zero***

(ii) **The value of Boltzman constant is:**
* $3.85 \times 10^{-23}$ * $2.185 \times 10^{-12}\ JK^{-1}$ * $1.62 \times 10^{-22}\ JK^{-1}$ * ***$1.38 \times 10^{-23}\ JK^{-1}$***

(iii) **The heat required to produce a unit change in the temperature of a unit mass of a substance is called:**
* Heat capacity * Molar heat * ***Specific heat*** * Latent heat

**Q.2(a)Choose the correct answer from given options.**

(i) **The difference of molar specific heats at constant pressure and at constant volume per mole is called:**
* Molar heat * Heat constant * Boltzman constant * ***Gas constant***

(ii) **A domestic pressure cooker is based on:**
* Adiabatic process * Isothermal process * Isobaric process * ***Isochoric process***

(iii) **The absolute temperature corresponding to 212°F is:**
* 485 K * ***373 K*** * 161 K * 100 K

## 11.50: MULTIPLE CHOICE QUESTIONS (FOR SELF PRACTICE)

**Q.1. According to the caloric theory heat is present in all bodies in the form of.**

(a) Molecular Interactions (b) Translatory motions of molecules
(c) Molecular Kinetic energy (d) A weightless fluid

**Q.2. Caloric is the:**

(a) Hypothetical weightless fluid (b) Imaginary concept of energy
(c) Energy (d) Molecular motion

**Q.3. The normal human body temperature is:**

(a) 212 °F (b) 100 °F (c) 98.4 °F (d) 37 °F

**Q.4. The temperature at which both Celsius and Fahrenheit scales coincide with each other is:**

(a) 100 (b) 273 (c) – 40 (d) Zero

**Q.5. Absolute zero is equivalent to:**

(a) 100 °C (b) – 460 °F (c) 0 °C (d) 273 K

**Q.6. Kinetic energy of gas molecule is:**

(a) RT (b) $\frac{3}{2}$RT (c) KT (d) $\frac{3}{2}$KT

**Q.7. Kinetic energy per mole of ideal gas molecules is:**

(a) RT (b) $\frac{3}{2}$RT (c) KT (d) $\frac{3}{2}$KT

**Q.8. Upon which Physical quantity Kinetic energy of gas molecules depends.**

(a) Number of moles of gas. (b) Temperature of gas
(c) Pressure of gas. (d) Volume of gas

**Q.9. Molecules of which gas, Oxygen or Nitrogen in air will move fast at some particular temperature.**

(a) Molecules of both gases will move with same Velocities
(b) Oxygen
(c) Nitrogen
(d) None of these

**Q.10. The unit of Co-efficient of thermal expansion is:**

(a) mK (b) $\frac{m}{K}$ (c) $K^{-1}$ (d) K

**Q.11. Co-efficient of Volumetric expansion is the:**

(a) Intrinsic Quantity
(b) Thrice of Co-efficient of Linear expansion
(c) One third of Co-efficient of Linear expansion
(d) Thermometric Property

**Q.12. Which physical quantity of substance does not change with thermal expansion?**

(a) Volume (b) Length (c) Mass (d) Density

**Q.13. Which types of strips of metals are used in Bimetallic strip.**

(a) Different Co-efficient of thermal expansion
(b) Different lengths
(c) Different Sizes
(d) Different Shapes

**Q.14. A thermostat is a device which is used:**

(a) to keep the heat flow constant
(b) to Isolate the system from surroundings
(c) in all heating appliances
(d) to keep the temperature constant

**Q.15. The quantity of heat required to change the state of a substance is:**

(a) Molar specific heat (b) Heat capacity
(c) Latent heat (d) Specific heat

**Q.16. The quantity of heat required per degree rise the temperature of a substance is:**

(a) Molar specific heat (b) Heat capacity
(c) Latent heat (d) Specific heat

**Q.17. The quantity of heat required per degree rise the temperature of unit mass of a substance is:**

(a) Molar specific heat (b) Heat capacity
(c) Latent heat (d) Specific heat

**Q.18. The quantity of heat required to rise the temperature of 1Kg of water through 1K, in Joules is:**

(a) 420 (b) 4200 (c) 4.2 (d) 42

**Q.19. The quantity of heat required to rise the temperature of one mole of an ideal gas at constant pressure through 1K is:**

(a) $C_V$ (b) C (c) 1J (d) $C_P$

**Q.20. The quantity of heat required to rise the temperature of one mole of an ideal gas at constant volume through 1K is:**

(a) $C_V$ (b) C (c) 1J (d) $C_P$

**Q.21.** $PV^\gamma =$ _____.

(a) KT (b) nRT (c) Constant (d) RT

**Q.22. The graph of Boyles law is a:**

(a) Curve (b) Slope (c) Straight line (d) Hyperbola

**Q.23. The graph of Charle's law is a:**

(a) Curve (b) Slope (c) Straight line (d) Hyperbola

**Q.24. In which process there is no work done:**

(a) Isothermal Process (b) Adiabatic Process
(c) Isobaric Process (d) Isochoric Process

**Q.25. Work done in an Isobaric Process is:**

(a) PV (b) $R\Delta T$ (c) $P\Delta V$ (d) $n\Delta T$

**Q.26. In which process there is no change in Internal energy of system, with heat transfer.**

(a) Thermal Process (b) Iso-thermal Process

(c) Isolated Process (d) Isochoric Process

**Q.27. Efficiency of heat engine will be minimum when:**

(a) Source and sink are kept at thermal equilibrium

(b) Sink is kept at 0 °C

(c) Temperature of source is kept at Infinity

(d) Sink is kept at Absolute zero

**Q.28. Entropy change of heat engine would be maximum when:**

(a) Source and sink are kept at thermal equilibrium

(b) Sink is kept at 0 °C

(c) Temperature of source is kept at infinity

(d) Sink is kept at Absolute zero

**Q.29. In which process work done is maximum:**

(a) Isobaric Process (b) Isochoric Process

(c) Isothermal Process (d) Adiabatic Process

**Q.30. The internal energy of a system depends upon.**

(a) Temperature (b) Entropy

(c) Pressure (d) Volume

**Q.31. The universal gas constant per molecule is called:**

(a) Raleigh-Jean's constant (b) Boltzman Constant

(c) Gas constant (d) Stefan's constant

**Q.32. 1 Cal = _____J.**

(a) 42 (b) 420 (c) 0.42 (d) 4.2

**Q.33. The difference of Molar specific heat capacity at constant pressure and at constant volume is equal to the:**

(a) Avogadro's number (b) Boltzman Constant

(c) Universal Gas constant (d) Non of these

**Q.34. The machine which works on the principle of Kelvin's statement is:**

(a) Refrigerator (b) Heat engine

(c) Thermostat (d) Oven

**Q.35. The machine which works on the Principle of claussius statement is:**

(a) Refrigerator (b) Heat engine

(c) Thermostat (d) Oven

**Q.36. There are four rods of same substance and same area of cross action but of different lengths. When they are heated through the same range of temperature the linear thermal expansion will be maximum in:**

(a) 50m rod (b) 100m rod (c) 1.0m rod (d) 10m rod

**Q.37. Increase in length per unit length per degree rise in temperature of aluminum rod of 10m is 24 x $10^{-6}$/C. What would be the increase in volume per unit volume per degree rise in temperature of a cube of aluminum of volume 100$m^3$ when both are heated through the same range of temperature?**

**(a)** 72 x $10^{-6}$/C. **(b)** 7.2 x $10^{-3}$/°C.

**(c)** 24 x $10^{-6}$/C. **(d)** 2.4 x $10^{-3}$/°C.

**Q.38. Linear thermal expansion does not take place in which of the following:**

**(a)** Water **(b)** Iron stick. **(c)** Glass rod **(d)** Steel bar

**Q.39. Ratio between the coefficient of linear thermal expansion and coefficient of cubical thermal expansion is:**

**(a)** 1:3 **(b)** 3:1 **(c)** 6:2 **(d)** a and b are correct.

**Q.40. A fixed mass of a gas is heated at constant volume. Which one of the following will not change?**

**(a)** Average distance between the molecules.

**(b)** K. E. of the molecules.

**(c)** Average speed of the molecules.

**(d)** Frequency of collisions of the molecules.

**Q.41. The pressure of a fixed mass of gas increases when it is heated at constant volume is due to:**

**(a)** Increase in Average speed of the molecules.

**(b)** Gas becomes light.

**(c)** Increase in average distance between the molecules.

**(d)** Elastic molecular collision.

**Q.42. Change in temperature of a body is $50^0$C. The change in temperature on the Kelvin Scale is:**

**(a)** 50 K **(b)** 323 K **(c)** 70 K **(d)** 30 K

**Q.43. Absolute zero of a gas is the temperature at which its:**

**(a)** K.E. is zero **(b)** Volume is zero **(c)** P.E. is zero **(d)** a and b are correct.

**Q.44. Bimetallic thermostat is used to:**

**(a)** To increase the temperature.

**(b)** To increase the K.E. of molecules of substance.

**(c)** Measure the temperature.

**(d)** To control the temperature.

**Q.45. At volume V and temperature T, the pressure of N molecules the gas is P. If the number of molecule of the gas is doubled at constant volume then:**

**(a)** Temp. will become half. **(b)** Temp. will become twice.

**(c)** Pressure will become half. **(d)** Pressure will become twice.

**Q.46. The total K.E. of molecules of gas gives the measurement of:**

**(a)** Temperature of the gas. **(b)** Specific heat capacity of the gas.

**(c)** Heat energy of the gas. **(d)** Internal energy of the gas.

**Q.47. At constant pressure the volume of the given mass of a gas is V at temperature T. At what temperature volume of the gas will be 4V:**

(a) 4T (b) $\frac{1}{4}$T (c) 2T. (d) $\frac{1}{2}$T.

**Q.48. When ice cube melts into water the ice water system undergoes a change such that:**

(a) Both entropy and the internal energy of system increase.

(b) Entropy of the system decreases but internal energy of the system decreases.

(c) Entropy of the system increases and internal energy of the system remains constant.

(d) Entropy of the system increases and internal energy decreases.

**Q.49. The temperature of a substance changes from $-20^0$C to $20^0$C. What would be the change on Kelvin Scale?**

(a) 40 K. (b) 293 K. (c) 0 K. (d) 20 K.

**Q.50. If heat energy is removed from an object, its temperature will normally.**

(a) does not change. (b) Rise.

(c) Falls. (d) Falls then rise.

**Q.51. The root mean square speed of the molecules of an ideal gas in a sealed container is v. The gas is heated until the pressure in the container is tripled. The r.m.s. Speed is now.**

(a) $\sqrt{3}$ v. (b) v/9. (c) 9v. (d) 3.

**Q.52. The average K.E. of the molecules of an ideal in a closed vessel is increased by a factor 4. What would be pressure of the gas?**

(a) It will remain the same. (b) It will increases by a factor of 2.

(c) It will increases by a factor of 4. (d) It will increases by a factor of $\sqrt{2}$.

**Q.53. If $\Delta Q$ heat energy is supplied to the system and $\Delta W$ is the work done by the system then internal energy retained by the system is:**

(a) $\Delta W - \Delta U$. (b) $\Delta Q - \Delta W$. (c) $\Delta U + \Delta W$. (d) $\Delta U - \Delta W$.

**Q.54. The work done during _____ process is obtained form the internal energy of a gas:**

(a) Isobaric. (b) Isochoric. (c) Adiabatic. (d) Isothermal.

**Q.55. The process in which whole amount of heat energy supplied is used to increase the internal energy is:**

(a) Isobaric. (b) Isochoric. (c) Adiabatic. (d) Isothermal.

**Q.56. In an isothermal process work done is maximum and change in interna energy is:**

(a) Minimum. (b) Zero. (c) Maximum. (d) Negative.

**Q.57. A fixed mass of a gas is heated at constant volume, which one of the follow would not change?**

(a) Temperature. (b) Molecular motion.

(c) Internal energy. (d) Density of gas.

**Q.58. The statement of the first law of thermodynamics implies that:**

**(a)** All the work is mechanical.

**(b)** Energy remains conserve.

**(c)** No heat can enter or leave the system.

**(d)** The temperature remains constant.

**Q.59. The molar specific heat of an ideal gas is greater at constant pressure than at constant volume because:**

**(a)** There are more number of collisions at constant volume.

**(b)** The molecules move fast.

**(c)** Additional energy is needed for the external work at constant pressure.

**(d)** The molecules acquire greater K.E. at constant pressure.

**Q.60. The molar specific heat of an ideal monatomic gas at constant pressure is:**

**(a)** 2R **(b)** 5/2R. **(c)** R/2 **(d)** 3/2R

**Q.61. When a monatomic ideal gas under goes an isothermal change; then:**

**(a)** There would be no exchange of heat with the surroundings.

**(b)** No external work, will be done.

**(c)** There would be no change of the internal energy.

**(d)** The temperature changes.

**Q.62. The efficiency of Carnot engine depends upon:**

**(a)** Temperature of the both source and sink only.

**(b)** Temperature of the sink only.

**(c)** Temperature of the source only.

**(d)** None of these.

**Q.63. The efficiency of the Carnot engine is directly proportional to the:**

**(a)** Temperature of the working substance.

**(b)** Difference of temperature of heat source and sink.

**(c)** Temperature of the source only.

**(d)** Temperature of the sink only.

**Q.64. For an ideal gas an isobaric change is given by:**

**(a)** Coulomb's law **(b)** General gas law

**(c)** Boyle's law **(d)** Charle's law

**Q.65. If $T_1$ is the temperature of the heat source and $T_2$ is the temperature of the heat sink then the efficiency of the Carnot engine will be:**

**(a)** $T_1+T_2 / T_2$ **(b)** $T_1+T_2 / T_1$ **(c)** $T_2-T_1 / T_1$ **(d)** $T_1-T_2 / T_1$

**Q.66. The efficiency of Carnot heat engine is always:**

**(a)** More than 100%. **(b)** Less than 100%.

**(c)** 100%. **(d)** None of these.

**Q.67. If $Q_1$ is the amount of heat energy supplied to the Carnot heat engine and $Q_2$ is the heat energy rejected to the sink. The efficiency of the heat engine is directly proportional to the:**

**(a)** $Q_2 - Q_1$. **(b)** $Q_2 + Q_1$. **(c)** $Q_1 - Q_2$. **(d)** $Q_1 + Q_2$.

**Q.68. For an ideal gas an isothermal change is given by:**

**(a)** Coulumb's Law. **(b)** General gas Law.

**(c)** Boyle's Law. **(d)** Charle's Law.

**Q.69. Two equal masses of an ideal gas at same temperature and pressure are compressed to half of their volumes, one of them isothermally and the other adiabatically. Which one of the following would be same for both?:**

**(a)** The internal energy of the compressed gases.

**(b)** Heat given out during compression.

**(c)** Temperature of the compressed gases.

**(d)** None of these.

**Q.70. Two Carnot heat engines would have same efficiencies when:**

**(a)** The difference of temperature of their heat sources and heat sinks is same.

**(b)** The temperature of their heat sources is same.

**(c)** The same amount of heat energy is supplied to them.

**(d)** None of these.

**Q.71. Entropy is the measure of the _____ of a system:**

**(a)** Disorder. **(b)** Work done.

**(c)** Internal energy. **(d)** Change in temperature.

**Q.72. When ice melts then entropy of the system:**

**(a)** Does not change. **(b)** Is zero.

**(c)** Increases **(d)** Decreases

**Q.73. The maximum efficiency of a heat engine could be increased by:**

**(a)** Decreasing the temperature of hot and cold bodies simultaneously.

**(b)** Keeping the temperature of hot and cold bodies constant.

**(c)** Increasing the temperature of hot and cold bodies simultaneously.

**(d)** Decreasing the temperature of sink and increasing the temperature of source.

**Q.74. Net change in entropy of a system in a natural process is:**

**(a)** Zero. **(b)** Infinite. **(c)** Positive. **(d)** Negative.

**Q.75. Change in internal energy of system at constant pressure is:**

**(a)** $nC_v\Delta T$ **(b)** Zero. **(c)** $\Delta Q$. **(d)** $\Delta W$.

# ANSWER KEY

| | | | | |
|---|---|---|---|---|
| (1) **d** | (2) **a** | (3) **c** | (4) **c** | (5) **b** |
| (6) **d** | (7) **b** | (8) **b** | (9) **c** | (10) **c** |
| (11) **b** | (12) **c** | (13) **a** | (14) **d** | (15) **c** |
| (16) **b** | (17) **d** | (18) **b** | (19) **d** | (20) **a** |
| (21) **c** | (22) **d** | (23) **c** | (24) **d** | (25) **c** |
| (26) **b** | (27) **a** | (28) **a** | (29) **c** | (30) **a** |
| (31) **b** | (32) **d** | (33) **c** | (34) **b** | (35) **a** |
| (36) **b** | (37) **a** | (38) **a** | (39) **a** | (40) **a** |
| (41) **a** | (42) **a** | (43) **d** | (44) **d** | (45) **d** |
| (46) **c** | (47) **a** | (48) **a** | (49) **a** | (50) **c** |
| (51) **a** | (52) **c** | (53) **b** | (54) **c** | (55) **b** |
| (56) **b** | (57) **d** | (58) **b** | (59) **c** | (60) **b** |
| (61) **c** | (62) **a** | (63) **b** | (64) **d** | (65) **d** |
| (66) **b** | (67) **c** | (68) **c** | (69) **d** | (70) **a** |
| (71) **a** | (72) **c** | (73) **d** | (74) **c** | (75) **a** |