S.S.R. DEGREE COLLEGE, (AUTONOMOUS) NIZAMABAD
II SEMESTER INTERNAL ASSESSMENT I EXAMINATIONS
PHYSICS (THERMAL PHYSICS) QUESTION BANK

I. Multiple choice questions.

1. _________________of a gas is due to transport of momentum. [c]
(a) Energy (b) Mass (c) Viscosity (d) Density

2. The mean free path of a gas molecule is inversely proportional to square of the [a]
(a) Diameter of the molecule (b) Radius of the molecule
(c) Density of the molecule (d) Pressure of the molecule

3. The Viscosity of a gas is directly proportional to [c]
(a) $\sqrt{T}$ (b) T^2 (c) Density of gas (d) Temperature

4. The coefficient of thermal conductivity=C_vx [a]
(a) Coefficient of viscosity (b) Temperature
(c) Coefficient of difficusion (d) Pressure

5. At very low temperatures, the coefficient of viscosity of a gas [a]
(a) Is independent of pressure (b) Decreases with increasing pressure
(c) Is equal to pressure (d) Increases with decreasing pressure

6. The entropy of universe _________ continuously. [c]
(a) Remains constant (b) Independent (c) Increases (d) Decreases

7. The energy of the total system is constant while entropy__________. [c]
(a) Remains constant (b) Remains dependent (c) Increases (d) Decreases

8. The proses in which conduction of heat is along a metal bar and electricity flow along a Resistor is _________. [b]
(a) Reversible Process (b) Irreversible process (c) Isothermal process (d) Adiabatic process

9. The work done in an isothermal expansion of a gas depends on _____________. [c]
(a) Expansion ratio (b) Temperature (c) Both (a) and (b) (d) None of the above

10. The change in entropy of universe is given as [a]
(a) $dS_{universe} \geq 0$ (b) $dS_{universe} \leq 0$ (c) $dS_{universe} = 0$ (d) $dS_{universe} \neq 0$

11. The general expression for Joule – Kelvin coefficient is given as μ=________. [a]

(a) $\frac{1}{Cp}\left[T(\frac{\partial V}{\partial T})p - V\right]$ (b) $\left[T(\frac{\partial V}{\partial T})p + V\right]$ (c) $P\left(\frac{\partial V}{\partial T}\right)_p - \frac{a}{V^2}\left(\frac{\partial V}{\partial T}\right)_p$ (d) $R\left(P - \frac{a}{V^2}\right)$

12. In an adiabatic process, the work done by a system is due to its ___________ energy. [a]

(a) Internal (b) External (c) Heat (d) None of the above

13. The phenomenon of changing temperature is known as __________. [b]

(a) Vander Waal's (b) Joule kelvin effect (c) Maxwell's equation (d) Perfect gas

14. The vander waals equation for one mole of a gas is given as, ____________ [c]

(a) $\left(P + \frac{a}{V^2}\right)(V + b) = RT$ (b) $\left(P - \frac{a}{V^2}\right)(V - b) = RT$
(c) $\left(P + \frac{a}{V^2}\right)(V - b) = RT$ (d) $\left(P - \frac{a}{V^2}\right)(V + b) = RT$

15. The coefficient of performance of a refrigerator is given by, k = __________ [d]
(a) $\frac{T_1}{T_2 - T_1}$ (b) $\frac{T_2}{T_2 - T_1}$ (c) $\frac{T_1}{T_1 - T_2}$ (d) $\frac{T_2}{T_1 - T_2}$

16. Maxwell's first T.dS equation, T.dS = ____________ [a]

(a) $C_V\, dT + T\left(\frac{\partial P}{\partial V}\right)_P dV$ (b) $C_P\, dT - T\left(\frac{\partial V}{\partial T}\right)_P dP$

(c) $C_V \left(\frac{\partial T}{\partial P}\right) dP + C_p \left(\frac{\partial T}{\partial V}\right)_P dV$ (d) $C_P\, dV - T\left(\frac{\partial V}{\partial T}\right)_V dV$

17. The equation for Helmholtz free energy is given as F = [c]

(a) U + TS (b) TS – U (c) U – TS (d) $\frac{TS}{U}$

18. A gas always shows cooling effect in _________ [d]

(a) Adiabatic expansion (b) Joule Thomson expansion (c) Gas expansion (d) Joule expansion

19. The device used for converting high pressure of refrigerant into low pressure is _______ [a]

(a) Evaporator (b) Expansion value (c) condenser (d) Compressor

20. Ideal properties of an refrigerant are __________ [c]

(a) Low viscosity and less expensive (b) Easily available and simple to handle

(c) Both a and b (d) None of the above

II. Fill in the blanks

1. <u>Average velocity</u> can be defined as the average of the velocities of all the gas molecules.
2. The square root of the mean of the velocities of a large number of the gas molecules is <u>root mean square velocity</u>
3. A non-equilibrium gas has different layers with different <u>velocities</u>
4. The <u>relative motion</u> of layers give rise to transport of momentum, which in turn results in viscosity.
5. The expression for average energy per molecule is given by, E = $\frac{3}{2} KT$
6. In <u>isolated</u> system, neither matter nor energies are exchanged with the surroundings as the boundary Is sealed as well as insulated.
7. The entropy of universe remains <u>constant</u>
8. Thermodynamics scale of temperature is introduced by <u>kelvin</u>
9. <u>Reversible</u> process occurs at very slow speed.
10. In <u>Adiabatic</u> process, temperature keeps on changing.
11. The <u>net</u> energy of a system is known as internal energy or intrinsic energy of the system.
12. The expression for enthalpy is given as, H= <u>U + PV</u>
13. The viscosity of the refrigerant is maintained <u>low</u>
14. Refrigerator or vapour compression cycle operates at both high and low <u>pressure</u>
15. In an adiabatic process, dQ= <u>0 (zero)</u>
16. The boiling point of a substance increases with the <u>increase</u> in pressure.
17. In case of Joule Thomson expansion, cooling effect depends on the <u>external</u> work done by its internal energy.
18. A <u>thermodynamic potential</u> is a scalar quantity used to represent the thermodynamic state of a system.
19. The heat transferred to the working fluid in an evaporator is known as <u>refrigeration load</u>
20. In an adiabatic and Joule Thomson expansion system is <u>not isolated</u> mechanically from the external system.

III. Descriptive Questions.

1. Give the postulates of kinetic theory of gases. Derive an expression for the viscosity of a gas on the basis of kinetic theory?
2. What T-S diagram? Find the expression for efficiency of a reversible carnot's engine with the help of T-S diagram?
3. Explain the joule - kelvin effect. Derive expression for Joule -Kelvin Co-efficient for an ideal gas and for a vander wall's gas?
4. Define and explain the term mean free path. Derive and expression for viscosity of a gas in terms of mean free path of it's molecules?
5. Obtain maxwell's thermodynamic equations using thermodynamic potentials