

**COLLEGE: SCIENCES DEPARTMENT: MATHEMATICAL AND PHYSICAL SCIENCES**

**COURSE CODE: PHY 408 COURSE TITLE: STATISTICAL AND THERMAL PHYSICS**

**TIME 45 MINUTES ANSWER ALL QUESTIONS TEST**

1.The total no of molecules arriving the surface of a fluid per unit area per unit time is?

(a)Flow flux (b) molecular flux (c) fractional flow (d) viscosity flow

2. The average no of collisions between the molecules of a fluid per unit time is what?

(a) Collision time (b) collision frequency (c) collision interval (d) collision period

3. Calculate the collision frequency of nitrogen molecule at S.T.P. Given that the coefficient of viscosity is 16.6x10-6NS/m. The density of nitrogento be 1.25kg/m3, average speed =450 m/s

(a) 50.84x108Hz (b) 30.84x108Hz (c) 20.84x108Hz (d) 25.8x108Hz

4. Which of the distribution has zero integral spin among the following

(a) Bose-Einstein (b) Fermi-Dirac (c) Maxwell-Boltzmann (d) none of the options

5. Which of the distribution has half integral spin among the following

(a) Bose-Einstein (b) Fermi-Dirac (c) Maxwell-Boltzmann (d) none of the options

6. Which of the distribution has 9 possible states in their numerical statistics among the following

(a) Bose-Einstein (b) Fermi-Dirac (c) Maxwell-Boltzmann (d) none of the options

7 Which of the distribution does not obey Pauli’s exclusion principle among the following

(a) Bose-Einstein (b) Fermi-Dirac (c) Maxwell-Boltzmann (d) none of the options

8. The collection of essentially independent systems having the same temperature, volume and no of particles (T, V, N) is called

(a) Canonical ensemble (b) ensemble (c) macro canonical ensemble (d) micro canonical ensemble

9. Which of the following distribution has symmetric total wave function?

(a) Bose-Einstein (b) Fermi-Dirac (c) Maxwell-Boltzmann (d) Fermi-Dirac/Bose-Einstein

10. Which of the following distribution has Anti-symmetric total wave function?

(a) Bose-Einstein (b) Fermi-Dirac (c) Maxwell-Boltzmann (d) Fermi-Dirac/Bose-Einstein

11. A gas occupies a volume of 0.30 m3 exerting pressure of 2x105N/m2 at constant pressure, the volume expands to 0.45 m3.Find 4he work done by the gas.

(a) 0.3x105J (b) 3x106J (c) 0.3x105J (d) 30x105J

12. The chemical potential of an ideal fermion gas at temperature of 4TB is 4.4 KTB. If the energy Eigen value of a single particle state at this temperature is 7.0KTB. Determine the mean occupation number for the state. i.e. Fermi-Dirac distribution function.

(a) 13.5% (b) 22.8% (c) 12.39% (d) 56.2 %

13. The Eigen value of a single particle state of an ideal bosons is 4.0KTB. If the chemical potential at temperature of 5TB is -5.2 KTB. Determine the mean occupation number for the state. i.e. Bose-Einstein distribution function.

(a) 4.17 % (b) 22.8 % (c) 34.21 % (d) 56.2 %

14. If the average kinetic energy in any region of a system is the same as the average kinetic energy in any other region. This definition is known as

(a) Heat (b) temperature (c) mechanical equilibrium (d) thermal equilibrium

15. if two systems are in thermal equilibrium with the third system, the three systems are in thermal equilibrium with one another. Which law in thermodynamics states this?

(a) Zeroth law (b) first law (c) second Law (d) third Law

16. Which of the following is not an example of fermions

(a) Electron (b) proton (c) positron (d) alpha particle

17. Which law of thermodynamics states that it is impossible to design engine whose whole function is complete removal of heat from a system and total conversion to work.

(a) Zeroth law (b) first law (c) second Law (d) third Law

18. The measure of the system’s thermal energy per unit temperature that is available for doing useful work is known as

(a) Entropy (b) enthalpy (c) Helmholtz (d) temperature