

Assignment Physics Paper 302

For Unit test – 2

UNIT-2

- 1) What is Raman Effect? Explain Raman Effect under basis of Quantum theory.
- 2) Describe experimental arrangement for the study of Raman Effect.
- 3) explain arise for Raman spectra helps in determining the structure of molecule.
- 4) Distinguish between Raman spectra & Fluorescence spectra of diatomic molecule.
- 5) Give the classical theory of Raman Effect, What are its limitations?
- 6) What is Raman Effect? What is Raman shift?
- 7) explain in detail what are Stokes and Anti-Stokes Raman lines?
- 8) State the selection rules for electronic transition and hence, show that the transition $\sum u^+ \rightarrow \sum g^+$ is allowed.
- 9) Write a short note on Fluorescence spectra of gases.
- 10) Explain the term (a) Fluorescence (b) Phosphorescence.

UNIT-3

Statistical mechanics

- 1) Derive equation of rotational partition function and discuss changes in rotational partition function at high and low temperature. (7 Marks)
- 2) Discuss vibration contributions to thermodynamic quantities and derive equations of different thermodynamic quantities using vibration partition function. (7 Marks)
- 3) Derive equation of electronic partition function. Using electronic partition function derive equations of different thermodynamic quantities and discuss changes in specific heat with temperature. (7 Marks)
- 4) Write short note on symmetric and anti-symmetric state functions. (7 Marks)
- 5) Derive equations of Bose-Einstein & Fermi-Dirac distribution functions. (7 Marks)
- 6) Explain Bose-Einstein condensation. (10 Marks)

UNIT- 4

Chapter – Free Electron Fermi gas

- 1) Discuss free electron gas in one dimension and derive equation of energy of electrons in topmost filled energy level. (7 Marks)
- 2) Discuss free electron gas in three dimensions and derive equations of (a) Number of electrons in Fermi energy level. (b) Fermi-energy (c) Fermi velocity (d) Fermi temperature & (e) Density of states. (14 Marks)
- 3) Derive equation of electronic heat capacity of free electron gas. (7 Marks)
- 4) Derive equation of electronic heat capacity of free electron gas at low temperature. (7 Marks)
- 5) Explain experimental heat capacity of metals & also explain thermal effective mass of electrons. (7 Marks)
- 6) On the basis of free electron theory derive equation of electrical conductivity and write down equation of thermal conductivity, Derive Wide-mann Franz law. Explain its importance, what is Lorentz number. (10 Marks)
- 7) Discuss the effect of temperature on Fermi-Dirac distribution function. (5 Marks)