School of Basic Sciences
Bachelor of Science in General
Semester End Examination - Nov 2023

Duration : 180 Minutes
Max Marks : 100

Sem V - C1UD501T - Classical and Statistical Mechanics

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) Define the concept of first order phase space.

K1 (2)

2) Illustrate the two properties of possion backet.

K2 (4)

3) Show the Hamiltonian for a charged particle in Electromagnetic field.

K2 (6)

4) Explain planck distribution theory? Calculate the average energy of an oscillator of frequency 0.60×10^{14} sec-1 at 1800 K treating as (i) classical oscillator, (ii) Planck's oscillator.

K3 (9)

5) Explain the Black body curve of thermal radiation with graph. If the wavelength of a black body is 800 nm at 100 K then calculate the wavelength of a black body whose temperature is changed from 100 K to 800 K.

K3 (9)

6) A simple pendulum of length l and mass m is released from rest at an angle from the vertical. Calculate the Lagrangian of the pendulum and derive the equation of motion for the angular displacement ?.

K5 (10)

7) If $r^2 = a^2 cos^2\Theta + b^2 sin^2\Theta$? for a central motion then prove that $F(r) = \frac{1}{r^7}$.

K4 (12)

8) Evaluate the differences in the statistics of indistinguishable particles obeying Bose-Einstein and Fermi-Dirac statistics, and how these differences affect the macroscopic behavior of the systems.

K5 (15)

9) Eight particles are distributed in ten energy cells of equal size. Calculate all possible ways of this distribution when particles are (i) classical particle (ii) Bosonic Particles (iii) Fermionic particles.

K5 (15)

10) What is center orbit. Prove the equation of motion of center orbit.

K6 (18)