JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MID TERM (SUMMER SEMESTER EXAMINATION)- June-2018

B.Tech. II Semester

COURSE CODE: 10B11PH211

COURSE NAME: PHYSICS-II

COURSE CREDITS: 04

MAX. MARKS: 50

MAX. TIME: 2 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

I. Write basic assumptions of Maxwell-Boltzmann statistics. Derive an expression for the distribution of n-particles in g-cells as per Maxwell-Boltzmann statistics. **[10]**

II. Five bosons are distributed in 2-compartments, the first having 3-cells and the second having 4-cells. Find the total number of meaningful arrangements for the macrostate (i) (5,0) & (ii) (4,2). **[7]**

III. Find the total number of ways in which 4-bosons may be distributed in 5-cells. **[3]**

IV. What are fermions? Write down the postulates of Fermi-Dirac Statistics. Derive an expression for probability distribution of particles governed by Fermi-Dirac statistics. **[10]**

V. The numerical aperture of an optical fibre with cladding refractive index 1.59 is 0.2. Calculate the refractive index of core. Also calculate the acceptance angle for the fibre in water (refractive index of water = 1.33). **[5]**

VI. Explain the working principle of optical fibres. Derive an expression for numerical aperture. **[7]**

VII. An optical fibre has an attenuation 3.5 Db/KM. If 0.5 mW of optical power is initially launched into the fibre, then calculate the power level in μW after 4 km. **[2]**

VIII. For oxygen gas at NTP calculate (i) most probable velocity, (ii) average velocity, (iii) root mean square velocity. Given Boltzmann constant (k_B) = 1.38 x 10^{-23} J/K, mass of oxygen molecule = 5.31 x 10^{-26} kg. **[6]**