JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
MAKEUP EXAMINATION- April 2018
B.Tech II Semester (CSE, ECE, IT)

COURSE CODE: 10B11PH211
COURSE NAME: PHYSICS-II
COURSE CREDITS: 04

MAX. MARKS: 25

MAX. TIME: 1.5 Hrs

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Attempt all the questions in sequence.*

1. Using Coulomb's law, derive the Gauss law of electrostatics. Also, drive the fourth Maxwell's equation of electrodynamics. **[4 Marks]**

2. Draw a simple diagram to show all possible meaningful arrangements of two particles in three cells assuming that the particles obey. (i) M.B. Statistics, (ii) B.E. Statistics and (iii) F.D. Statistics. **[3 Marks]**

3. Eight distinguishable particles are distributed in two compartments of unequal size. The first compartment is divided into 6 cells and the second into two cells. Each cell is of equal a priori probability and there is no restriction on the number of particles that can be contained in each cell. Calculate the thermodynamic probability of the macrostates (6, 2) and (4, 4). **[2 Marks]**

4. Assuming MB distribution of molecular speeds, drive the expression for (i) $v_{m.p.}$ (ii) $\bar{v}$ and (iii) $v_{rms}$. **[3 Marks]**

5. (a) Prove that Planks law of radiation reduces to Reyleigh- Jeans law for long wavelengths and Wein's radiation law for short wavelengths. **[4 Marks]**

(b) Calculate the Fermi energy of free electrons in tungsten assuming that there is two free electrons per atom. Hence find the average energy per electron at 0K. Given Avogadro's number= $6.02 \times 10^{23}$ atoms/mole; atomic wt of Tungsten = 183.8g. Mole$^{-1}$, density = 19.3 gm/cm$^3$, h = $6.63 \times 10^{-27}$ erg.sec and mass of electron m = $9.1 \times 10^{-28}$ gm. **[3 Marks]**

6. (a) How are losses calculated in optical fibers? Explain linear and non linear scattering loss in optical fibers? **[3 Marks]**

(b) For a 30/120 step index fiber the refractive with $n_1$= 1.47 and $n_2$= 1.45. Calculate the cut of wave length for the fiber to be single mode? Also calculate the threshold radius to avoid loss due to macro bending? **[3 Marks]**