


Assignment - 2  
B.Sc Physics Sec. A.  
(H)

Q<sub>1</sub> A system has non-degenerate energy levels with energy  $E = (n + \frac{1}{2}) \hbar \omega$ , where  $\hbar \omega = 8.625 \times 10^{-5} \text{ eV}$ , and  $n = 0, 1, 2, 3, \dots$ . Calculate the probability that the system is in the  $n = 10$  state if it is in contact with a heat bath at room temperature ( $T = 300 \text{ K}$ ). What will be the probability for the limiting cases of very low temp and very high temperature? 

Q<sub>2</sub> Derive Boltzmann's formula for the probability of atom in thermal equilibrium occupying a state  $E$  at absolute temperature  $T$ . 