

<b>Tutorial No. : 04</b> (Module 4: Solid State Physics)			
<b>Subject</b>	<b>Physics</b>	<b>Subject Code</b>	<b>UBS1008</b>

1. Calculate the probability of occupancy of energy level by an electron at 300 K which is lying 0.015 eV below Fermi level.
2. Calculate the probability of an electron occupying the energy level 0.02 eV above the Fermi level at 200 K.
3. A superconducting tin has a critical temperature of 3.7 K in zero magnetic fields and a critical field of 0.0306 Tesla at 0 K. Find the critical field at 2 K.
4. The transition temperature for Pb is 7.2 K. However, at 5 K it loses the superconducting property subjected to a magnetic field of  $3.3 \times 10^4$  A/m. Find the maximum value of H which will allow the metal to retain its superconductivity at 0 K.
5. At what temperature is  $H_c(T) = 0.1H_c(0)$  for Pb having  $T_c = 7.2$  K.
6. The critical fields at 6 K and 8 K for NbTi alloys are 7.616 and 4.284 MA/m respectively. Calculate the transition temperature and critical field at 0 K.
7. For a specimen of superconductor, the critical fields are  $1.4 \times 10^5$  and  $4.2 \times 10^5$  A/m for temperature 14 K and 13 K. Calculate the transition temperature and critical fields at 0 K and 4.2 K.
8. Determine the transition temperature and critical field at 4.2 K for a given specimen of superconductor if the critical fields are  $1.410 \times 10^5$  and  $4.205 \times 10^5$  amp/m at 14.1 K and 12.9 K respectively.