Physics Department
Subject & Code No.: Superconductivity P 6122
Date of Exam. 29 / 12 / 2018 Time allowed: 2 hrs.

Answer the following questions:

1. What could you conclude as interesting results from the following expression for the energy gap of a superconducting metal at 0K as given by the BCS theory

$$\Delta_0 = 4\hbar\omega_D \, e^{-(2/g(E_f)V)}$$

Where ω_D is the Debye frequency, $g(E_f)$ is the density of states for the normal metal at the Fermi level and V is the strength of the electron lattice interaction. (50).

2. Discuss each of the following: (45).
   a. Perfect diamagnetism or the Meissner effect. (15)
   b. Using the two fluid model, derive an expression for London equation. (30)

3. Complete the empty spaces: (25)
   a. The attractive forces between Cooper pairs is due to.....(10)
   b. According to the two fluid model, the number of superelectrons n_s can be given as.....(10)
   c. Bad normal conductors could make ..(5).. superconductors and vice versa.

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