Problem Sheet - 1

ANSWERS TO THE QUESTIONS.

1) Conduction of current requires empty energy states in the band. Electron will drift but for every electron moving with a given velocity, there is an equal and opposite electron movement elsewhere in the band. So, if we apply an electric field the net current will be zero. An empty conduction band or completely filled valence band cannot give rise to a net motion of e-s.
2) Total Energy Potential energy
3.) Option 3 and 4. (Think yourself. You can refer book)
4)TRUE Hint(function of $E^{0.5}$)
5) $3.77 * 10^{18}/cm^3$. (Hint: use the actual Fermi function not approximate.)
6)$m^* = \frac{\hbar}{10} = \frac{h}{20\pi}$. (From equation.) , v_d = $-q * \frac{E_l}{m^*} * \tau$. (From v = u + a*t, initial drift velocity (u) is zero). J = $q^2 * \frac{E_l}{m^*} * \tau * n$. (From J = $q * n * v_d$)