EE 207, Quiz 3

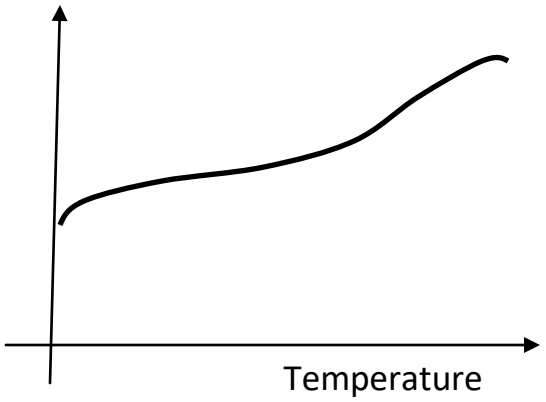
(Total marks: 10, Closed book exam)

Roll Number:

In case of any apparent ambiguity or inconsistency or missing parameters, DON'T ASK. State your assumptions and solve the problem accordingly.

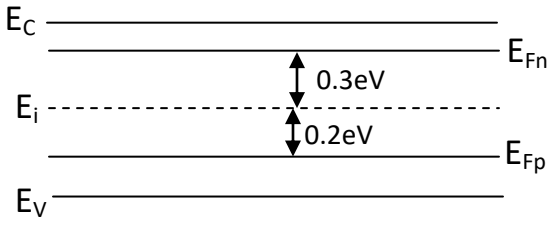
Question 1.

(a) The carrier generation rate due to a particular physical mechanism as a function of temperature is given below. Assuming detailed balance, plot the corresponding recombination rate at steady state (1 marks).



Question 2.

(a) The band diagram shown below represents a Si sample. Is the sample under equilibrium or steady state conditions. Why? (1 mark)?



(a) Find the carrier densities - both electron and hole (assume $n_i=10^{10}cm^{-3}$ at T=300K; 2 marks).

(b) Assuming low level illumination, find the doping density of the sample (1 mark).

(c) Find the effective carrier lifetime. Assume $k=10^{-15}cm^3/s$, and $\tau_n = \tau_p = 100\mu s$ (3 marks).

(d) Find the carrier generation rate (2 marks)