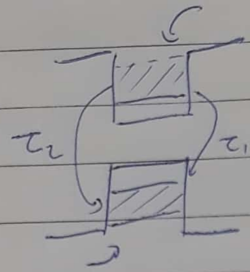
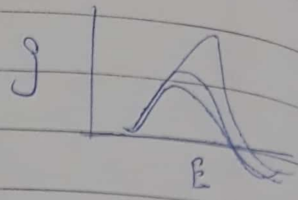


as n_i, occupancy is higher for higher energy levels, also τ is faster, so that the peak shifts to right

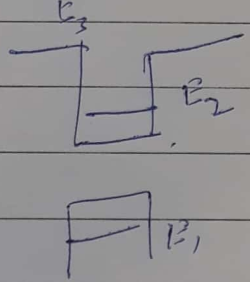


$E_g = E_{g_0} - \dfrac{\alpha T^2}{\beta + T}$ $T = 300K$ $E_g = 1.12$.

at high doping, $e^- - e^-$ scattering, h-h scattering.

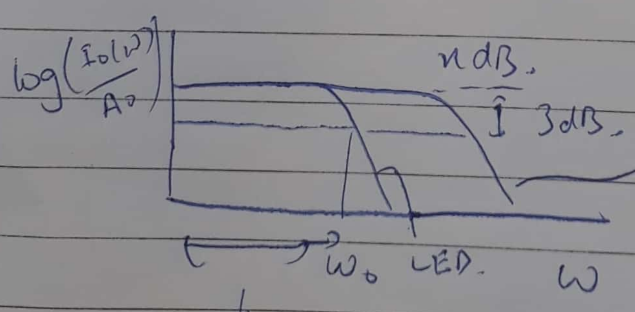
$E = E_g + E_1 + E_2 - E_{ex}$. (excitonic binding energy)
$\hookrightarrow$ 30meV.

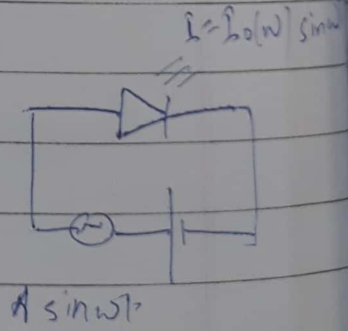
can only happen stimulated if more than E_r 2 energy levels.
The density of e^-s should be more in high energy levels than in low levels, then only lazesss.



$\therefore$ E_3 no. of e^-s should be greater than in quantum well.

Modulation bandwidth. $\rightarrow$





modulation bandwidth. The max ω upto which max intensity $\downarrow$ by a factor of 2.

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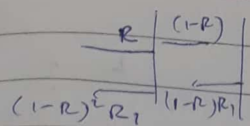
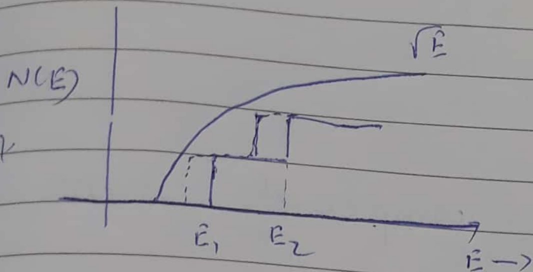
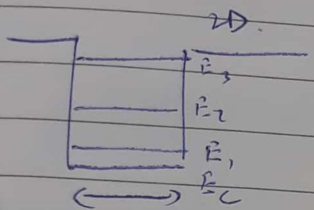


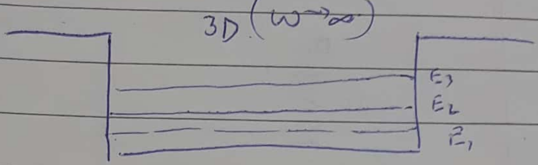


$N(E) = \alpha\sqrt{E-E_c}$, 3D, cm^{-3}

$= \beta\sigma(E-E_1)$, 2D, cm^{-2}

$N_{2D}(E) = \beta\sum_i \sigma(E-E_i)$





$$E_n = \frac{n^2h^2}{8mw^2}$$

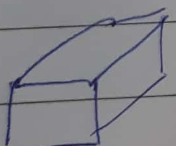
$N_{2D}(E) = \beta n$,
$n \rightarrow$ number of subbands below E.

below n there are n subbands,
$\therefore$ $n \propto \sqrt{E}$, but w is varying, $\Rightarrow n \propto w\sqrt{E}$.

$$N_{2D}(E) = \beta w\sqrt{E}.$$

N_{2D} is cm^{-2}, 3D is cm^{-3}, $\therefore$ for per volume, have to divide by width of quantum well.

$\Rightarrow \lim_{w\to\infty} \frac{N_{2D}}{w} \Rightarrow \propto \sqrt{E-E_c}$. $\therefore$ done



$N(E) = \alpha_{3D}\sqrt{E-E_c}$.

$N(E)^{2D} = \alpha_{2D}\,\sigma(E-E_1)$

$$E_1 = \frac{h^2}{8mL^2}$$

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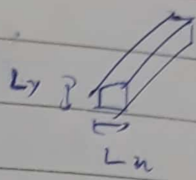
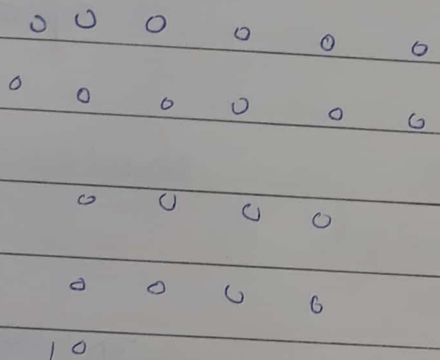
$N(E) = \alpha_{1D} \frac{1}{\sqrt{E-E_1}}$

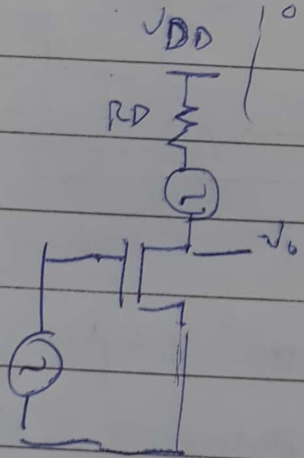


$E_1' = \frac{h^2}{8mL_x^2} + \frac{h^2}{8mL_y^2}$



compressively strain.

$\left(\frac{a_1-a_0}{a_0}\right)$.



$a_1 \to a_0$.

$I_{DS} = k'(V_1-V_T)(V_{DD}-I_{DS}R_D-V_2)$

$\Rightarrow I_{DS} = \frac{k'(V_1-V_T)(V_{DD}-I_DR_D-V_2)}{1+k'(V_1-V_T)R_D}$