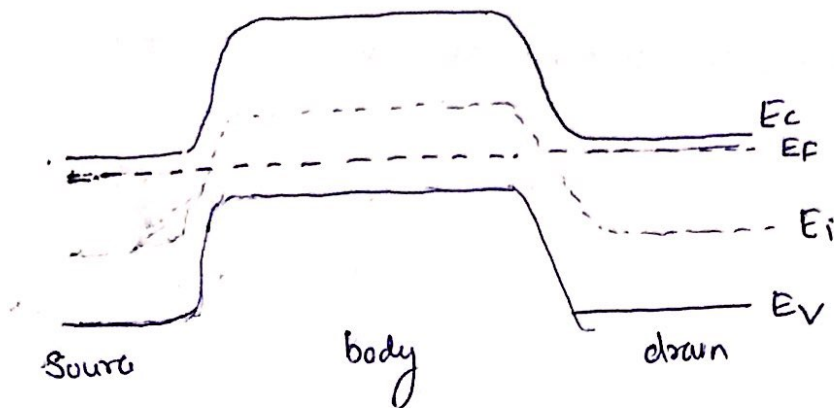


QUIZ 9

QNo1 - Draw the E-B band of a MOSFET along Source to drain at flat band condition
 $N_D = 10^{19}/\text{cm}^3$ $N_A = 10^{16}/\text{cm}^3$

Sol -



position of E_F
 Can be calculated
 using Expression
 of n & p
 $n = n_i e^{(E_i - E_F)/kT}$
 $p = n_i e^{-(E_F - E_i)/kT}$

QNo2 →

I_{DS}	V_{GS}
10^{-12} A	0 V
10^{-6} A	100 mV

Is the measurement ~~more~~ accurate?

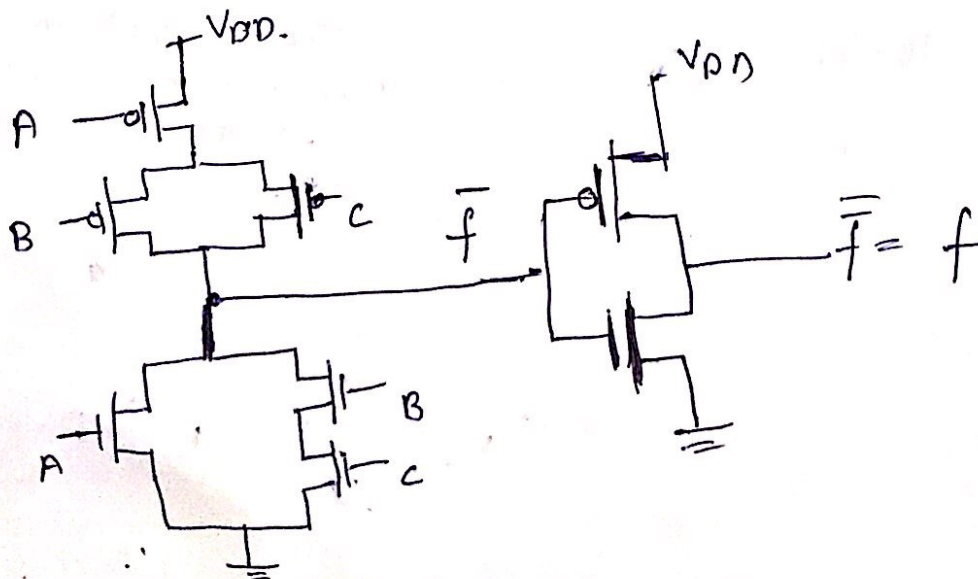
$$SS = \left(\frac{\partial \log(I_{DS})}{\partial V_{GS}} \right)^{-1} \rightarrow \text{It comes less than } 60 \text{ mV/dec}$$

So measurement is inaccurate.

QNo3 - IMPLEMENT CMOS LOGIC for $F = A + BC$

Sol - $\bar{f} = \overline{(A + BC)}$ Where $\bar{f} = \overline{A + BC}$

$$f = \bar{\bar{f}} = \overline{\bar{A} \cdot (\bar{B} + \bar{C})}$$

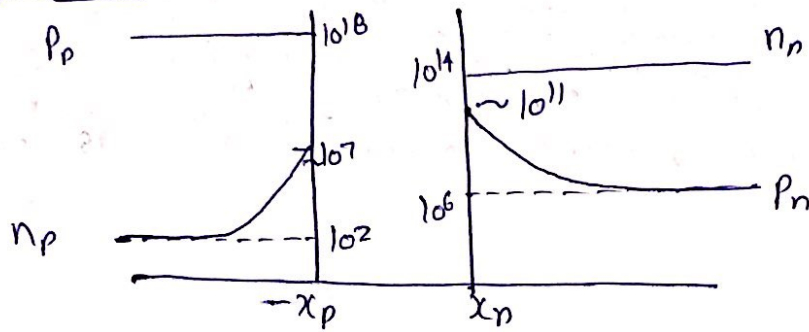


QUIZ-5

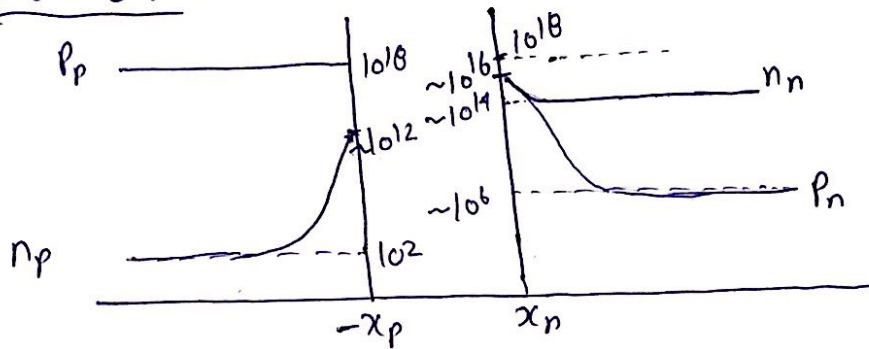
QNo1 - Plot n, p, V_d, χ at $V_a = 0.3V, 0.5V$
 $N_A = 10^{18}/cm^3$ and $N_D = 10^{14}/cm^3$

Sol → $\Delta n_p(-\chi_p) = \frac{n_i^2}{N_A} (e^{qV_a/kT} - 1)$
 $\Delta p_n(\chi_n) = \frac{n_i^2}{N_D} (e^{qV_a/kT} - 1)$ if $n_i \approx 10^{10} cm^{-3}$

For 0.3V →



For 0.6V →



QNo2 → Ideality factor at 0.3V
 at 0.6V ?

Sol → At 0.3V, low injection → $\eta = 1$
 0.6V, high injection → $\eta > 1$

QNo3 -

Plot

Q No 3 - Plot $I-V$ (log)

