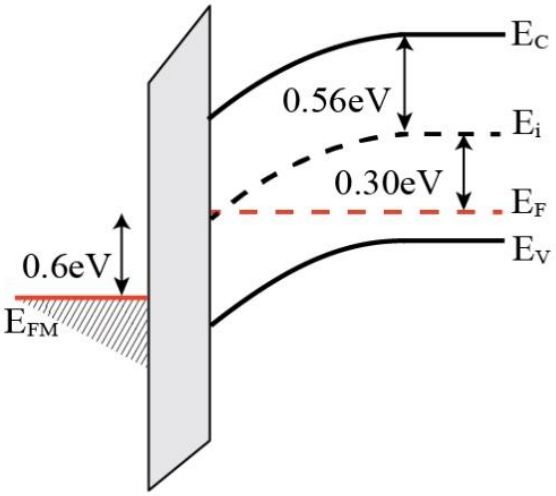
DA-IICT
EL401 PHYSICS OF SEMICONDUCTOR DEVICES
SEMESTER – AUTUMN 2024-25
QUIZ 4 (Nov 7,2024)

Time: 20 mints **Max Marks 2X5=10**

NOTE: Books, notes and calculator is allowed. The solution must be shown step by step.

The energy band diagram of a MOSCAP device is sketched in the figure below. Assume that the electrostatic potential is zero in the semiconductor bulk, (i.e. at large distance from Si-SiO_2 interface) and that there is no metal-semiconductor work function difference.

(Take $\epsilon ox=3.9$, kT=26meV, Eg=1.1eV, $\epsilon si=11.8\epsilon ox=3.9$, $ni=10^{10}cm^{-3,}$)



Q1. What is the value of ϕF ?

ANS:

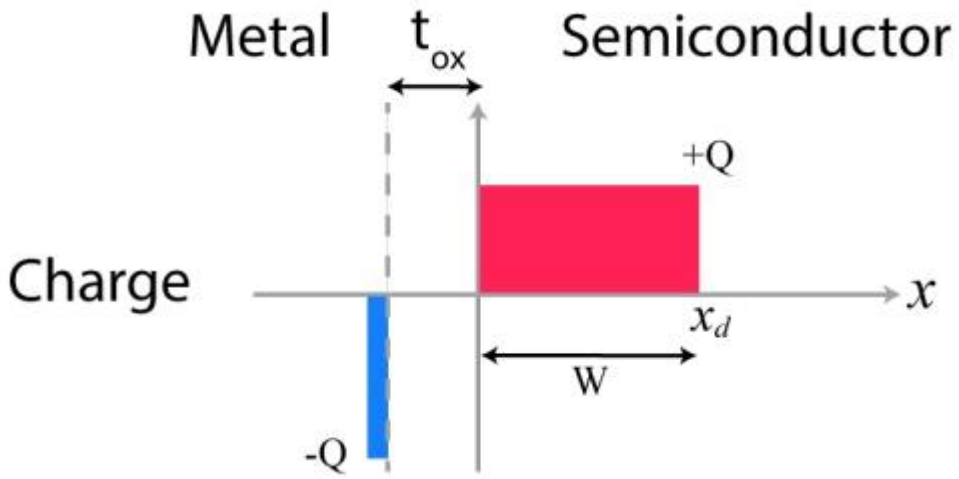
Q2. What is the applied gate voltage, VG ?

ANS:

Q3. What is the doping density, NA in cm^{-3} ?

ANS:

Q4. The charge block diagram of a semiconductor is shown below:



Q4. Draw the E-field plot corresponding to given charge diagram?

Ans:

Q5. Which is the correct Electrostatic potential wrt X?