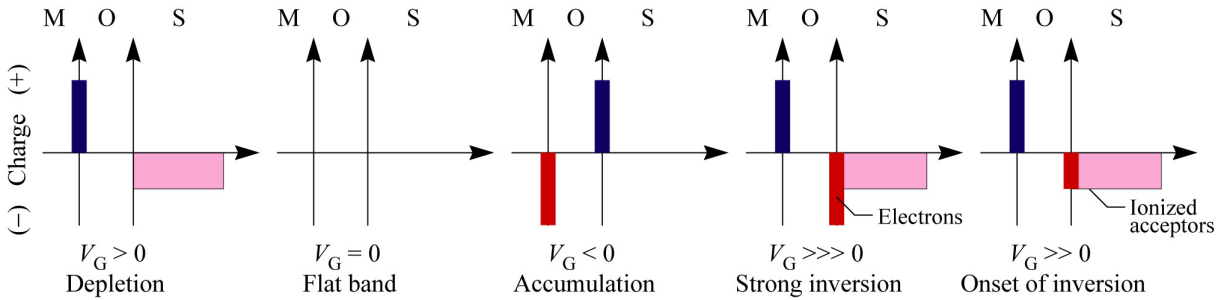
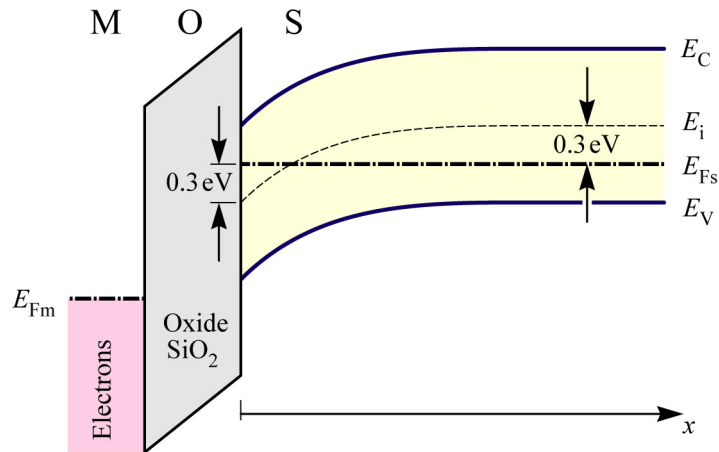


**ECSE-2210 Microelectronics Technology**  
**Class Activity 25**

1. Following are five figures showing charge density plots in ideal metal-oxide Si (p-type) structures. Identify whether the voltages applied to the metal gate are  $V_G < 0$  or  $V_G \ll 0$  or  $V_G = 0$  or  $V_G (= V_T) > 0$  or  $V_G \gg 0$  for each case. Identify which one is accumulation or depletion or flat-band or start of inversion or strong inversion. Qualitatively draw the band diagram for each case.



2. An MOS capacitor is made from Si. When  $V_G$  is applied to the gate of the capacitor, the band diagram looks as shown below. Answer the questions that follow.





- g. Plot the charge density as a function of  $x$ . Identify in your plot which are mobile charges and which are ionized donors or acceptors.