Answer the **multiple choice questions** below by choosing the **one, best answer**.

1) When majority carriers pile up at the oxide-Si interface, what is the bias condition?
   
   a) **Accumulation.**  
   b) Flatband.  
   c) Depletion.  
   d) Deep depletion.  
   e) Inversion

2) When majority carriers are pushed away from the oxide-Si interface, what is the bias condition?
   
   a) Accumulation.  
   b) Flatband.  
   c) **Depletion.**  
   d) Deep depletion.  
   e) Inversion

3) When minority carriers pile up at the oxide-Si interface, what is the bias condition?
   
   a) Accumulation.  
   b) Flatband.  
   c) Depletion.  
   d) Deep depletion.  
   e) **Inversion**

4) When the charge density is zero in the semiconductor, what is the bias condition?
   
   a) Accumulation.  
   b) **Flatband.**  
   c) Depletion.  
   d) Deep depletion.  
   e) Inversion.

5) What is the parameter, $\phi_f$?
   
   a) A measure of the bandbending in the semiconductor.  
   b) A measure of the volt drop across the oxide.  
   c) **A measure of how far below the intrinsic level the Fermi level is.**  
   d) A measure of how far above the intrinsic level the Fermi level is.  
   e) The metal workfunction.
6) An MOS capacitor can be thought of as:
a) Two constant capacitors in series.
b) Two constant capacitors in parallel.
**c) One constant and one bias dependent capacitor in series.**
d) One constant and one bias dependent capacitor in parallel.
e) Two bias dependent capacitors in series.

7) When $V_G = V_T$, what is the bandbending in the semiconductor?
a) $\phi_F/2$.
b) $\phi_F$.
c) $3\phi_F/2$.
d) $2\phi_F$.
e) $5\phi_F/2$.

8) If the oxide capacitance per cm$^2$ is $C_{ox}$, and the charge per cm$^2$ in the semiconductor is $Q_S$, what is the voltage drop across the oxide?
a) $Q_S C_{ox}$
b) $-C_{ox}/Q_S$
**c) $-Q_S/C_{ox}$.**
d) $Q_S + C_{ox}$
e) $Q_S - C_{ox}$.

9) How are “high” and “low-frequency” MOS C-V characteristics different?
a) In accumulation, the high-frequency cap is lower than the low-frequency cap.
b) At flatband, the high-frequency cap is lower than the low-frequency capacitance.
c) In depletion, the high-frequency cap is lower than the low-frequency capacitance.
d) In depletion, the high-frequency cap is higher than the low-frequency capacitance.
**e) In inversion the high-frequency cap is lower than the low-frequency capacitance.**

10) What is a typical thickness of an SiO$_2$ layer in modern MOS technology?
a) 0.1 – 0.2 nm.
**b) 1-2 nm.**
c) 5-6 nm.
d) 10-20 nm.
e) 100-200 nm.