

## UM-SJTU JI Summer 2019 VE 320 Quiz 8

Name:

Student ID:

1. Draw the C-V curves of a MOS capacitor with n-type Si as the substrate, at low frequency and high frequency, respectively. Explain why they are different.

2. Consider an  $n^+$  polysilicon gate on silicon dioxide with a p-type silicon substrate doped to  $N_a = 3 \times 10^{16} \text{ cm}^{-3}$ . Assume  $Q_{ss}' = 5 \times 10^{10} \text{ cm}^{-2}$ . Determine the required oxide thickness such that the threshold voltage is  $V_{TN} = +0.65 \text{ V}$ . Please provide the process of derivation.