2010 Qual Exam Questions

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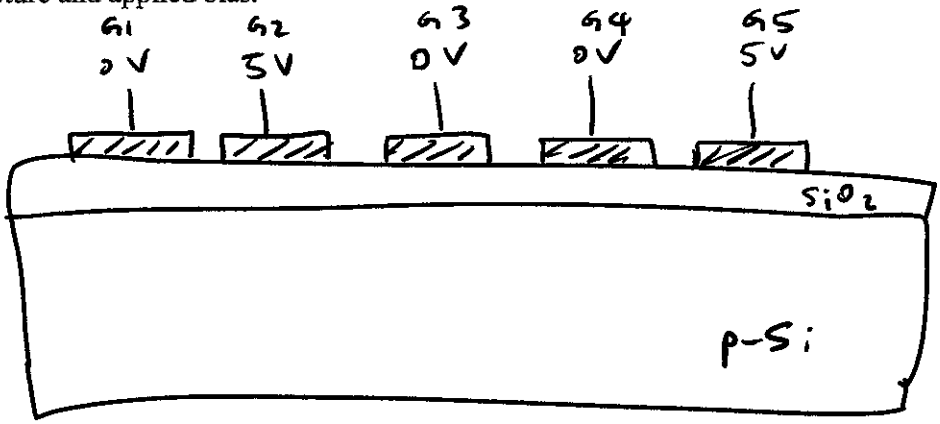
1. Do you know how a Charge-Coupled Device (CCD) works?
2. Draw the energy band diagram along the SiO2/Si interface for the following device structure and applied bias.



3. Assume some electrons are collected under G2. Now, we want to move the electrons to the right under G3. What biases would you apply to the gates G1 to G5?
4. What are the forces acting on the electrons that move the charges from G2 to G3?
5. If we want to move the electrons faster, what would you do? You can change anything you want, including (but not limited to) applied biases, device structure, doping, and the materials of the device.
6. If there is an n+ doping in the p-Si in between the gates, how does the band diagram look like and how does it affect the charge transfer?