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Submit to Justin by November 13

1. Why is Si in the diamond structure an insulator ? Why is molten Si a metal ? Explain using molecular orbital and energy band diagrams.

2. Which elements would you chose to n-dope Si, and which would you chose to p-dope Si. Is La a good n-dopant ? Is F a good p-dopant ?

3. A cylindrical piece of copper has a diameter of 1 cm and a length of 5 cm. Its resistivity is ρ. This piece of copper is now extended so that it is 10 cm long. How does the resistance change, assuming that ρ does not. Do you expect ρ to change ? Why ?

4. Describe how the carrier concentration in semiconductors with different doping levels changes with temperature and explain the different regions in the plot.

5. Explain the principle of a MOSFET.