

1. Describe three uses of etching in semiconductor manufacturing. (5 points)
2. Describe the process of wire bonding. (5 points)
3. Describe your design project by first giving a general floorplan of your chip layout and then circuit diagrams for each component in as much detail as you can remember. Gate level description is sufficient. This question is intended to determine how well group members know their own projects. (20 points).

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4. Explain why ESD is a problem, identify at least two sources of ESD, and describe two types of electrostatic protection circuits. (10 points)

5. Describe the process of design synthesis and briefly define the properties of the behavioral view and structural view on the architectural level, logic level, and circuit level. (10 points)

6. Identify and briefly describe five common IC package types. (5 points)

7. Draw the circuit diagram of a static memory element showing the word line, bit and $\overline{\text{bit}}$ lines, and inverter elements. (5 points)

8. Explain the operation of a three-transistor dynamic memory cell. (10 points)

9. Describe the general concepts behind built-in self test (BIST). (10 points)

10. Explain how Flash memory is written and erased and why memory values are retained even when the device is not powered up. (10 points)

11. Define the concept of *clock skew* and describe two techniques for minimizing clock skew. (10 points)