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**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**M.E. (CBCS : ECE) I-Semester Make up Examinations, March-2017**

**(Embedded Systems & VLSI Design)**

**VLSI Technology**

Time: 3 hours

Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE from Part-B*

**Part-A (10 × 2 = 20 Marks)**

1. How do you realize an integrated resistor in a CMOS process?
2. What are the different structures of MIM capacitors?
3. What is FOX layer? What are the uses of the same?
4. What are the roles played by Polysilicon layer on a wafer?
5. What are the aqueous mixtures required to clean the wafer?
6. List different oxide growth methods.
7. Why etching is needed?
8. Write different types of photoresist materials used during photolithography.
9. What is annealing and what is its importance?
10. Mention the temperature requirements of diffusion process.

**Part-B (5 × 10 = 50 Marks)**

11. a) Draw the structure of a Bipolar Junction Transistor indicating the different layers that make up the structure. Discuss the role of each of these layers. [8]
- b) Bring out the differences between Analog ICs and Digital ICs. [2]
12. a) Describe briefly the process flow for n-well CMOS ICs giving neat sketches for critical steps. [8]
- b) Explain what is meant by self-aligned gate. [2]
13. a) Compare CZ and FZ methods of single crystal growth. [4]
- b) Discuss the dynamics of oxide growth on Silicon wafers with the help of diagrams. [6]
14. a) With the help of a schematic view, explain the operation of a chemical vapour deposition system. [6]
- b) Compare thermal evaporation and sputtering techniques depositing metal layers. [4]
15. a) Explain the impurity diffusion process indicating the relevant equations (laws). [6]
- b) Compare Constant and Infinite source diffusions. [4]
16. a) Discuss how an isolated diode can be realized in a CMOS process. [5]
- b) What are the fabrication process steps of a BJT? [5]
17. Answer any *two* of the following:
  - a) What are the different shaping operations required for silicon? Give details. [5]
  - b) When do you prefer electron beam lithography? Explain how it is carried out. [5]
  - c) With the help of a diagram explain how Ion implantation is carried out? [5]