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ELECTRONICS ENGINEERING

Objective Practice Sets

Advanced Electronics

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1 CHAPTER
Introduction to VLSI Technology

Q.1 What is meant by the term VLSI?
(a) A device containing between 10^3 and 10^5 transistors.
(b) A device containing 10^5 and 10^7 transistors.
(c) A device containing between 10^7 and 10^9 transistors.
(d) A device containing between 10^9 and 10^{11} transistors.

Q.2 In integrated circuits, the design of electronic circuits is based on the approach of use of
(a) maximum number of resistors in the circuit
(b) large sized capacitor
(c) minimum chip area irrespective of the type of components in the design
(d) use of only bipolar transistors

Q.3 Which 'law' describes the exponential growth of integrated circuit complexity?
(a) Nyquist theorem (b) Moore law
(c) Faraday law (d) Lenz law

Q.4 What is meant by the term monolithic IC?
(a) Only one circuit element on IC
(b) Small IC
(c) Complete circuit on a single piece of silicon
(d) None of the above

Q.5 Diffusion, an important process in VLSI fabrication is governed by which law?
(a) Gauss law (b) Fick's law
(c) Charle's law (d) Boyle's law

Q.6 Which among the following functions are performed by MSI category of IC technology?
(a) Gates, Op-amps
(b) Microprocessor / AD
(c) Filters
(d) Memory / DSP

Q.7 ICs are generally made of _____.
(a) silicon (b) germanium
(c) copper (d) none of the above

Q.8 Consider the following statements:
Resistance in integrated circuit are:
1. Avoided since they contribute to power dissipation.
2. Included to increase current drain.
3. Values of 50 kΩ and above.
4. Avoided due to difficulty in fabricating required values.

Which of the statements are correct?
(a) 1 only (b) 2 only
(c) 2 and 3 (d) 1 and 4

Q.9 _____ cannot be fabricated on an IC.
(a) Transistors
(b) Diodes
(c) Resistors
(d) Large inductors and transformers

Q.10 The active components in an IC are _____.
(a) resistors
(b) capacitors
(c) transistors and diodes
(d) none of the above

Q.11 Which of the following capacitors are used widely for capacitance applications in monolithic ICs.
1. MOS capacitor
2. Collector Substrate capacitor
3. Collector-Base capacitor
4. Base -Emitter capacitor

Select the correct answer using the code given below:
(a) 1 and 2 only (b) 2 and 3 only
(c) 3 and 4 only (d) 1 and 4 only

Q.12 FPGA-based design is more suitable for
(a) large volume production
(b) prototype development
(c) high speed applications
(d) low power applications

Q.13 Which of the following are the advantages offered by retrograde well technology over conventional well technology of CMOS fabrication?
1. Increased device density.
2. Minimized latch-up problem.
3. Reduced chance of punch-through from drain to source.

(a) 1 to 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

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Answers Introduction to VLSI Technology

1. (b)	2. (c)	3. (b)	4. (c)	5. (b)	6. (c)	7. (a)	8. (d)	9. (d)
10. (c)	11. (a)	12. (b)	13. (d)					

Explanations Introduction to VLSI Technology

4. (c)

A monolithic IC is a set of electronic circuit on a single chip.

5. (b)

Fick's law states: $J = -D\frac{\partial N}{\partial x}$

7. (a)

Silicon is cheaply available.
SiO_2 a good insulator and can be easily formed.

8. (d)

Monolithic IC resistances are used in IC's

13. (d)

In retrograde well technology, high-energy implantation is used. So, it can form the well under low-temperature and short-time conditions. Hence, it can reduce the lateral diffusion and increase the device density. The doping profile of the well, in this case, can have a peak at a certain depth in the silicon substrate. Because of high doping near the bottom, the well resistivity is lower than that of the conventional well, and the latch-up problem can be minimized.
Higher well doping at the bottom can also reduce the chance of punch through from the drain to the source.

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