17322

# BRAINWARE UNIVERSITY



**Term End Examination 2025-2026**
**Programme – B.Tech.(RA)-2022/B.Tech.(RA)-2023**
**Course Name – VLSI Circuit Design**
**Course Code - PCC-ECR501**
**( Semester V )**

**Full Marks : 60** **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

## Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the function of a digital circuit.
a) To process analog signals
b) To process binary signals
c) To process sound signals
d) To process image signals

(ii) Identify the purpose of VLSI technology.
a) To create smaller and faster electronic devices
b) To create larger and slower electronic devices
c) To create software programs
d) To create mechanical devices

(iii) Identify the two primary levels of design abstraction used in VLSI design.
a) Behavioral and structural
b) Logical and physical
c) Sequential and combinational
d) Analog and digital

(iv) Identify the person who originally described Moore's Law.
a) Gordon Moore
b) Bill Gates
c) Steve Jobs
d) Tim Berners-Lee

(v) Identify the process to create a semi-custom design.
a) Full custom design
b) Integrated custom design
c) Standard cell design
d) Not any of these.

(vi) Cite the advantage of using standard cell design over full-custom design.
a) High design flexibility
b) Low design cost
c) Shorter design time
d) Design optimization

(vii) Report the process used to generate standard cells.
a) Full-custom design
b) Semi-custom design
c) Gate-array design
d) Analog design

(viii) Choose the number of transistors present in ULSI.
a) 1,000 to 10,000
b) 10,000 to 100,000
c) 1,000 to 1,000,000
d) 1,000,000 to 10,000,000

(ix) Develop an example of VLSI design concept.

a) Combinational circuit design
b) Single transistor design
c) Bipolar Junction Transistor design
d) Not any of these.

(x) Articulate the importance of Moore's law in VLSI design.

a) It has led to the development of smaller, faster and cheaper chips
b) It has made it difficult to design complex chips
c) It has decreased the number of transistors on a chip
d) It has no impact on VLSI design

(xi) Illustrate the use of a PLA.

a) PLA is used in the design of digital circuits.
b) PLA is used in the design of analog circuits.
c) PLA is used to program FPGA.
d) PLA is used to program ASIC.

(xii) Report the purpose of the chemical vapor deposition (CVD) process.

a) Produce the final wafer
b) Modify the oxide layer
c) Articulate the wafer structure
d) Grow a thin film on the wafer

(xiii) Choose the act of depositing a thin layer of silicon onto a silicon wafer.

a) Cleaning
b) Etching
c) Epitaxial Deposition
d) Photo-lithography

(xiv) Choose a process of removing material from the surface of a semiconductor wafer.

a) Oxidation
b) Diffusion
c) Etching
d) Cleaning

(xv) Choose a process used to transfer a pattern from a photomask to a semiconductor wafer.

a) Oxidation
b) Diffusion
c) Cleaning
d) Photo-lithography

## Group-B

(Short Answer Type Questions) 3 x 5=15

2. Give an example of an application where FPGAs are used for acceleration. (3)
3. Contrast CMOS NAND and NOR gates. (3)
4. Define VLSI design and explain its importance. (3)
5. Identify the disadvantages of VLSI chips over earlier technologies. (3)
6. Focus on the key components of clocked JK latch made by CMOS logic. (3)

**OR**

Explain the performance of CMOS D-latch. (3)

## Group-C

(Long Answer Type Questions) 5 x 6=30

7. Design a stick diagram for a simple VLSI circuit and explain the layout rules used. (5)
8. Explain the role of place and route tools in FPGA design. (5)
9. Devise a truth table for a CMOS transmission gate. (5)
10. Illustrate how modularity affects chip design. (5)
11. Predict the challenges arise during design of VLSI chips. (5)
12. Analyze the impact of Moore's Law on VLSI design. (5)

**OR**

Evaluate the benefits and drawbacks of the different types of VLSI chips. (5)

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