BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – B.Tech.(ECE)-2019/B.Tech.(ECE)-2020
Course Name – VLSI Devices and Design
Course Code - PCC-EC603
(Semester VI)

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) Illustrate which of the following circuit designs can be best illustrated using the structural design domain:

a) Microprocessors b) Memories
c) Counters d) Multiplexers

(ii) Cite, what are the key considerations for full custom design:

a) Timing, area, power, cost b) Area, cost, reliability, security
c) Timing, power, reliability, security d) Timing, area, reliability, security

(iii) Explain the process to create a semi-custom design.

a) Full custom design b) Integrated custom design
c) Standard cell design d) None of the above

(iv) Identify the characteristics of semi-custom design.

a) Less design time b) Low cost
c) Limited flexibility d) All of the above

(v) Define VLSI.

a) A type of software program b) A methodology for designing circuits
c) A type of processor architecture d) A type of network protocol

(vi) Identify the term used to describe a pre-designed, pre-characterized and pre-verified logic cell, that is typically used for ASIC design.

a) Macro cell b) Analog cell
c) Memory cell d) Standard cell

(vii) Develop an example of VLSI design concept.

a) Combinational circuit design b) Single transistor design
c) Bipolar Junction Transistor design d) None of the above

(viii) Determine the type of VLSI chip that is designed for a specific application.

a) Analog VLSI chips b) Digital VLSI chips
c) General-purpose VLSI chips d) ASIC

(ix) Name a type of chip that can process both analog and digital signals.

a) FPGA b) DSP
c) ASIC d) CPLD

(x) State the term used for a digital circuit that is designed to be programmed by the customer or designer after manufacturing.

a) ASIC b) PLA
c) FPGA d) None of the above

(xi) Name a type of VLSI that is a type of ASIC which can be programmed by the customer after manufacturing.

a) FPGA b) PLA
c) LSI d) MSI

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

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

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

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

(xiv) Choose the process of modifying the properties of a semiconductor material by adding impurities to it.

a) Oxidation b) Cleaning
c) Ion-implantation d) Photo-lithography

(xv) Name the type of chip that can be programmed after being manufactured.

a) ASIC b) PLA
c) LSI d) FPGA

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain, how do VLSI chips influence modern technology (3)
3. Compare and contrast analog and digital VLSI design. (3)
4. Select two types of FPGA architectures. (3)
5. Describe analog VLSI design. (3)
6. Cite the advantages of VLSI chips over earlier technologies. (3)

OR

Identify the disadvantages of VLSI chips over earlier technologies. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Examine the impact of Moor's Law on VLSI design. (5)
8. Exemine the role of diffusion in VLSI fabrication and its impact on chip performance. (5)
9. Devise a truth table for a CMOS transmission gate. (5)
10. Explain the differences between the FPGA and CPLD architectures. (5)
11. Explain how FPGA technology is used for hardware emulation. (5)
12. Design a stick diagram for a simple VLSI circuit and explain the layout rules used. (5)

OR

Report the research on the latest developments in VLSI fabrication technology, including the challenges and future prospects. (5)

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