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Marks 33.00/40.00

Grade 82.50 out of 100.00

Question 1

Correct

Mark 1.00 out of 1.00

DFF behavior can be represented as:

- ☒ a. $\text{out}(t) = \text{int}(t-1)$ ✓
- ☐ b. $\text{in}(t) = \text{out}(t+1)$
- ☐ c. $\text{out}(t) = \text{out}(t+1)$
- ☐ d. $\text{out}(t) = \text{out}(t-1)$

Question 2

Correct

Mark 1.00 out of 1.00

The boolean expression $A \cdot B$ represents which of the following:

- ☒ a. A AND B ✓
- ☐ b. A OR B
- ☐ c. A AND NOT B
- ☐ d. A NAND B

Question 3

Correct

Mark 1.00 out of 1.00

If you want to convert x to its negative value in 2's complement you should:

- ☐ a. invert (not) every bit in the number x.
- ☐ b. invert the most significant bit of x.
- ☒ c. invert every bit of x and add 1. ✓
- ☐ d. invert every bit of x and subtract 1.

Question 4

Correct

Mark 1.00 out of 1.00

What is the decimal equivalent of the binary number 10011101?
Assume "unsigned" binary for the conversion.

- ☒ a. 157 ✓
- ☐ b. 99
- ☐ c. -99
- ☐ d. -29

Question 5

Incorrect

Mark 0.00 out of 1.00

Given the following logic gate, select the truth table from below that is NOT valid given the format A - B - Output:

- ☐ a. 0 - 0 - 0
- ☐ b. 0 - 1 - 1
- ☐ c. 1 - 1 - 1
- ☒ d. 1 - 0 - 0 ✗

Question 6

Incorrect

Mark 0.00 out of 1.00

Programs written in the Hack language (.asm) can be run in the following way:

- ☒ a. translate the program using the supplied assembler and then run the binary code (.hack) using the CPU simulator. ✗
- ☐ b. run the assembly code (.asm) using the CPU simulator.
- ☐ c. translate the program using the supplied assembler and then run the binary code (.hack) using the Hardware Simulator directly.
- ☐ d. Answers (a)-(b)-(c) are correct.
- ☐ e. Answers (a)-(b) are correct

Question 7

Correct

Mark 1.00 out of 1.00

The data structure used for representing the correspondence between symbols and their meaning is:

- ☐ a. Queue
- ☐ b. Stack
- ☒ c. Hash Table ✓
- ☐ d. List

Question 8

Correct

Mark 1.00 out of 1.00

A-instruction is used for:

- ☐ a. Entering a constant.
- ☐ b. Selecting a data memory location.
- ☐ c. Selecting an instruction memory location.
- ☒ d. All of the above ✓

Question 9

Correct

Mark 1.00 out of 1.00

A RAM device accepts the minimum following inputs:

- ☐ a. data input, and a load bit
- ☒ b. data input, an address input, and a load bit ✓
- ☐ c. data input, and an address input
- ☐ d. data input, and a clock input

Question 10

Correct

Mark 1.00 out of 1.00

Which compiler type is more suitable for modern languages with complex syntax and extensive error checking?

- ☐ a. Single-pass compiler
- ☒ b. Multipass compiler ✓
- ☐ c. Both are equally suitable
- ☐ d. Neither is suitable

Question 11

Correct

Mark 1.00 out of 1.00

What is the primary advantage of using assembly language over machine language?

- ☒ a. Easier debugging ✓
- ☐ b. Portability across different platforms
- ☐ c. Faster execution
- ☐ d. Greater expressiveness

Question 12

Correct

Mark 1.00 out of 1.00

What circuit does the following truth table belong to?

- ☒ a. half-adder ✓
- ☐ b. full-adder
- ☐ c. incrementer
- ☐ d. ALU (Arithmetic Logic Unit)

Question 13

Incorrect

Mark 0.00 out of 1.00

What is the function of the following logic circuit?

- ☐ a. full adder
- ☒ b. half adder ✗
- ☐ c. And circuit
- ☐ d. Inverter

Question 14

Incorrect

Mark 0.00 out of 1.00

If we want the ALU to compute the function $y-1$, what should be the value of the zx (zeroed) and nx (negated)?

- ☐ a. $zx = 1, nx=1$
- ☒ b. $zx = 0, nx=1$ ✗
- ☐ c. $zx = 1, nx=0$
- ☐ d. $zx = 0, nx=0$

Question 15

Correct

Mark 1.00 out of 1.00

Which of the following statements is NOT TRUE about the ALU discussed?

- ☐ a. The ALU is part of the computer's CPU.
- ☐ b. The ALU is eventually based on a set of Nand gates.
- ☐ c. The ALU can compute a fixed set of functions on its two 16-bit inputs.
- ☒ d. The ALU implementation is based on sequential logic. ✓
- ☐ e. The efficiency of the ALU is related to the efficiency of the Adder chip.

Question 16

Incorrect

Mark 0.00 out of 1.00

What is the function of the following logic circuit?

- ☐ a. half adder
- ☒ b. full adder ✖
- ☐ c. subtractor
- ☐ d. counter

Question 17

Correct

Mark 1.00 out of 1.00

It is possible to force the Hardware Simulator to load a built-in version of chip Xxx. This can be done by:

- ☒ a. making sure the Xxx.hdl file is not located in the current directory. ✔
- ☐ b. leaving the chip body in the Xxx.hdl file empty.
- ☐ c. stating in the chip header that this is a built-in chip.
- ☐ d. once the chip was implemented by the user, this is not possible.

Question 18

Correct

Mark 1.00 out of 1.00

In the context of program translation, what does the term "linker" typically refer to?

- ☐ a. A program that translates source code to machine code
- ☒ b. A program that resolves external references and generates an executable program ✔
- ☐ c. A program that optimizes the performance of the compiled code
- ☐ d. A program that translates machine code to assembly language

Question 19

Correct

Mark 1.00 out of 1.00

Which of the following is NOT a component required to represent a floating point number in binary?

- ☐ a. Exponent
- ☐ b. Fraction
- ☐ c. Sign bit
- ☒ d. Precision ✔

Question 20

Correct

Mark 1.00 out of 1.00



Which of the following is defined as a combinational device?

- ☐ a. Register
- ☐ b. RAM
- ☒ c. ALU ✓
- ☐ d. Screen

Question 21

Correct

Mark 1.00 out of 1.00

What is the function of the following circuit?

- ☒ a. DFF ✓
- ☐ b. Full Adder
- ☐ c. counter
- ☐ d. SR Latch

Question 22

Correct

Mark 1.00 out of 1.00

When building a new chip in HDL each input pin of a part may be fed by:

- ☐ a. An input pin of the chip
- ☐ b. One of the constants true and false (1 and 0)
- ☐ c. An output pin of the chip
- ☐ d. An internal pin
- ☒ e. All, except c. ✓

Question 23

Correct

Mark 1.00 out of 1.00

Which type of programming language is assembly language?



- ☐ a. High-level language
- ☒ b. Low-level language ✓
- ☐ c. Machine language
- ☐ d. Scripting language

Question 24

Correct

Mark 1.00 out of 1.00



The statement `foo[bar]=15` is conceptually the same as:

- ☐ a. `@bar`, followed by `foo=15`
- ☐ b. `@foo`, followed by `bar=15`
- ☐ c. `foo[* (bar)]=15`
- ☒ d. `*(foo+bar)=15` ✓

Question 25

Correct

Mark 1.00 out of 1.00

Which of the followings is an unary Boolean function:

- ☒ a. Not ✓
- ☐ b. And
- ☐ c. Or
- ☐ d. Nand

Question 26

Correct

Mark 1.00 out of 1.00

What is the decimal value of 54 (base 10) converted to binary?

- ☒ a. 00110110 ✓
- ☐ b. 11001010
- ☐ c. 11001001
- ☐ d. 11110001
- ☐ e. 10100001

Question 27

Correct

Mark 1.00 out of 1.00

In a 4-way 16-bit Multiplexor the selector is:

- ☒ a. 2-bit wide. ✓
- ☐ b. 16-bit wide.
- ☐ c. 4-bit wide.
- ☐ d. 1-bit wide.

Question 28

Correct

Mark 1.00 out of 1.00

In the HDL implementation of the Bit chip, the output from the DFF is connected to the input of the Mux. This is done

- ☐ a. to convert the Mux into a sequential chip.
- ☒ b. to ensure that the Bit value is retained after each clock cycle if load is off. ✓
- ☐ c. to ensure that the new input bit is stored on every clock cycle.
- ☐ d. to ensure that the Bit value is retained after each clock cycle if load is on.

Question 29

Correct

Mark 1.00 out of 1.00

Which of the followings is not a sequential chip:

- ☐ a. Counter
- ☐ b. DFF
- ☐ c. Bit
- ☒ d. Adder ✓

Question 30

Correct

Mark 1.00 out of 1.00

Which of the following is being used when loading a constant into a register:

- ☐ a. direct addressing
- ☒ b. immediate addressing ✓
- ☐ c. indirect addressing.
- ☐ d. None of the above

Question 31

Incorrect

Mark 0.00 out of 1.00

The following diagram shows a logic circuit using a combinatorial chip called A, and a sequential chip called B.[AB]Which wiring is legal, the wiring around chip A or the wiring around chip B.

- ☒ a. the wiring around chip A. ✗
- ☐ b. the wiring around chip B.

Question 32

Correct

Mark 1.00 out of 1.00

Every Boolean function can be constructed from ONLY:

- ☐ a. And function
- ☐ b. Or function
- ☒ c. Nand function ✓
- ☐ d. Not Function

Question 33

Correct

Mark 1.00 out of 1.00

Which Two-Input Boolean function will return 0 for every input it receives?

- ☒ a. Constant 0 ✓
- ☐ b. Not
- ☐ c. Nor
- ☐ d. And

Question 34

Correct

Mark 1.00 out of 1.00

In the context of digital circuit design, what is a key advantage of using Programmable Logic Devices (PLDs)?

- ☐ a. They offer higher processing speeds than custom-built circuits
- ☐ b. They provide fixed functionality and cannot be reprogrammed
- ☐ c. They are cost-prohibitive compared to custom-built circuits
- ☒ d. They allow for flexible and reconfigurable digital circuit implementations ✓

Question 35

Correct

Mark 1.00 out of 1.00

What is a fundamental goal in digital design?

- ☐ a. Minimizing power consumption
- ☐ b. Maximizing clock frequency
- ☐ c. Ensuring high-level language compatibility
- ☒ d. Achieving desired functionality using electronic circuits ✓

Question 36

Correct

Mark 1.00 out of 1.00



Which of the following memory types is primarily used for permanent storage and retains data even when the power is turned off?

- ☐ a. Random-Access Memory (RAM)
- ☒ b. Read-Only Memory (ROM) ✓
- ☐ c. Cache Memory
- ☐ d. Virtual Memory

Question 37

Correct

Mark 1.00 out of 1.00

What is a primary concern in the design of sequential circuits?

- ☐ a. Minimizing power consumption
- ☐ b. Maximizing clock frequency
- ☐ c. Ensuring a one-to-one mapping of inputs to outputs
- ☒ d. Avoiding feedback loops ✓

Question 38

Correct

Mark 1.00 out of 1.00

In the context of digital circuits, what is a primary function of a register?

- ☐ a. To perform arithmetic and logic operations
- ☐ b. To store a single bit of information
- ☐ c. To count the number of clock cycles
- ☒ d. To store multiple bits of information for data processing or storage ✓

Question 39

Correct

Mark 1.00 out of 1.00

Each memory address in the Hack computer references

- ☐ a. a single byte.
- ☒ b. a single word. ✓
- ☐ c. multiple words.
- ☐ d. the D-register.

Question 40

Incorrect

Mark 0.00 out of 1.00



A coding approach that recognizes the MSB with a value of 1 to be a negative number is called?

- ☐ a. Signed Magnitude
- ☐ b. 1's complement
- ☒ c. 2's complement **✗**
- ☐ d. Binary Coded Decimal