

**Started on** Wednesday, 9 December 2020, 9:00 AM  
**State** Finished  
**Completed on** Wednesday, 9 December 2020, 9:28 AM  
**Time taken** 28 mins 44 secs  
**Marks** 13.00/20.90  
**Grade** 6.22 out of 10.00 (62.2%)

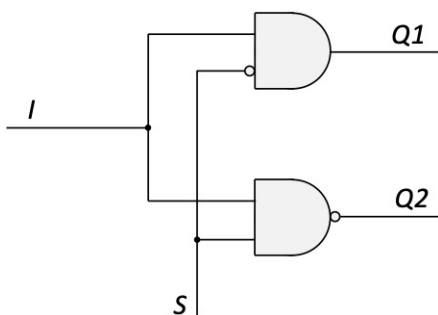
**Question 1**

Incorrect

Mark 0.00 out of 1.50

Consider a logic circuit depicted below.  $I$  denotes an input pin,  $S$  - a selector pin, and  $Q1$  and  $Q2$  - output pins. Which digital device from the list below corresponds to a depicted logic circuit?

[Time to spend: 2 mins]



Select one:

- ☐ Multiplexer
- ☒ Demultiplexer ✖
- ☐ Encoder
- ☐ Decoder
- ☐ None of the listed

Your answer is incorrect.

The correct answer is: None of the listed

**Question 2**

Correct

Mark 0.80 out of 0.80

Do you agree that some special-purpose MIPS processor registers are not directly addressable?

[Time to spend: 1 min]

Select one:

- ☒ True ✔
- ☐ False

The correct answer is 'True'.

## Question 3

Correct

Mark 1.00 out of 1.00

Northbridge/Southbridge computer architecture layout identifies two major chipsets, named as South Bridge and North Bridge. Do you agree that South Bridge, unlike North Bridge, is the one directly connected to the CPU, as it should provide a fast communication between the CPU and peripheral computer devices?

[Time to spend: 1 min]

Select one:

- ☐ Agree
- ☒ Totally disagree ✓

Your answer is correct.

The correct answer is: Totally disagree

## Question 4

Correct

Mark 1.00 out of 1.00

Do you agree that all modern processor architectures, such as Intel x86, ARM, and MIPS, assume Von Neumann computer Architecture?

[Time to spend: 1.5 min]

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

## Question 5

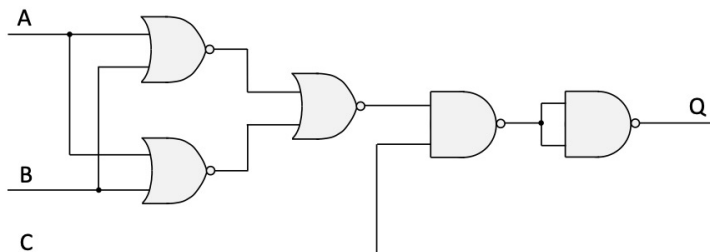
Correct

Mark 1.50 out of 1.50

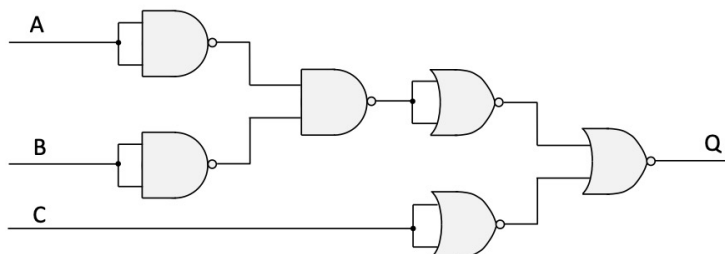
Are two logical circuits depicted below equivalent?

[Time to spend: 3 mins]

Circuit 1



Circuit 2



Select one:

☒ Yes ✓

☐ No

Your answer is correct.

The correct answer is: Yes

## Question 6

Correct

Mark 1.00 out of 1.00

Do you agree that, as opposed to a sequential digital circuit, the output of a combinational digital circuit depends only on its current inputs, but not on its past inputs?

[Time to spend: 2 mins]

Select one:

☒ True ✓

☐ False

The correct answer is 'True'.

## Question 7

Correct

Mark 1.00 out of 1.00

Do you agree that a processor register with a storage capacity of 8 bits consists of 16 flip-flops?

[Time to spend: 1 min]

Select one:

- ☐ True
- ☒ False ✓

The correct answer is 'False'.

## Question 8

Correct

Mark 1.00 out of 1.00

Recall MIPS32 R-type instructions. Why "rs", "rt", and "rd" R-type instruction fields are 5 bits long?

[Time to spend: 2 mins]

Select one:

- ☐ No choice is correct
- ☐ Because every MIPS32 register has a storage capacity of 32 bits
- ☒ Because MIPS32 processors have 32 registers ✓

Your answer is correct.

The correct answer is: Because MIPS32 processors have 32 registers

## Question 9

Incorrect

Mark 0.00 out of 1.20

What is the primary property of SIMD computation model? Choose the most precise option below:

[Time to spend: 2 mins]

Select one:

- ☐ No choice is correct
- ☐ A simultaneous execution of different floating-point processor instructions
- ☐ A simultaneous execution of different processor instructions
- ☒ A simultaneous access to a shared memory unit from different CPU cores ✗

Your answer is incorrect.

The correct answer is: No choice is correct

## Question 10

Incorrect

Mark 0.00 out of 1.00

Assume that two MIPS registers, \$t0 and \$t1, contain the following binary data:

\$t0: 01111000

\$t1: 01010101

(For simplicity, we assume 8-bit registers, rather than 32)

What is the value of \$t1 after the execution of the following instruction?:

sll \$t1, \$t0, 4

[Time to spend: 1 min]

Answer:



The correct answer is: 10000000

## Question 11

Incorrect

Mark 0.00 out of 0.75

R, I, and J are three major types of MIPS instructions. Do you agree that instructions of different types differ in the number of instruction fields?

[Time to spend: 0.5 min]

Select one:

- ☐ The number of instruction fields does not depend on R, I, or J type
- ☒ Disagree
- ☐ Agree

Your answer is incorrect.

The correct answer is: Agree

## Question 12

Partially correct

Mark 0.83 out of 1.25

Choose valid statements for a CPU cache:

[Time to spend: 2 mins]

Select one or more:

- ☐ Different cores of the same processor might share L2 or L3 cache
- ☒ CPU L1, L2, or L3 cache provides a faster access to data, as compared to the main system memory ✓
- ☒ CPU cache, depending on a cache level (L2, L3, etc.), can be implemented as a physically separate chip from a CPU chip ✓
- ☐ No choice is correct

Your answer is partially correct.

You have correctly selected 2.

The correct answers are: CPU L1, L2, or L3 cache provides a faster access to data, as compared to the main system memory, Different cores of the same processor might share L2 or L3 cache, CPU cache, depending on a cache level (L2, L3, etc.), can be implemented as a physically separate chip from a CPU chip

## Question 13

Correct

Mark 0.75 out of 0.75

Do you agree that ARM and MIPS are both the examples of complex instruction set computers (CISC)?

[Time to spend: 0.5 min]

Select one:

- ☐ True
- ☒ False ✓

The correct answer is 'False'.

## Question 14

Correct

Mark 0.80 out of 0.80

Choose a CPU component from the list below, which is responsible for fetching instructions to be executed by a CPU, as well as any other data, from an external memory unit, such as cache or the main system memory.

[Time to spend: 0.5 min]

Select one:

- ☒ Control Unit ✓
- ☐ Register File
- ☐ Floating-Point Coprocessor
- ☐ Arithmetic-Logical Unit

Your answer is correct.

The correct answer is: Control Unit

## Question 15

Correct

Mark 0.90 out of 0.90

What is a "register spilling" in the context of MIPS instruction set architecture?

[Time to spend: 0.5 min]

Select one:

- ☒ The transfer of some live variables from registers to other memory, due to the lack of registers ✓
- ☐ The use of multiple registers to store double precision floating-point values
- ☐ The use of registers for purposes they are not originally designed for

Your answer is correct.

The correct answer is: The transfer of some live variables from registers to other memory, due to the lack of registers

## Question 16

Partially correct

Mark 0.67 out of 1.00

Choose valid statements for the main system memory of modern personal computers:

[Time to spend: 1.5 min]

Select one or more:

- ☒ It belongs to DRAM memory type ✓
- ☐ Its typical read/write access speed exceeds a CPU clock speed
- ☐ Its typical storage capacity is a few megabytes
- ☐ No choice is correct
- ☒ It provides a faster access speed as compared to a remote SSD disk ✓
- ☐ It supports direct addressing of data
- ☐ It is non-volatile

Your answer is partially correct.

You have correctly selected 2.

The correct answers are: It supports direct addressing of data, It belongs to DRAM memory type, It provides a faster access speed as compared to a remote SSD disk

## Question 17

Correct

Mark 0.75 out of 0.75

Convert decimal number "144" into the octal numeric system:

[Time to spend: 1 min]

Answer:  ✓

The correct answer is: 220



## Question 18

Incorrect

Mark 0.00 out of 1.20

What is the primary goal of MESI coherence protocol?

[Time to spend: 2 mins]

Select one:

- ☐ To support data communication between CPU and GPU
- ☐ No choice is correct
- ☒ To speed-up data exchange between a CPU cache and the peripheral storage devices ❌
- ☐ To maximise the overall hit cache ratio for a CPU

Your answer is incorrect.

The correct answer is: No choice is correct

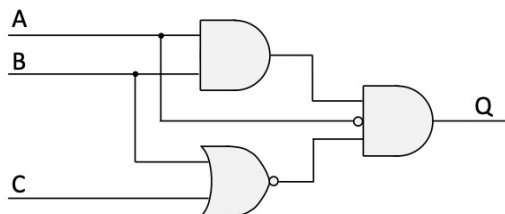
## Question 19

Incorrect

Mark 0.00 out of 1.50

Consider the combinational logic circuit below having 3 input pins, A, B, and C. What is the value of output Q?

[Time to spend: 3.5 min]



Select one:

- ☐  $(A+B)*(B+C)$
- ☐ 0
- ☐ 1
- ☒ No choice is correct ❌

Your answer is incorrect.

The correct answer is: 0

## Question 20

Correct

Mark 1.00 out of 1.00

Choose J-type MIPS instructions from the list below:

[Time to spend: 1.5 min]

Select one or more:

- ☐ sb
- ☒ No choice is correct ✓
- ☐ addi
- ☐ sub
- ☐ div
- ☐ lh
- ☐ add

Your answer is correct.

The correct answer is: No choice is correct