

Question 1 (1 point)

In ARM Cortex-M architecture, what is the starting address of data memory?

☐ 0x0000 0000

☐ 0x0800 0000

☐ 0x2000 0000

☒ 0x4000 0000

☐ 0x6000 0000

☐ 0xA000 0000

☐ 0xFFFF FFFF

(1)

Question 2 (1 point)

Saving... ↕

Instruction operands are collected from the...

☐ External Memory

☐ CPU control unit

☐ ALU

☐ Register Memory

☐ I/O Devices

☒ Grocery Store

(2)

Question 3 (1 point)

It is not possible to design an embedded system at the transistor/logic gate level.

☐ True

☐ False

(3)

Question 4 (1 point)

✓ *Saved*

It is possible to design an embedded system entirely in software.

☒ True

☐ False

(4)

Question 5 (1 point) ✓ *Saved*

In ARM architecture, how many bits of memory are referenced by a single memory address?

☒ 2

☐ 4

☐ 8

☐ 16

☐ 32

☐ 64

☐ 128

☐ 256

(5)

Question 6 (1 point)

Which of the following components of a program are stored in what parts of memory?

Dynamically Allocated Data

1. Instruction Memory

Local Variables

2. Heap Memory

Program Instructions

3. Happy Memories

Uninitialized Global Variables

4. Zero-Initialized Data Segment

Initialized Global Variables

5. Initialized Data Segment

6. Stack Memory

(6)

Question 1 (1 point)

Order the following steps in the design of an embedded system.

- Gather system requirements
- Develop software
- Deploy system
- Test system
- Produce a hardware design
- Select major hardware components

(7)

Question 2 (1 point)

What does ALU stand for?

A✓

Question 3 (1 point)

What effect does using a high-level language have on the per-unit production cost of an embedded system?

- ☐ Increases it
- ☐ Decreases it
- ☐ No effect

(8)

Question 4 (1 point)

What effect does using a low-level language have on the non-recurring engineering cost of an embedded system?

- ☐ Increases it
- ☐ Decreases it
- ☐ No effect

(9)

Question 5 (1 point) ✓ Saved

Instructions are fetched from the...

- ☐ External Memory
- ☐ CPU control unit
- ☐ ALU
- ☐ Register Memory
- ☐ I/O Devices

☒ Grocery Store

(10)

Question 2 (1 point)

An embedded system **requires** which of the following?

- ☐ Reprogrammability
- ☐ RAM
- ☐ Electronic circuitry
- ☐ A central processing unit
- ☐ Input / Output devices

(11)

Question 3 (1 point) ✓ Saved

All ARM processors use Harvard architecture.

☒ True

☐ False

(12)

Question 4 (1 point)

Von Neumann CPU architecture was a refinement of the earlier Harvard architecture.

- ☐ True
- ☐ False

(13)

Question 5 (1 point)

Which of the following is not an embedded system.

- ☐ Anti-lock brake system of a 2018 Honda Civic
- ☐ DVD box set of Seinfeld, Season 3
- ☐ Laptop Computer
- ☐ Washing Machine from the year 2017
- ☐ Nintendo Switch Joy-con experiencing stick drift

(14)

Question 6 (1 point)

Give two advantages of Harvard architecture, versus Von Neumann architecture.

(15)

Question 1 (1 point)

A 32 bit ARM MCU can only fetch one 16 bit or one 32 bit instruction per clock cycle.

- ☐ True
- ☐ False

(16)

Question 2 (1 point)

How much is the program counter incremented by after each instruction has been executed?

A✓

(17)

Question 3 (1 point)

Describe the function of the program counter (R15).

(18)

Question 4 (1 point)

In Harvard Architecture, data and instruction memory are kept separate, and do not share a data bus.

- ☐ True
- ☐ False

(19)

Question 5 (1 point)

Register memory has the fastest access time of any type of memory.

- ☐ True
- ☐ False

(20)

Question 2 (1 point)

What hardware component generates a system's clock signal?



(20)

Question 3 (1 point)

Which of the following is a reason for restricting the number of CPU registers?

- ☐ Fewer registers means fewer bugs in your code.
- ☐ Fewer registers mean less circuitry, so instructions can be executed faster
- ☐ Fewer registers means smaller addresses, meaning smaller instructions.
- ☐ Having more registers would not be useful to the system designer.

(21)

Question 4 (1 point)

There is no advantage to designing an embedded system at the gate level.

- ☐ True
- ☐ False

(22)

Question 5 (1 point)

Instruction results (aside from load and store operations) are stored in the...

- ☐ External Memory
- ☐ CPU control unit
- ☐ ALU
- ☐ Register Memory
- ☐ I/O Devices
- ☐ Grocery Store

(23)

Question 6 (1 point) ✓ *Saved*

What effect does using a high-level language have on power consumption in an embedded system?

- ☐ Increase it
- ☐ Decrease it
- ☒ It has no effect

(24)

Question 2 (1 point)

In digital electronics, what is the function of a multiplexer?

- ☐ Combines multiple analog signals into one combined signal.
- ☐ Converts an integer to a decimal number.
- ☐ Connects one of several input wires to a single output wire, switching between them based on a selection signal.
- ☐ Connects a single input wire to one of several output wires, switching between them based on a selection signal.
- ☐ Switches between multiple CDs in a home stereo system.

(25)

Question 4 (1 point)

What effect does using a high level language have on the non-recurring engineering cost of an embedded system?

- ☐ Increases it
- ☐ Decreases it
- ☐ No effect

(26)

Question 5 (1 point)

What effect does using a low-level language have on the per-unit production cost of an embedded system?

- ☐ Increases it
- ☐ Decreases it
- ☐ No effect

(27)

Question 6 (1 point)

Match the following languages to the manner of their encoding.

C

1. Character Encoded

Machine Code

2. Binary Encoded

Assembly Code

3. Encoded in Fez Glyphs

(28)

Question 1 (1 point)

Most embedded systems are programmed in assembly language

☐ True

☐ False

(29)

Question 2 (1 point)

In CPU-based systems, only program data is stored in memory; instructions are stored elsewhere.

☐ True

☐ False

(30)

Question 3 (1 point)

Which of the following components may be included in an embedded system?

☐ Real-time Operating System

☐ Application Software

☐ A tiny dinosaur in a box that does everything like on the Flintstones

☐ Sensors and Actuators

☐ Hardware

(31)

Question 4 (1 point)

What effect does using a low-level language have on the execution speed of an embedded system?

- ☐ Increases it
- ☐ Decreases it
- ☐ No effect

(32)

Question 5 (1 point)

What effect does using a high-level language have on the execution speed of an embedded system?

- ☐ Increases it
- ☐ Decreases it
- ☐ No effect

(33)

Question 1 (1 point)

Instructions are executed in the...

- ☐ External Memory
- ☐ CPU control unit
- ☐ ALU
- ☐ Register Memory
- ☐ I/O Devices
- ☐ Grocery Store

(34)

Question 2 (1 point)

What are the three processes a CPU must perform to process an instruction, in the order they are performed?

Blank # 1  

Blank # 2 

Blank # 3 

(35)

Question 3 (1 point)

The ARM Cortex-M has 32 registers, which each contain 16 bits.

- ☐ True
- ☐ False

(36)

Question 4 (1 point)

Industry is currently trending towards higher level of abstraction in embedded systems design.

- ☐ True
- ☐ False

(37)