



Hands-on Internet of Things Specialization

IoT Devices

Week 3

Question 1:

What component allows ICs to determine whether or not a signal on a data line is a 0, a 1, or undetermined?

N/A

Question 2:

How can poor DC balance deteriorate the accuracy of a level slicer?

The imbalance in voltage causes shifting of the thresholds of the level slicer, causing it to become biased.

Question 3:

Why is it important that a synchronous encoding scheme NOT have a long and continuous string of 0s transmitted over the data line? (Select all that apply)

- **Without transitions to re-align, clocks on either side of the connection drift out of sync.**
- **Long transitions of 1's or 0's can lead to biasing of the level shifter.**

Question 4:

What is the maximum number of 0's that can occur in an a continuous span within an encoded binary string that was encoded using 4B/5B?

Three



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Question 5:

Convert the data 0000 0001 0011 0011 0111 into the appropriate 4B5B encoding that would be sent over the wire.

11110 01001 10101 10101 01111

Question 6:

What is baudrate and how does it differ from bitrate?

Baudrate is the rate at which symbols are sent over a communication channel. Bitrate is the rate at which bits are sent over a communication channel.

Question 7:

Refer to the image below.



It shows the signal sent over the wire and the intended data to be transferred displayed underneath the waveform. Which encoding scheme is being used to encode this data?

Manchester Encoding

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Question 8:

Refer to the image below.



It shows the signal sent over the wire and the intended data to be transferred displayed underneath the waveform. Which encoding scheme is being used to encode this data?

NRZI

Question 9:

Name an advantage of Manchester encoding over NRZI encoding.

Improved clock synchronization

Question 10:

What type of IC does an Arduino use as its main computational unit?

Microcontroller

Question 11:

What type of IC would NASA would to use for the Mars Rover, if they want it's hardware circuits to be reprogrammable?

FPGA



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Question 12:

What type of memory is often used for the main memory of a laptop nowadays?

DRAM

Question 13:

John plans to buy a bunch of CPUs to run his cryptocurrency mining operation. Is John making the optimum processor choice, or is there a different kind of processor that might be better? (Select all that apply)

- **No, FPGAs are probably a better option.**
- **No, GPUs are probably a better option.**

Question 14:

How do microcontrollers and CPUs typically differ when it comes to memory and I/O?

CPUs typically have external busses to reach memory and I/O, while microcontrollers usually have those components on-chip.

Question 15:

Suppose you wanted to implement a circuit, but just implement one copy of it. Which technology would be best to avoid?

ASIC