Continuing Education Course #506
Microcontrollers: An Introduction

1. The difference between a microcontroller and a microprocessor is that
- ○ a. microcontrollers are specialized microprocessors
- ○ b. microcontrollers sometimes contain internal data and program memory whereas microprocessors usually do not contain any internal memory
- ○ c. microcontrollers usually contain peripherals such as communication controllers
- ○ d. all of the above

2. This is a list of all possible instructions that can be interpreted by the CPU. It can be thought of as the processor's vocabulary.
- ○ a. compiler
- ○ b. dictionary
- ○ c. register bank
- ○ d. instruction set

3. A file containing a series of ones and zeros that is interpreted by the central processing unit that instructs the processor to carry out a series of instructions is called
- ○ a. C programming language
- ○ b. compiler
- ○ c. machine code
- ○ d. assembler

4. A series of sequential instructions executed by the CPU is called what? It is what software engineers write in a higher level language like C/C++.
- ○ a. memory
- ○ b. multiplexer
- ○ c. program
- ○ d. decoder

5. All of the following are processor architectures except
- ○ a. Harvard architecture
- ○ b. von Neumann architecture
- ○ c. Babbage architecture
- ○ d. modified Harvard architecture

6. The differences in the processor architectures discussed in the course focus on
- ○ a. processor speed
- ○ b. program memory and data memory access
- ○ c. the number of transistors
- ○ d. the number of registers in the core

7. Simultaneous access to program memory and data memory is an advantage of a processor designed with this architecture

- a. von Neumann
- b. Harvard
- c. Babbage
- d. Turing

8. The main components of the CPU are the following except

- a. ALU
- b. flash memory
- c. control unit
- d. registers

9. The ALU performs the following operations

- a. addition, subtraction, multiplication, division
- b. AND, OR, NOT, XOR, bit shifting
- c. logical comparisons
- d. all of the above

10. A processor which contains an address 0x00000000 for program memory and an address 0x00000000 for data memory is most likely which type of architecture

- a. Harvard
- b. Von Neuman
- c. Babbage
- d. Turing

11. Which of the following characteristics best describes a modified Harvard architecture?

- a. data memory starts at address 0x00000000 and program memory starts at address 0x00000000
- b. program and data memories share the same bus to the CPU
- c. the processor has a single address space
- d. program memory and data memory must be stored on the same memory device

12. All of the following characteristics describe a processor with a von Neumann architecture except

- a. the program instructions and data are located in the same memory space
- b. code and data can exist in the same memory space
- c. one bus is used for both program and data memory
- d. one bus is used for program memory and a separate bus is used for data memory

13. What is the two’s complement of –58?

- a. 1001 1100
- b. 1100 1000
- c. 0101 1100
- d. 1100 0110

14. To multiply a number by 4 you would

- a. shift the number left by one bit
- b. shift the number right by two bits
- c. shift the number left by two bits
- d. shift the number left by four bits

15. What best describes the function of the control unit?

- ○ a. it performs addition and subtraction
- ○ b. it performs logical comparisons
- ○ c. it performs two's complement on a register
- ○ d. it configures the ALU, memory and register bank for a particular operation

16. Half duplex communications means that
- ○ a. every device has a unique address
- ○ b. the device cannot transmit and receive simultaneously
- ○ c. the slaves need a chip select
- ○ d. the device can transmit and receive simultaneously

17. Which of the following communications peripherals is half duplex?
- ○ a. UART
- ○ b. SPI
- ○ c. I2C

18. Synchronous communications means that
- ○ a. the slaves need a chip select
- ○ b. a clock is sent with the data on a separate line
- ○ c. there is a data line but no clock line
- ○ d. the communications link is slow

19. Which of the following communication peripherals is asynchronous?
- ○ a. UART
- ○ b. SPI
- ○ c. I2C

20. A device that measures elapsed time or controls events during a predetermined interval is called a
- ○ a. register
- ○ b. timer
- ○ c. flip-flop
- ○ d. GPIO

21. A timer overflow occurs after
- ○ a. the timer is initialized
- ○ b. the ALU completes a move operation
- ○ c. the CPU starts to overheat
- ○ d. the timer's counter register fills up

22. The name for a temporary storage area for an instruction or piece of data is a
- ○ a. UART
- ○ b. timer
- ○ c. register
- ○ d. byte

23. What cycle governs the CPU's operation
- ○ a. fetch-decode-execute
- ○ b. fetch-deliver-execute
- ○ c. fetch-deliver-program
- ○ d. program-decode-execute

24. Which CPU cycle configures the ALU for a particular operation?
- a. run
- b. decode
- c. memory
- d. deliver

25. Which component decodes an instruction from the program code?
- a. clock
- b. control unit
- c. ALU
- d. register

26. General purpose input/output is best described as
- a. a single pin that can be set high or low as an output or can be read as an input
- b. a UART
- c. an address bus
- d. a data bus

27. Which device has an input frequency of 32768 Hz, does not go to sleep with the processor and may or may not contain an integrated calendar?
- a. universal asynchronous receiver/transmitter
- b. core
- c. arithmetic logic unit
- d. real-time clock

28. Which of the following communications peripherals require a chip select?
- a. UART
- b. SPI
- c. I2C

29. Which of the following communications peripherals requires the sender (or master) to send the address of the receiver (or slave)?
- a. UART
- b. SPI
- c. I2C

30. Which of the following communications peripherals usually is used in conjunction with a transceiver (such as RS-232 or RS-485) to communicate with a device on another circuit board?
- a. UART
- b. SPI
- c. I2C