**Chapter 21: microprogrammed control**

**MULTIPLE CHOICE**

1. The term *microprogram* was first coined by \_\_\_\_\_\_\_\_\_\_ in the early 1950s.

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1. The set of microinstructions is stored in the \_\_\_\_\_\_\_\_\_\_.

A. control address register B. control buffer register

C. control memory D. control word

1. The \_\_\_\_\_\_\_\_\_ contains the address of the next microinstruction to be read.

A. control memory B. control address register

C. control word D. control buffer register

1. When a microinstruction is read from the control memory it is transferred to a \_\_\_\_\_\_\_\_\_.

A. control buffer register B. control memory

C. control address register D. control unit

1. Which of the following is a control unit input?

A. IR B. ALU flags

C. clock D. all of the above

1. In executing a microprogram the address of the next microinstruction to be executed is in which of the following categories?

A. determined by instruction register B. branch

C. next sequential address D. all of the above

1. The terms \_\_\_\_\_\_\_\_\_\_ relate to the relative width of microinstructions.

A. packed/unpacked B. hard/soft

C. horizontal/vertical D. direct/indirect

1. The terms \_\_\_\_\_\_\_\_\_ microprogramming are used to suggest the degree of closeness to the underlying control signals and hardware layout.

A. hard/soft B. horizontal/vertical

C. direct/indirect D. packed/unpacked

1. With \_\_\_\_\_\_\_\_\_ encoding one field is used to determine the interpretation of another field.

A. resource B. indirect

C. direct D. functional

1. Which of the following is a LSI-11 microinstruction?

A. add word B. test word

C. Jump D. all of the above

1. The standard IBM 3033 control memory consists of \_\_\_\_\_\_\_\_ words.

A. 2K B. 8K

C. 4K D. 16K

1. The \_\_\_\_\_\_\_\_\_ allows multiple levels of nested calls or interrupts and it can be used to support branching and looping.

A. stack B. register

C. counter D. firmware

1. The \_\_\_\_\_\_\_\_\_ is a 32-bit ALU with 64 registers that can be configured to operate as four 8-bit ALUs, two 16-bit ALUs, or a single 32-bit ALU.

A. PDP-11 B. 8832

C. 3033 D. 8818

1. \_\_\_\_\_\_\_\_\_ is a subfield that is used to indicate a conditional branch.

A. ZERION B. S2-S0

C. SELDR D. OSEL

1. A \_\_\_\_\_\_\_\_\_ is a combinatorial circuit that generates an address based on the microinstruction, the machine instruction, the microinstruction program counter, and an interrupt register.

A. microsequencer B. vertical microinstruction

C. translation array D. control word

**SHORT ANSWER**

1. An alternative, which has been used in many CISC processors, is to implement a \_\_\_\_\_\_\_\_\_\_ control unit.
2. The \_\_\_\_\_\_\_\_\_\_ generated by a microinstruction are used to cause register transfers and ALU operations.
3. Each line of a microprogramming language describes a set of micro-operations occurring at one time and is known as a \_\_\_\_\_\_\_\_.
4. A sequence of instructions is known as a \_\_\_\_\_\_\_\_\_\_\_, or *firmware*.
5. In a \_\_\_\_\_\_\_\_\_\_ microinstruction every bit in the control field attaches to a control line.
6. In a \_\_\_\_\_\_\_\_ microinstruction a code is used for each action to be performed and the decoder translates this code into individual control signals.
7. Microprogramming is the dominant technique for implementing control units in pure \_\_\_\_\_\_\_\_\_ architectures due to its ease of implementation.
8. \_\_\_\_\_\_\_\_\_ processors, with their simpler instruction format, typically use hardwired control units.
9. The two basic tasks performed by a microprogrammed control unit are microinstruction sequencing and microinstruction \_\_\_\_\_\_\_\_\_\_.
10. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ instruction depends on the following types of information: ALU flags, part of the opcode or address mode fields of the machine instruction; parts of a selected register -- such as the sign bit, and status bits within the control unit.
11. The \_\_\_\_\_\_\_\_\_\_ approach involves the use of a microinstruction address that has previously been saved in temporary storage within the control unit.
12. Each microinstruction cycle is made up of two parts: fetch and \_\_\_\_\_\_\_\_\_.
13. Two approaches can be taken to organizing the encoded microinstruction into fields: functional and \_\_\_\_\_\_\_\_\_\_.
14. The LSI-11 is a good example of a \_\_\_\_\_\_\_\_\_\_ microinstruction approach.
15. The principal function of the 8818 \_\_\_\_\_\_\_\_\_\_ is to generate the next microinstruction address for the microprogram.