**Chapter 20: control unit operation**

**MULTIPLE CHOICE**

1. A single micro-operation generally involves which of the following?
2. a transfer between registers
3. a transfer between a register and an external bus
4. a transfer between a register and the ALU
5. all of the above
6. Each instruction executed during an instruction cycle is made up of shorter \_\_\_\_\_\_.

A. executions B. subcycles

C. steps D. none of the above

1. \_\_\_\_\_\_\_\_\_\_ are the functional, or atomic, operations of a processor.

A. Micro-operations B. Interrupts

C. Subcycles D. All of the above

1. The \_\_\_\_\_\_\_\_\_ cycle occurs at the beginning of each instruction cycle and causes an instruction to be fetched from memory.

A. execute B. indirect

C. fetch D. interrupt

1. The \_\_\_\_\_\_\_\_\_ is connected to the address lines of the system bus.

A. MBR B. MAR

C. PC D. IR

1. The \_\_\_\_\_\_\_\_ is connected to the data lines of the system bus.

A. MAR B. PC

C. MBR D. IR

1. The \_\_\_\_\_\_\_\_ holds the address of the next instruction to be fetched.

A. IR B. PC

C. MAR D. MBR

1. The \_\_\_\_\_\_\_\_\_ holds the last instruction fetched.

A. PC B. MBR

C. MAR D. IR

1. The groupings of micro-operations must follow which rule?
2. a sequence of events does not need to be followed
3. use read to and write from the same register in one time unit
4. conflicts must be avoided
5. all of the above
6. The \_\_\_\_\_\_\_ designates the state of the processor in terms of which portion of the cycle it is in.

 A. ICC B. BSA

 C. ALE D. ISC

1. Machine cycles are defined to be equivalent to \_\_\_\_\_\_\_\_ accesses.

A. flag B. bus

C. clock D. path

1. The \_\_\_\_\_\_\_\_ portion of the control unit issues a repetitive sequence of pulses.

A. instruction register B. flag

C. control bus signals D. clock

1. The \_\_\_\_\_\_\_\_ pulse signals the start of each machine cycle from the control unit and alerts external circuits.

A. AC B. INSTR

C. ALE D. OUT

1. Which of the following is an Intel 8085 external signal?

A. CLK(OUT) B. read control

C. HOLDA D. all of the above

1. The \_\_\_\_\_\_\_\_\_\_ module handles multiple levels of interrupt signals.

A. interrupt control B. incrementer address latch

C. serial I/O control D. decrementer address latch

**SHORT ANSWER**

1. The prefix \_\_\_\_\_\_\_\_\_\_ refers to the fact that each step is very simple and accomplishes very little.
2. The \_\_\_\_\_\_\_\_\_\_\_\_ of a processor causes the processor to step through a series of micro-operations in the proper sequence, based on the program being executed.
3. The \_\_\_\_\_\_\_\_\_ of a processor generates the control signals that cause each micro-operation to be executed.
4. The \_\_\_\_\_\_\_\_\_\_\_\_ generated by the control unit cause the opening and closing of logic gates, resulting in the transfer of data to and from registers and the operation of the ALU.
5. The six things needed to specify the function of a processor are: operations (opcodes), addressing modes, registers, I/O module interface, memory module interface, and \_\_\_\_\_\_\_\_.
6. Each of the smaller cycles involves a series of steps, each of which involves the processor registers, referred to as \_\_\_\_\_\_\_\_\_.
7. The \_\_\_\_\_\_\_\_\_\_ register specifies the address in memory for a read or write operation.
8. The \_\_\_\_\_\_\_\_\_\_ register contains the value to be stored in memory or the last value read from memory.
9. If the instruction specifies an indirect address, then a(n) \_\_\_\_\_\_\_\_ cycle must precede the execute cycle.
10. \_\_\_\_\_\_\_\_\_\_ is when the control unit examines the opcode and generates a sequence of micro-operations based on the value of the opcode.
11. The key control unit inputs are: clock, instruction register, control signals from control bus, and \_\_\_\_\_\_\_\_\_.
12. The timing of processor operations is synchronized by the \_\_\_\_\_\_\_\_\_\_ and controlled by the control unit with control signals.
13. Control unit implementation techniques fall into two categories: microprogrammed implementation and \_\_\_\_\_\_\_\_\_\_\_ implementation.
14. The \_\_\_\_\_\_\_\_\_\_\_\_\_ must control the state of the instruction cycle.
15. In a \_\_\_\_\_\_\_\_\_\_ implementation the control unit is essentially a state machine circuit and its input logic signals are transformed into a set of output logic signals, which are the control signals.