**18. Given a memory of 2048 bytes consisting of several 64 × 8 RAM chips, and**

**assuming byte-addressable memory, which of the following seven diagrams**

**indicates the correct way to use the address bits? Explain your answer.**

a). 10 bit address

|  |  |
| --- | --- |
| 2 bits chip select | 8 bits for address on chip |

b). 64 bit address

|  |  |
| --- | --- |
| 16 bits chip select | 48 bits for address on chip |

c). 11 bit address

|  |  |
| --- | --- |
| 6 bits chip select | 5 bits for address on chip |

e). 11 bit address

|  |  |
| --- | --- |
| 6 bits chip select | 5 bits for address on chip |

f). 10 bit address

|  |  |
| --- | --- |
| 4 bits chip select | 6 bits for address on chip |

g). 64 bit address

|  |  |
| --- | --- |
| 8 bits chip select | 56 bits for address on chip |

**19. Explain the steps in the fetch–decode–execute cycle. Your explanation should**

**include what is happening in the various registers.**

**21. Explain why, in MARIE, the MAR is only 12 bits wide and the AC is 16 bits**

**wide. (Hint: Consider the difference between data and addresses.)**

**22. List the hexadecimal code for the following program (hand assemble it**

|  |  |  |
| --- | --- | --- |
| **HEX Address** | **Label** | **Instruction** |
| **100** |  | **LOAD A** |
| **101** |  | **ADD ONE** |
| **102** |  | **JUMP S1** |
| **103** | **S2,** | **ADD ONE** |
| **104** |  | **STORE A** |
| **105** |  | **Halt** |
| **106** | **S1,** | **ADD A** |
| **107** |  | **JUMP S2** |
| **108** | **A,** | **HEX 0023** |
| **109** | **One,** | **HEX 0001** |

**23. What are the contents of the symbol table for the preceding program?**

**24. Consider the MARIE program below.**

**a) List the hexadecimal code for each instruction.**

**b) Draw the symbol table.**

**c) What is the value stored in the AC when the program terminates?**

|  |  |  |
| --- | --- | --- |
| **HEX Address** | **Label** | **Instruction** |
| **100** | **Start,** | **LOAD A** |
| **101** |  | **ADD B** |
| **102** |  | **STORE D** |
| **103** |  | **CLEAR** |
| **104** |  | **OUTPUT** |
| **105** |  | **ADDI D** |
| **106** |  | **STORE B** |
| **107** |  | **HALT** |
| **108** | **A,** | **HEX 00FC** |
| **109** | **B,** | **DEC 14** |
| **10A** | **C,** | **hEX 0108** |
| **10B** | **D,** | **HEX 0000** |

**27. Write the assembly language equivalent of the following MARIE machine**

**language instructions:**

**a) 0111000000000000**

**b) 1011001100110000**

**c) 0100111101001111**

**33. Write the following code segment in MARIE assembly language:**

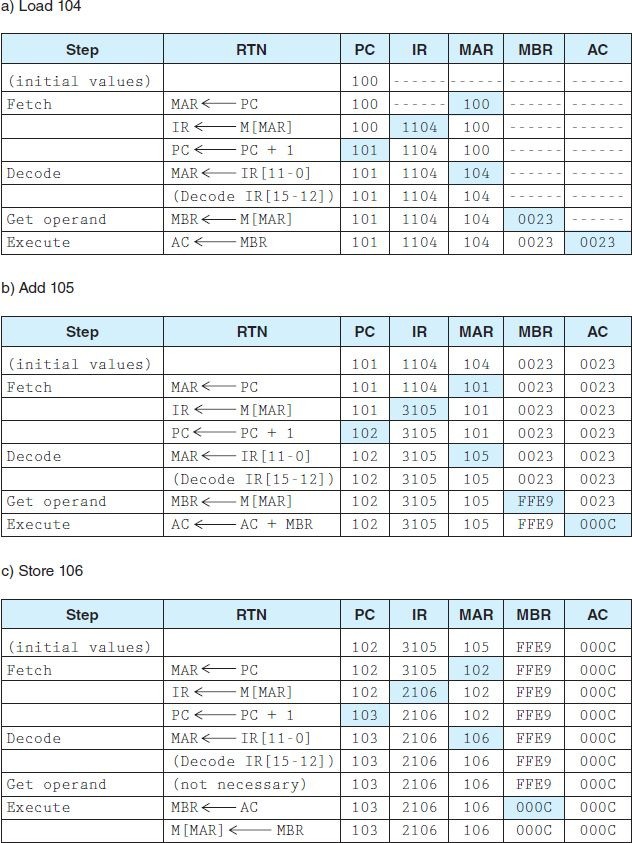
**X = 1;**

**While X <10 do**

**X = X +1;**

**Endwhile;**

**41. Provide a trace (similar to the one in Figure 4.14) for Example 4.3.**

****