**Wk3D**

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| **MARIE Assembly Language**  Part I  Write a short program of five to ten lines in MARIE assembly language to accomplish something.  For example: Write a program in MARIE assembly language to evaluate the expression: A=B+C-D  We suppose that the program start at address 100 hexadecimal in the main memory and the content of the variables A,B,C,D are at the addresses 200,201,202,203 hexadecimal  You can implement any another example if you want.  Part II  Suppose you wanted to implement a control unit for a computer that you are designing.  Would you use a hardwired implementation or a micro-programmed control unit?  Why?  What factors in the computer design would affect your decision?  Part III   1. A digital computer has a memory unit with 32 bits per word. The instruction set consists of 132 different operations. All instructions have an operation code part (opcode), and an address part (allowing for only one address).   Each instruction is stored in one word of memory.   1. How many bits are needed for the opcode? \_\_\_\_\_\_\_\_ 2. How many bits are left for the address part of the instruction? \_\_\_\_\_\_\_ 3. What is the maximum allowable size for memory? \_\_\_\_\_\_\_ 4. Suppose that a 4 M x 32 bits main memory is built using 512 K x 8 bits RAM chips and memory is word addressable. 5. How many RAM chips are necessary? \_\_\_\_\_\_ 6. How many RAM chips are needed for each memory word? \_\_\_\_\_\_\_ 7. How many address bits are needed for each RAM chip? \_\_\_\_\_\_\_ 8. How many address bits are needed for all memory? \_\_\_\_\_\_\_ |  |