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CS 219

HW3

1.2

a) The first 8 bits IAS machine code instruction to load the contents of memory address 2 into the accumulator would be: 00000001. This following 12 bits of the instruction would be 000000000010.
b) One trip for CPU to read the value from memory. Second trip to replace value in the memory location it was read from.

1.3

For the CPU to read a value from memory, it loads the address of the value into the MAR or Memory Address Register. Next it labels that address with the read control line and loads the address of the value onto the address bus, which allows the CPU to read the data from that memory on the databus and copy the data from that databus to the Memory Buffer Register or MBR. For writing data, the CPU loads the address where the value will go into the MAR and loads its corresponding data into the MBR. The CPU makes sure that it can write to the memory, makes sure that the address is labeled with the write control line, and loads the respective address and data into their own buses. Next the CPU copies the data from the databus to the memory location specified.

1.4

Address	Instructions
08A	LOAD M(0FA) STOR M(0FB)
08B	LOAD M(0FA) JUMP +M(08D)
08C	LOAD –M(0FA) STOR M(0FB)

This program stores the absolute value of data at memory address 0FA into 0FB.

1.5

MBR: 40 bits
MAR: 12 bits
IBR: 20 bits
PC: 12 bits
IR: 8 bits
AC: 40 bits
MQ: 40 bits

1.6

a) 0x45 = 1001 0101 = b10010101
b) 0xFA = 1111 1010 = b11111010
c) 0x5D = 0101 1101 = b01011101
d) 0x99 = 1001 1001 = b10011001
e) 0x03 = 0000 0011 = b00000011
f) 0x6B = 0110 1011 = b01101011
g) 0xDD = 1101 1101 = b11011101
h) 0xFE = 1111 1110 = b11111110
i) 0x22 = 0010 0010 = b00100010
j) 0x18 = 0001 1000 = b00011000

1.7

a) 11001100 = 1100 1100 = 0xCC
b) 11110001 = 1111 0001 = 0xF1
c) 00110001 = 0011 0001 = 0x31
d) 11000010 = 1100 0010 = 0xC2
e) 10100100 = 1010 0100 = 0xA4
f) 10100111 = 1010 0111 = 0xA7
g) 11101100 = 1110 1100 = 0xEC
h) 11111100 = 1111 1100 = 0xFC
i) 00111111 = 0011 1111 = 0x3F
j) 00000011 = 0000 0011 = 0x03 = 0x3