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ECE 375 hw 1

1)

a) The opcode field is 8 bits long thus 2^8=256 different opcodes. The instruction format is shown below

|  |  |  |  |
| --- | --- | --- | --- |
| Opcode: 8bits | AM: 2bits | REG: 5bits | Address 17bits |

b) The number of bits in the IR depends on whether you assume the IR can hold the entire instruction or just the opcode. If the IR can hold the entire instruction then it is 32 bits otherwise it is 8. The possible answers for the other special registers are 10 bits or 15 bits again depending on the length of the IR.

2)

3) fetch and execute for STA –(x)

→←

Fetch:

MAR ← PC;

MDR ← M(MAR), PC←PC+1

IR←MDR(opcodes), MAR←MDR(address)

Execute:

MDR←M(MAR),TEMP←AC

AC←MDR

AC←AC+1

MDR←AC

M(MAR) ←MDR,AC←AC-1

MAR←AC

MDR←TEMP,AC←TEMP

M(MAR) ←MDR

4

5 This function loads a value into register 31(0xf0) then enters a loop where inside the loop the contents of register 31 are shifted using rotate. After the rotation register 5 is incremented. The conditional for the loop is checking for a value in the carry flag. This loop will continue until the ‘f’ in the value is rotated into the carry flag by the rotate. The should take 2 rotations so the loop should execute twice. The value at the end will be 2.