# FE Cycle Register Questions

### Instruction Set

|  |  |  |
| --- | --- | --- |
| OpCode | Instruction | Description |
| 0 | Halt | Halts |
| 1 | Load | Loads Memory address to accumulator |
| 2 | Store | Store accumulator value to memory address |
| 3 | AC+ | Adds Memory address to accumulator |
| 4 | AC- | Subtracts Memory address to accumulator |
| 5 | ACX | Multiplies Memory address to accumulator |
| 6 | AC/ | Divide accumulator by Memory address |
| 7 | Jump | Unconditional jump |
| 8 | Jump- | Jump when accumulator has value < 0 |
| 9 | Jump0 | Jump when accumulator has value = 0 |
| A | Jump() | Jump to indirect address |
| B | INP | User Input to accumulator |
| C | OUT | Output to printer |
| D | N/A | Don’t worry about these |
| E | N/A | Don’t worry about these |
| F | N/A | Don’t worry about these |

## Multiply Two Numbers (location 13 and 14 and store in location15)

### Memory

|  |  |  |
| --- | --- | --- |
| Address | Contents (hex)  SEPERATED BY SPACE) | Decoded Instruction |
| 0 | 1 D |  |
| 1 | 5 E |  |
| 2 | 2 F |  |
| 3 | 0 0 |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 9 |  |  |
| A |  |  |
| B |  |  |
| C |  |  |
| D | 7 |  |
| E | 2 |  |
| F |  |  |

### Register Dry-run Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pc | MAR | MBR | CIR | Decoded Instruction | Oprand | ACC |
| 0 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

|  |  |
| --- | --- |
|  | Load E |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

### Fetch

[MAR] 🡨[ PC]  
[MBR] 🡨 [MEM]LOC ; [ PC] 🡨 [PC]+1  
[CIR]🡨[MBR]  
*INSTRUCTION DECODED*

### Execute

|  |  |  |
| --- | --- | --- |
| Getting a value (load, add etc.) | Storing a value | Jumping |
| [MAR] 🡨[CIR]  [MBR] 🡨 [MEM]LOC  [ACC] 🡨 [MBR] (LOAD)  OR  [ACC]🡨[ACC} + MBR (ADD) | [MAR] 🡨[CIR]  [MBR] 🡨 [ACC]  [MEM]LOC 🡨 [MBR] | PC🡨CIR  [MAR] 🡨[ PC] [MBR] 🡨 [MEM]LOC |