**Assignment 2**

**Instruction Set**

|  |  |  |  |
| --- | --- | --- | --- |
| **OPCODE** | **SYNTAX**  Instruction Operands | | **SEMANTICS** |
| 000 | STOP |  |  |
| 001 | ADD | Rk, Ri, Rj | R[k] <− R[i] + R[j] |
| 010 | SUB | Rk, Ri, Rj | R[k] <− R[i] − R[j] |
| 011 | TEST | Rk, Ri, Rj | R[k] <− (R[i]<R[j])&(R[i]=R[j])) |
| 100 | LDI | Rk, value | R[k] <− value |
| 101 | SHOW | Rk | d1=R[k] |
| 110 | BEQ | Displ | if (R[i]=R[j])  PC ← PC + Displ |
| 111 | BLT | Displ | if (R[i]<R[j])  PC ← PC + Displ  where Displ = value - 1 |

**Physical Format**

ADD, SUB, TEST:

11 9 8 6 5 3 2 0

|  |  |  |  |
| --- | --- | --- | --- |
| OPCODE | i | j | k |

LDI:

11 9 8 3 2 0

|  |  |  |
| --- | --- | --- |
| OPCODE | VALUE |  |

BEQ, BLT:

11 9 8 3 2 0

|  |  |  |
| --- | --- | --- |
| OPCODE | VALUE |  |

11 6 5 3 2 0

|  |  |  |  |
| --- | --- | --- | --- |
|  | i | j |  |

SHOW:

11 9 8 3 2 0

|  |  |  |
| --- | --- | --- |
| OPCODE |  | k |

STOP:

11 9 8 0

|  |  |
| --- | --- |
| OPCODE |  |

**Assembly Language Program stored in M**

LDI Rk, value LDI R0, 3

ADD Rk, Ri, Rj ADD R1, R0, R0

SHOW Rk SHOW R1

STOP STOP

**Assembly Language Program to calculate the smaller value**

LDI R0, m

LDI R1, n

TEST R2, R1, R0

BLT 4

TEST R2, R0, R1

BLT 0

SHOW R0

STOP

SHOW R1

STOP

Machine Language Instructions

|  |  |  |
| --- | --- | --- |
| m=7,n=4 | m=4,n=7 | m=4,n=2 |
| MEM(0) := X"838";  MEM(1) := X"821";  MEM(2) := X"642";  MEM(3) := X"E28";  MEM(4) := X"60A";  MEM(5) := X"E08";  MEM(6) := X"A00";  MEM(7) := X"000";  MEM(8) := X"A01";  MEM(9) := X"000"; | MEM(0) := X"820";  MEM(1) := X"839";  MEM(2) := X"642";  MEM(3) := X"E28";  MEM(4) := X"60A";  MEM(5) := X"E08";  MEM(6) := X"A00";  MEM(7) := X"000";  MEM(8) := X"A01";  MEM(9) := X"000"; | MEM(0) := X"820";  MEM(1) := X"811";  MEM(2) := X"642";  MEM(3) := X"E28";  MEM(4) := X"60A";  MEM(5) := X"E08";  MEM(6) := X"A00";  MEM(7) := X"000";  MEM(8) := X"A01";  MEM(9) := X"000"; |