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**Computer Organization-305**  
**Assignment-4**

**Solution-1:**

```
ORG 100
LOAD H // Load ASCII of 'H'
OUTPUT
LOAD E // Load ASCII of 'E'
OUTPUT
LOAD L // Load ASCII of 'L'
OUTPUT
OUTPUT
LOAD O // Load ASCII of 'O'
OUTPUT
HALT
```

```
H, DEC 72 // ASCII value for 'H'
E, DEC 69 // ASCII value for 'E'
L, DEC 76 // ASCII value for 'L'
O, DEC 79 // ASCII value for 'O'
```

**Output:**

The screenshot shows the Marie.js online assembler simulator. The assembly code is as follows:

```
1 ORG 100
2 LOAD H // Load ASCII of 'H'
3 OUTPUT
4 LOAD E // Load ASCII of 'E'
5 OUTPUT
6 LOAD L // Load ASCII of 'L'
7 OUTPUT
8 OUTPUT
9 LOAD O // Load ASCII of 'O'
10 OUTPUT
11 HALT
12
13 H, DEC 72 // ASCII value for 'H'
14 E, DEC 69 // ASCII value for 'E'
15 L, DEC 76 // ASCII value for 'L'
16 O, DEC 79 // ASCII value for 'O'
17
18
```

The output log shows the following values:

Register	Value
AC	004F
IR	7000
MAR	109
MBR	7000
PC	10A
IN	0000
OUT	004F

The output mode is set to UNICODE (UTF-16BE) and the output is "HELLO".

The machine halted normally.

The memory dump shows the following values:

Address	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F
000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
010	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
020	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

The simulator interface includes a menu bar (File, Edit, View, History, Bookmarks, Profiles, Tab, Window, Help) and a toolbar (Home, File, Examples, Edit, View, Help). The bottom status bar shows the current state (Assemble, Step, Microstep, Step Back, Halted, Restart) and a delay slider (1 ms).

## **Solution-2:**

```
    ORG 100
    Load Zero
    Store i
Loop, Load i
    Subt Three
    Skipcond 400
    Jump print
    Jump endLoop
print, Load i
    Output
    Jump next
endLoop, Halt
next, Load i
    Add One
    Store i
    Jump Loop
```

```
i,    Dec 0
Zero, Dec 0
One,  Dec 1
Three, Dec 3
```

## Output:

Assembly code:

```
1 ORG 100
2 Load Zero
3 Store i
4 Loop, Load i
5 Subt Three
6 Skipcond 400
7 Jump print
8 Jump endLoop
9 print, Load i
10 Output
11 Jump next
12 endLoop, Halt
13 next, Load i
14 Add One
15 Store i
16 Jump Loop
17
18 i, Dec 0
19 Zero, Dec 0
20 One, Dec 1
21 Three, Dec 3
22
```

Machine halted normally.

	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F
000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
010	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
020	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

AC 0000  
IR 7000  
MAR 10A  
MBR 7000  
PC 10B  
IN 0000  
OUT 0002

OUTPUT MODE: DEC

Assemble Step Microstep Step Back Halted Restart Delay: 1 ms

**Solution-3:**

ORG 100

Load ZeroValue

Store CounterVariable

StartLoop, Load CounterVariable

Subt ThreeValue

Skipcond 400

Jump SkipPrint

Jump IncrementCounter

SkipPrint, Load CounterVariable

Output

IncrementCounter, Load CounterVariable

Add OneValue

Store CounterVariable

Load FiveValue

Subt CounterVariable

Skipcond 400

Jump StartLoop

EndLoop, Halt

CounterVariable, HEX 0

OneValue, DEC 1

ThreeValue, DEC 3

FiveValue, DEC 5

ZeroValue, HEX 0

END

## A screenshot of a web browser window. The address bar shows 'marie.js.org'. The page title is 'MARIE.js | Home'. The page content includes a navigation bar with links: Home, File, Examples, Edit, View, Help. The main content area has a heading 'Why Study A Sec...' and a large code block containing assembly-like instructions for the MARIE processor, such as 'Load R1', 'Store R1', 'Add R1', etc. The browser's developer tools are open at the bottom, showing the 'Console' tab with a message: 'MARIE.js:1:1 Uncaught SyntaxError: Unexpected token &lt;'.

Assembly code:
Autosaved file

```

1 ORG 100
2
3 Load ZeroValue
4 Store CounterVariable
5
6 StartLoop, Load CounterVariable
7 Subt ThreeValue
8 Skipcond 400
9 Jump SkipPrint
10 Jump IncrementCounter
11
12 SkipPrint, Load CounterVariable
13 Output
14
15 IncrementCounter, Load CounterVariable
16 Add OneValue
17 Store CounterVariable
18 Load FiveValue
          
```

Machine halted normally.

	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F
000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
010	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
020	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

[Output log](#)
[RTL log](#)
[Watch list](#)

Input list

OUTPUT MODE: DEC ▾

**AC**  
  
**IR**  
  
  
**MAR**  
  
  
**MBR**  
  
  
**PC**  
  
  
**IN**  
  
  
**OUT**

0  
1  
2  
4

A screenshot of a web browser window. The address bar shows 'marie.js.org'. The page title is 'Why Study A Sec...'. The browser's developer tools are open at the bottom, showing the 'Home' tab. The page content is mostly obscured by the browser interface.

[illegible]

**Solution-4:**

```
ORG 100
  INPUT
  STORE M
  INPUT
  STORE N
  LOAD N
  SUBT ONE
LOOP, SKIPCOND 800
  JUMP DONE
  LOAD M
  ADD PRODUCT
  STORE PRODUCT
  LOAD N
  SUBT ONE
  STORE N
  JUMP LOOP
DONE, LOAD PRODUCT
  OUTPUT
  HALT
M, DEC 0
N, DEC 0
PRODUCT, DEC 0
ONE, DEC 1
```

## Output:

Assembly code:

```
1 ORG 100
2 INPUT
3 STORE M
4 INPUT
5 STORE N
6 LOAD N
7 SUBT ONE
8 LOOP, SKIPCOND 800
9 JUMP DONE
10 LOAD M
11 ADD PRODUCT
12 STORE PRODUCT
13 LOAD N
14 SUBT ONE
15 STORE N
16 JUMP LOOP
17 DONE, LOAD PRODUCT
18 OUTPUT
```

Machine halted normally.

	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F
000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
010	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
020	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Machine status: AC 000C, IR 7000, MAR 111, MBR 7000, PC 112, IN 0003, OUT 000C. OUTPUT MODE: DEC.

Assembly code:

```
7 SUBT ONE
8 LOOP, SKIPCOND 800
9 JUMP DONE
10 LOAD M
11 ADD PRODUCT
12 STORE PRODUCT
13 LOAD N
14 SUBT ONE
15 STORE N
16 JUMP LOOP
17 DONE, LOAD PRODUCT
18 OUTPUT
19 HALT
20 M, DEC 0
21 N, DEC 0
22 PRODUCT, DEC 0
23 ONE, DEC 1
24
```

Machine halted normally.

	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+A	+B	+C	+D	+E	+F
000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
010	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
020	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
030	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Machine status: AC 000C, IR 7000, MAR 111, MBR 7000, PC 112, IN 0003, OUT 000C. OUTPUT MODE: DEC.