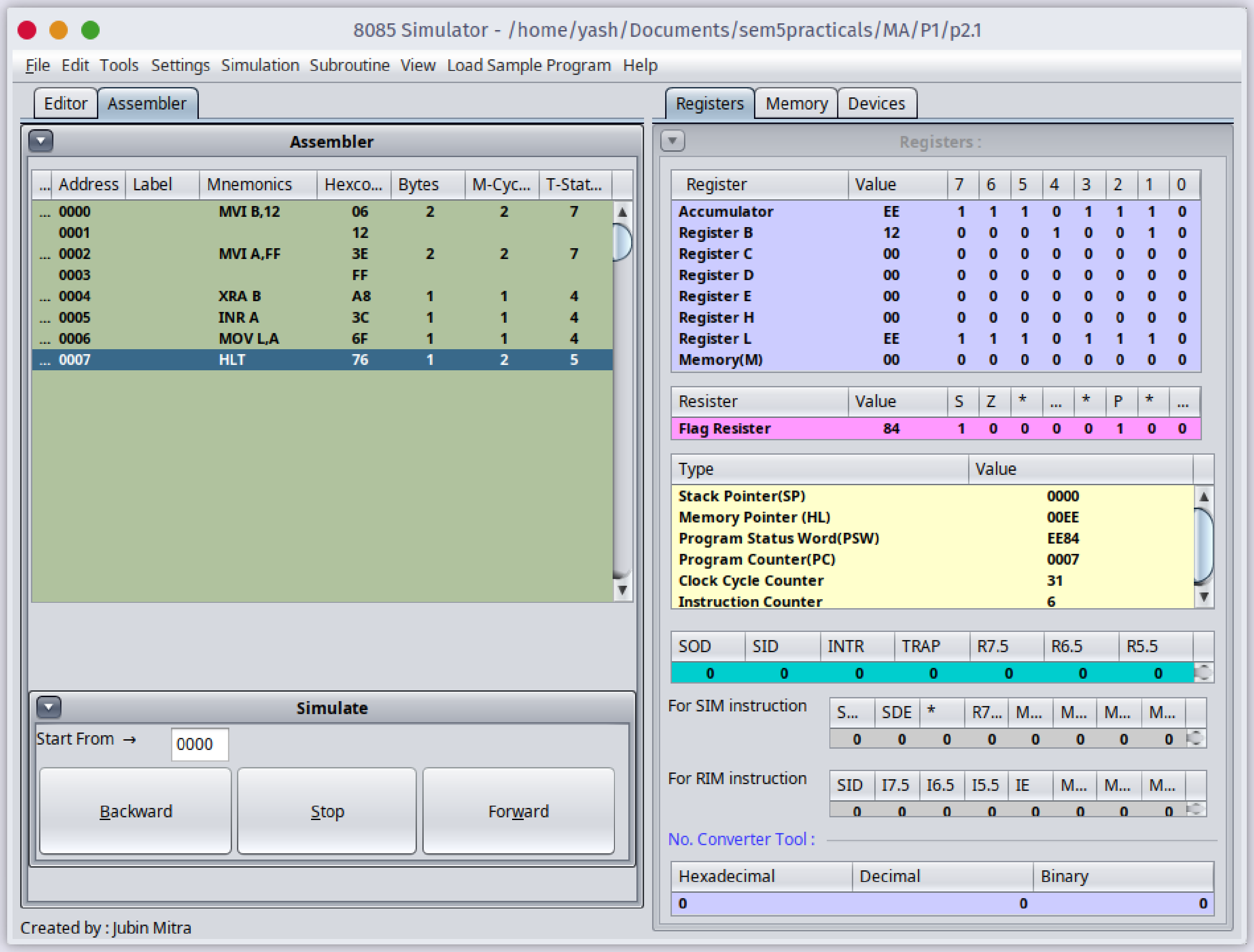
Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51
M&A Practical 2

Aim : Learning Programs using Logical Instructions like ANA, ANI, ORA, ORI, XRA, XRI, CMA, RAL, RRC, RAR, CMP, CPI etc.

Exercise :

1. To find 2's complement of 8-bit data without CMA instruction. Take 8-bit data (Last two digits of your enrollment number) in B register and store 2's complement of that number in Reg-L.

Screenshots :


8085 Simulator - /home/yash/Documents/sem5practicals/MA/P1/p2.1
File Edit Tools Settings Simulation Subroutine View Load Sample Program Help
Editor
Assembler
Registers
Memory
Devices
Assembler
Registers :
Simulate
Backward
Stop
Forward
Created by : Jubin Mitra

...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI B,12	06	2	2	7
	0001			12			
...	0002		MVI A,FF	3E	2	2	7
	0003			FF			
...	0004		XRA B	A8	1	1	4
...	0005		INR A	3C	1	1	4
...	0006		MOV L,A	6F	1	1	4
...	0007		HLT	76	1	2	5

Start From → 0000

Register	Value	7	6	5	4	3	2	1	0
Accumulator	EE	1	1	1	0	1	1	1	0
Register B	12	0	0	0	1	0	0	1	0
Register C	00	0	0	0	0	0	0	0	0
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	00	0	0	0	0	0	0	0	0
Register L	EE	1	1	1	0	1	1	1	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	84	1	0	0	0	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	00EE
Program Status Word(PSW)	EE84
Program Counter(PC)	0007
Clock Cycle Counter	31
Instruction Counter	6

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

S...	SDE	*		R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0	

For RIM instruction

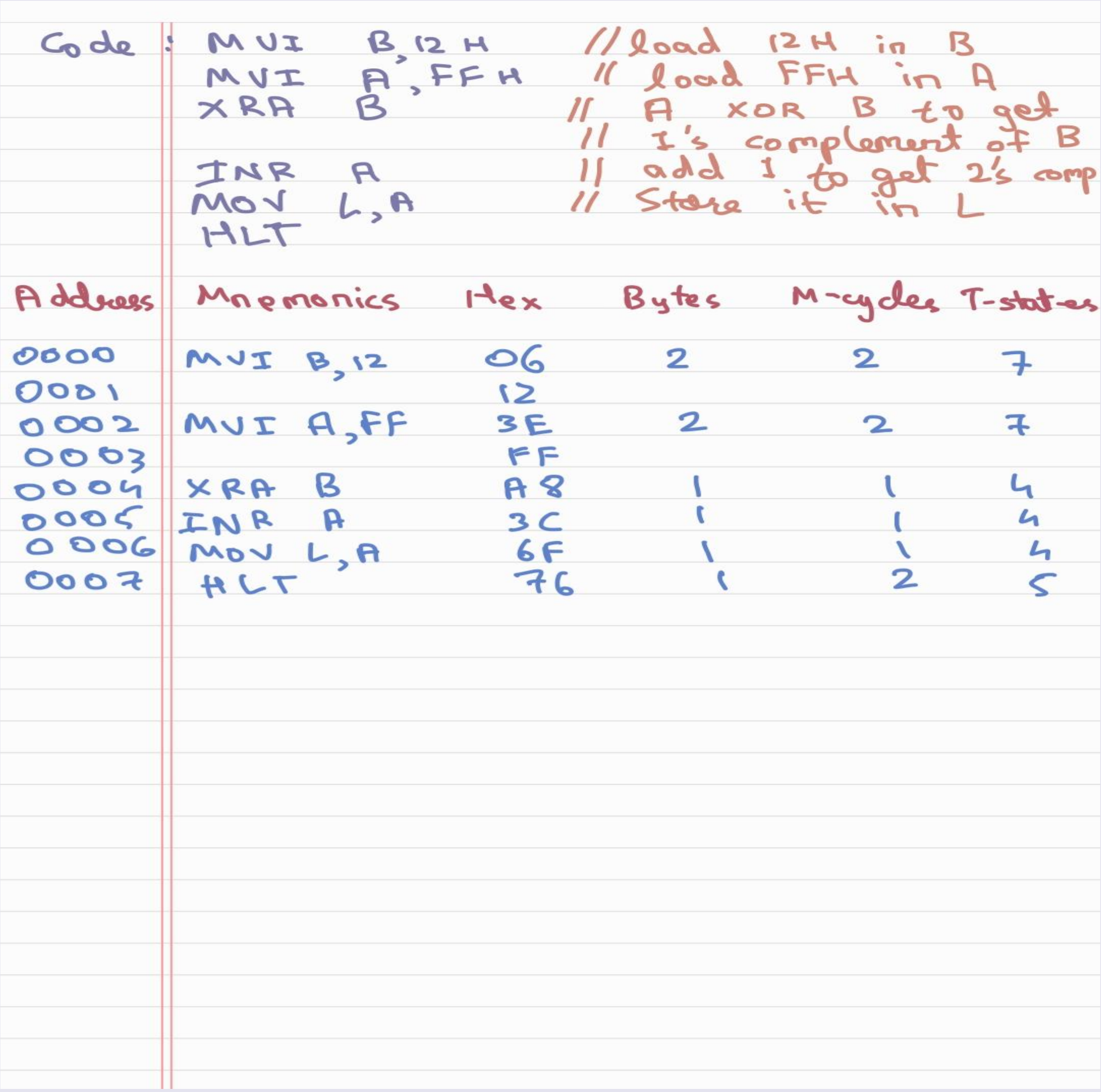
SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2

Contents and comment :



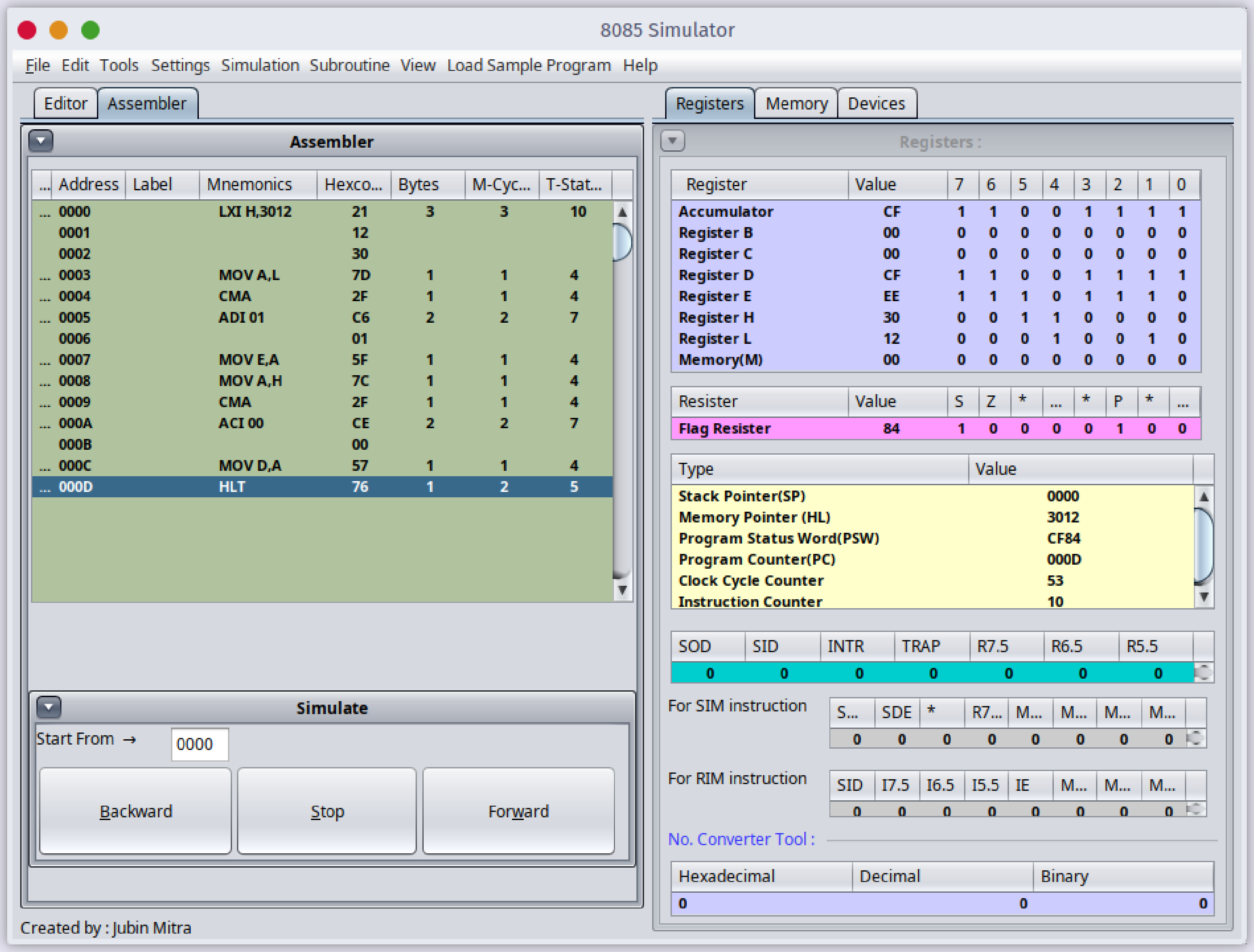
```
Code : MVI  B, 12 H     //load 12H in B
       MVI  A, FFH      // load FFH in A
       XRA  B           // A XOR B to get
                        // 1's complement of B
       INR  A           // add 1 to get 2's comp
       MOV  L, A        // Store it in L
       HLT
```

Address	Mnemonics	Hex	Bytes	M-cycles	T-states
0000	MVI B,12	06	2	2	7
0001		12			
0002	MVI A,FF	3E	2	2	7
0003		FF			
0004	XRA B	A8	1	1	4
0005	INR A	3C	1	1	4
0006	MOV L,A	6F	1	1	4
0007	HLT	76	1	2	5

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2

2. To find 2's complement of a given 16-bit number. Take 16-bit number (3 appended with last three digits of your enrollment number) in Register pair HL and 2's complement in DE register pair.

Screenshots :


8085 Simulator
File Edit Tools Settings Simulation Subroutine View Load Sample Program Help
Editor
Assembler
Registers
Memory
Devices

Assembler

...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		LXI H,3012	21	3	3	10
	0001			12			
	0002			30			
...	0003		MOV A,L	7D	1	1	4
...	0004		CMA	2F	1	1	4
...	0005		ADI 01	C6	2	2	7
	0006			01			
...	0007		MOV E,A	5F	1	1	4
...	0008		MOV A,H	7C	1	1	4
...	0009		CMA	2F	1	1	4
...	000A		ACI 00	CE	2	2	7
	000B			00			
...	000C		MOV D,A	57	1	1	4
...	000D		HLT	76	1	2	5

Simulate

Start From → 0000

Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	CF	1	1	0	0	1	1	1	1
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	CF	1	1	0	0	1	1	1	1
Register E	EE	1	1	1	0	1	1	1	0
Register H	30	0	0	1	1	0	0	0	0
Register L	12	0	0	0	1	0	0	1	0
Memory(M)	00	0	0	0	0	0	0	0	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	84	1	0	0	0	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	3012
Program Status Word(PSW)	CF84
Program Counter(PC)	000D
Clock Cycle Counter	53
Instruction Counter	10

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

S...	SDE	*	R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

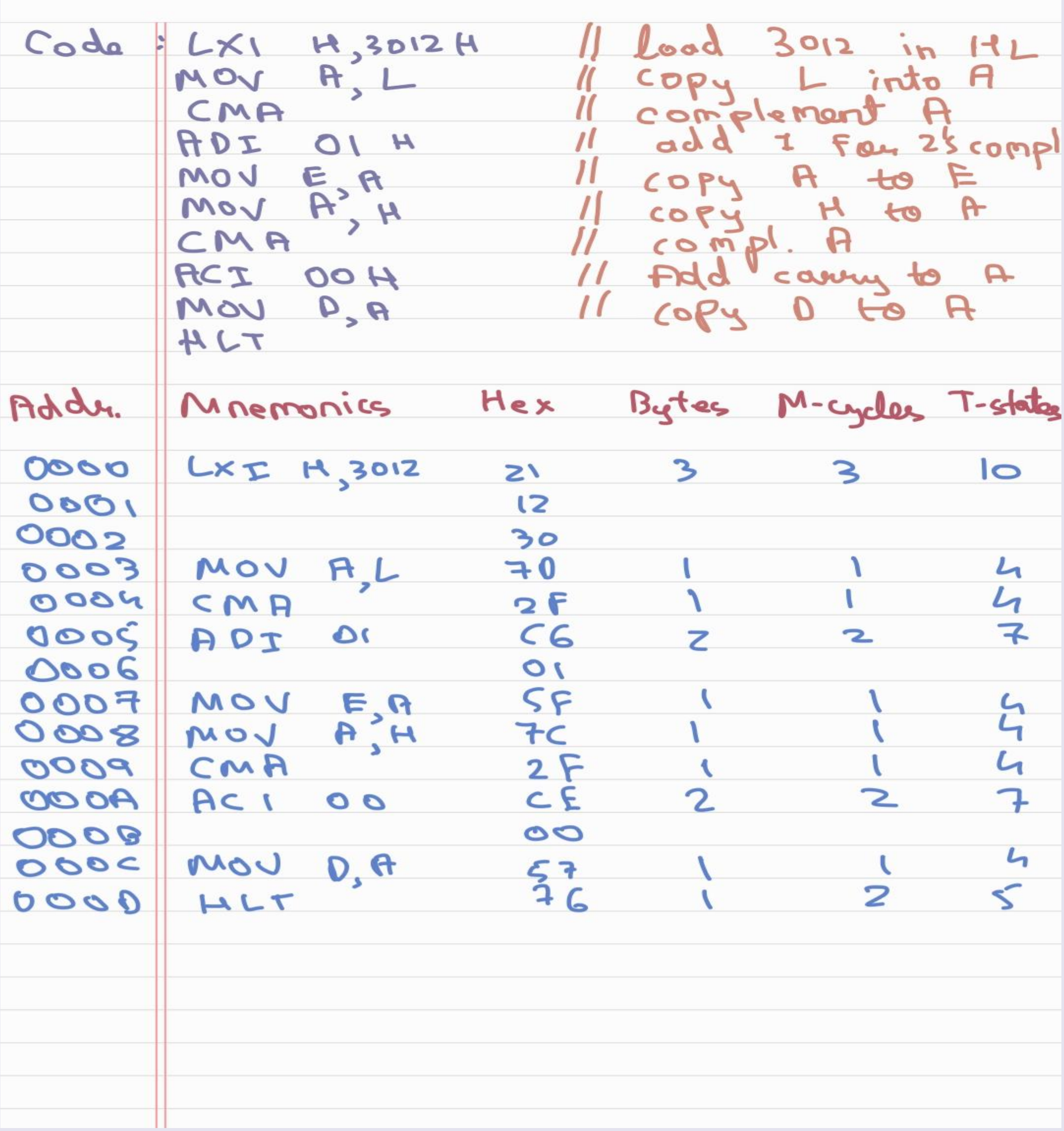
No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

Created by : Jubin Mitra

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51
M&A Practical 2

Contents and comment :



```
Code : LXI  H,3012H    // load 3012 in HL
       MOV  A,L        // copy L into A
       CMA             // complement A
       ADI  01 H       // add 1 for 2's compl
       MOV  E,A        // copy A to E
       MOV  A,H        // copy H to A
       CMA             // compl. A
       ACI  00H        // Add carry to A
       MOV  D,A        // copy D to A
       HLT
```

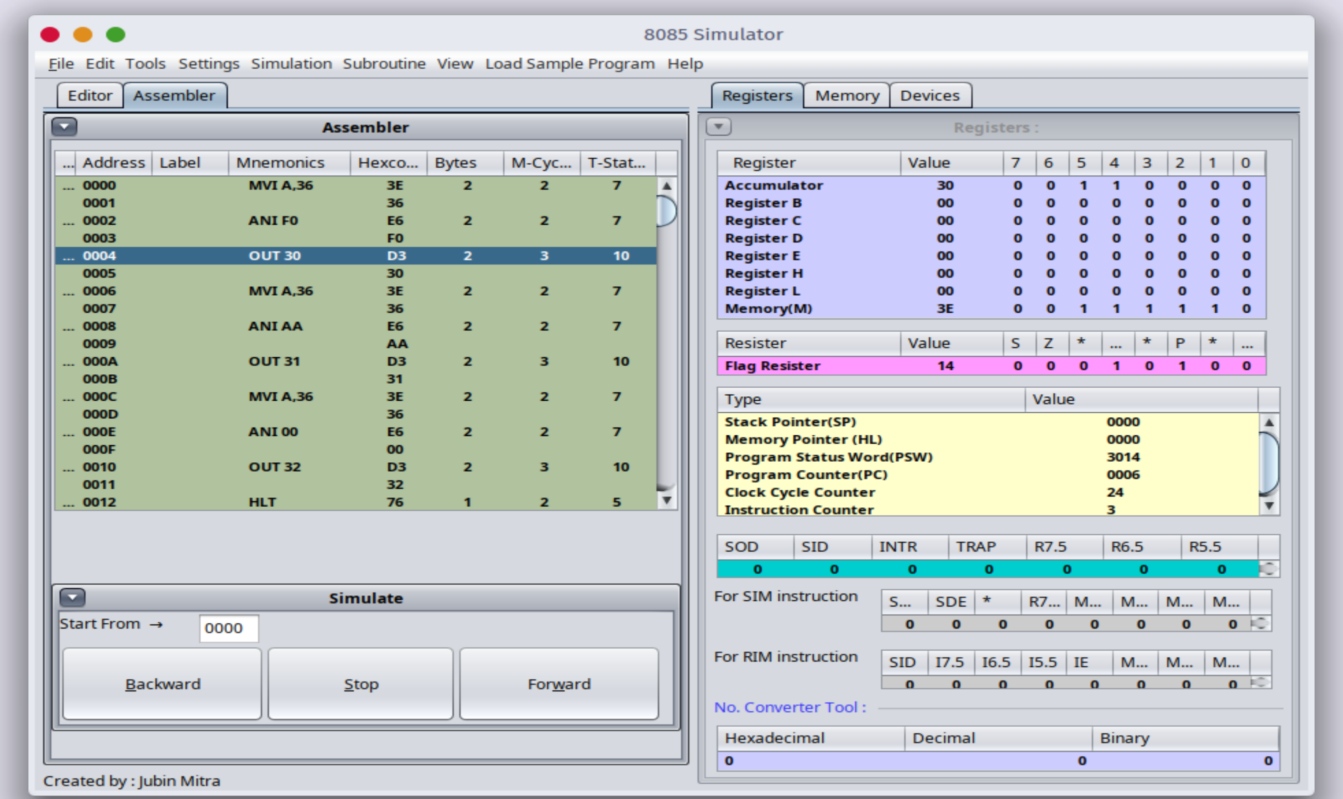
Addr.	Mnemonics	Hex	Bytes	M-cycles	T-states
0000	LXI H,3012	21	3	3	10
0001		12			
0002		30			
0003	MOV A,L	70	1	1	4
0004	CMA	2F	1	1	4
0005	ADI 01	C6	2	2	7
0006		01			
0007	MOV E,A	5F	1	1	4
0008	MOV A,H	7C	1	1	4
0009	CMA	2F	1	1	4
000A	ACI 00	CE	2	2	7
000B		00			
000C	MOV D,A	57	1	1	4
000D	HLT	76	1	2	5

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2

3. To learn masking patterns and hence making specific bits to zero. Take one 8-bit data that is multiplied by 3 with the last two digits of your enrollment number. Perform operations to result as follows and display on the port 30H, 31H and 32H respectively:

Case 1: Lower nibble should be masked and upper nibble should remain unchanged.
Case 2: All even bits shall be masked.
Case 3: Answer after masking becomes zero.

Screenshots :
Case-1:



...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,36	3E	2	2	7
	0001			36			
...	0002		ANI F0	E6	2	2	7
	0003			F0			
...	0004		OUT 30	D3	2	3	10
	0005			30			
...	0006		MVI A,36	3E	2	2	7
	0007			36			
...	0008		ANI AA	E6	2	2	7
	0009			AA			
...	000A		OUT 31	D3	2	3	10
	000B			31			
...	000C		MVI A,36	3E	2	2	7
	000D			36			
...	000E		ANI 00	E6	2	2	7
	000F			00			
...	0010		OUT 32	D3	2	3	10
	0011			32			
...	0012		HLT	76	1	2	5

Start From → 0000

Register	Value	7	6	5	4	3	2	1	0
Accumulator	30	0	0	1	1	0	0	0	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	00	0	0	0	0	0	0	0	0
Register L	00	0	0	0	0	0	0	0	0
Memory(M)	3E	0	0	1	1	1	1	1	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	14	0	0	0	1	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	0000
Program Status Word(PSW)	3014
Program Counter(PC)	0006
Clock Cycle Counter	24
Instruction Counter	3

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

S...	SDE	*	R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0

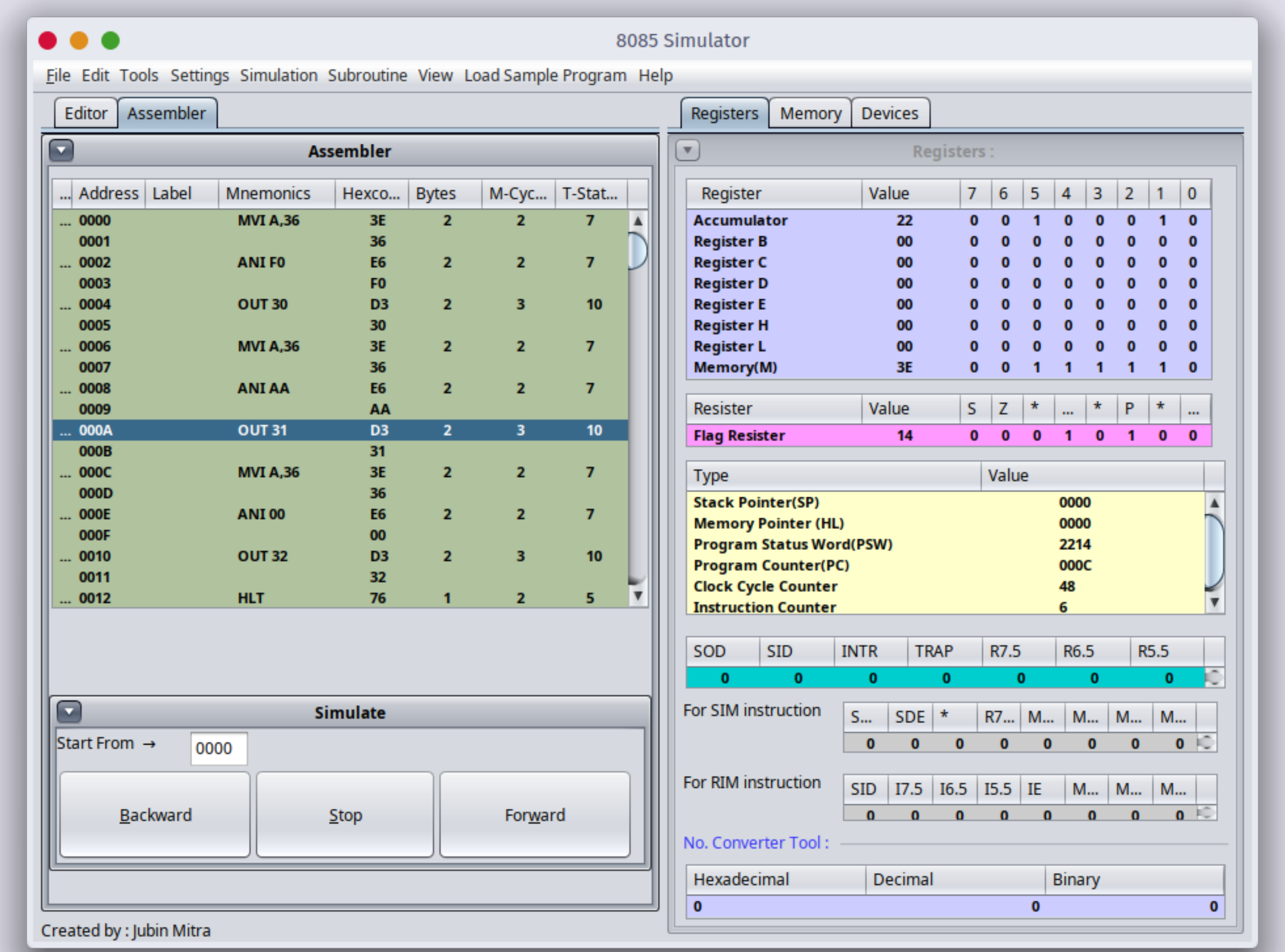
For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

Hexadecimal	Decimal	Binary
0	0	0

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2

Case-2:



Assembler

...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,36	3E	2	2	7
	0001			36			
...	0002		ANI F0	E6	2	2	7
	0003			F0			
...	0004		OUT 30	D3	2	3	10
	0005			30			
...	0006		MVI A,36	3E	2	2	7
	0007			36			
...	0008		ANI AA	E6	2	2	7
	0009			AA			
...	000A		OUT 31	D3	2	3	10
	000B			31			
...	000C		MVI A,36	3E	2	2	7
	000D			36			
...	000E		ANI 00	E6	2	2	7
	000F			00			
...	0010		OUT 32	D3	2	3	10
	0011			32			
...	0012		HLT	76	1	2	5

Simulate

Start From → 0000

Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	22	0	0	1	0	0	0	1	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	00	0	0	0	0	0	0	0	0
Register L	00	0	0	0	0	0	0	0	0
Memory(M)	3E	0	0	1	1	1	1	1	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	14	0	0	0	1	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	0000
Program Status Word(PSW)	2214
Program Counter(PC)	000C
Clock Cycle Counter	48
Instruction Counter	6

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

S...	SDE	*	R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0

For RIM instruction

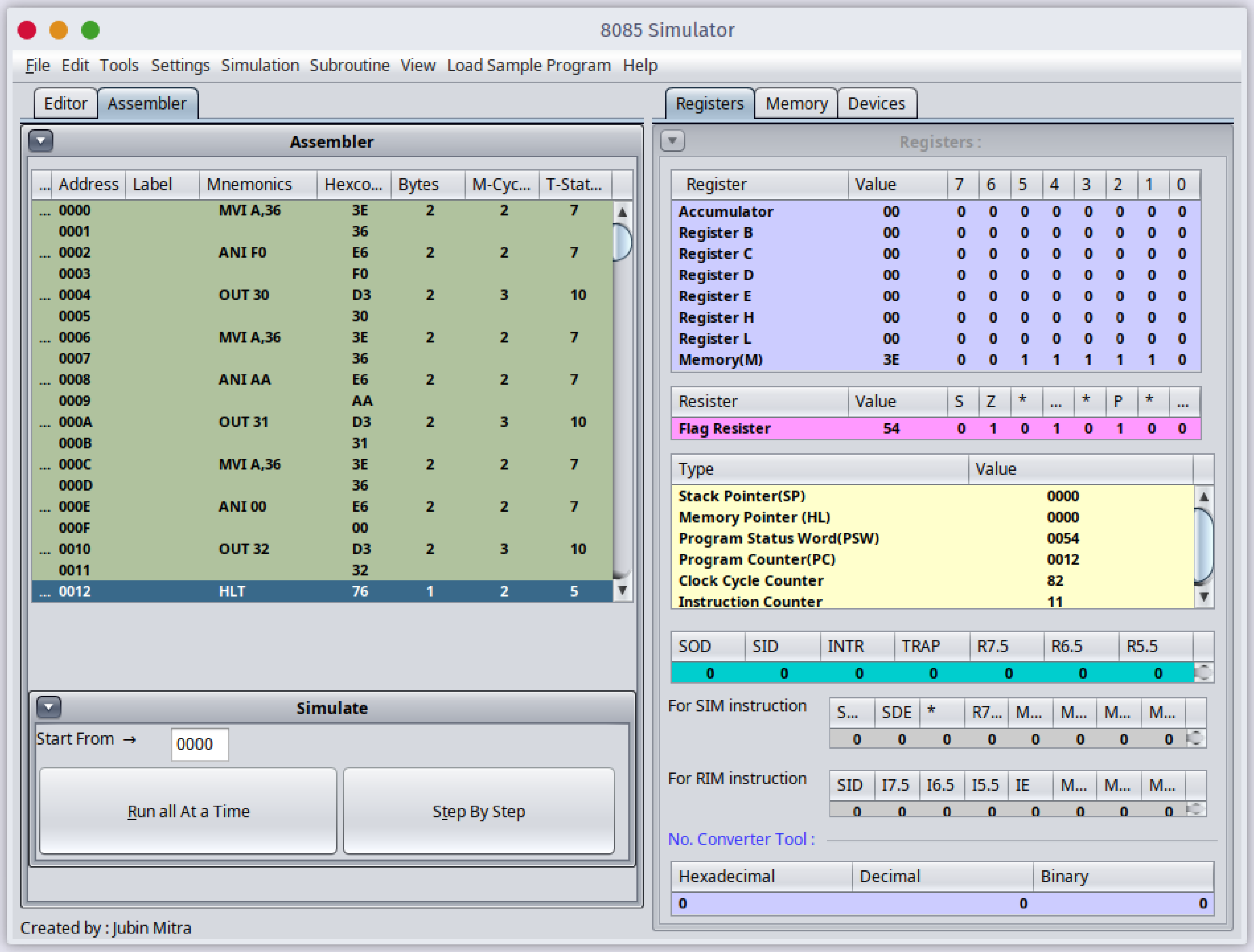
SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2

Case-3:


8085 Simulator
File Edit Tools Settings Simulation Subroutine View Load Sample Program Help
Editor
Assembler
Registers
Memory
Devices

Assembler

...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,36	3E	2	2	7
	0001			36			
...	0002		ANI F0	E6	2	2	7
	0003			F0			
...	0004		OUT 30	D3	2	3	10
	0005			30			
...	0006		MVI A,36	3E	2	2	7
	0007			36			
...	0008		ANI AA	E6	2	2	7
	0009			AA			
...	000A		OUT 31	D3	2	3	10
	000B			31			
...	000C		MVI A,36	3E	2	2	7
	000D			36			
...	000E		ANI 00	E6	2	2	7
	000F			00			
...	0010		OUT 32	D3	2	3	10
	0011			32			
...	0012		HLT	76	1	2	5

Simulate

Start From → 0000

Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	00	0	0	0	0	0	0	0	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	00	0	0	0	0	0	0	0	0
Register L	00	0	0	0	0	0	0	0	0
Memory(M)	3E	0	0	1	1	1	1	1	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	54	0	1	0	1	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	0000
Program Status Word(PSW)	0054
Program Counter(PC)	0012
Clock Cycle Counter	82
Instruction Counter	11

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

S...	SDE	*	R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

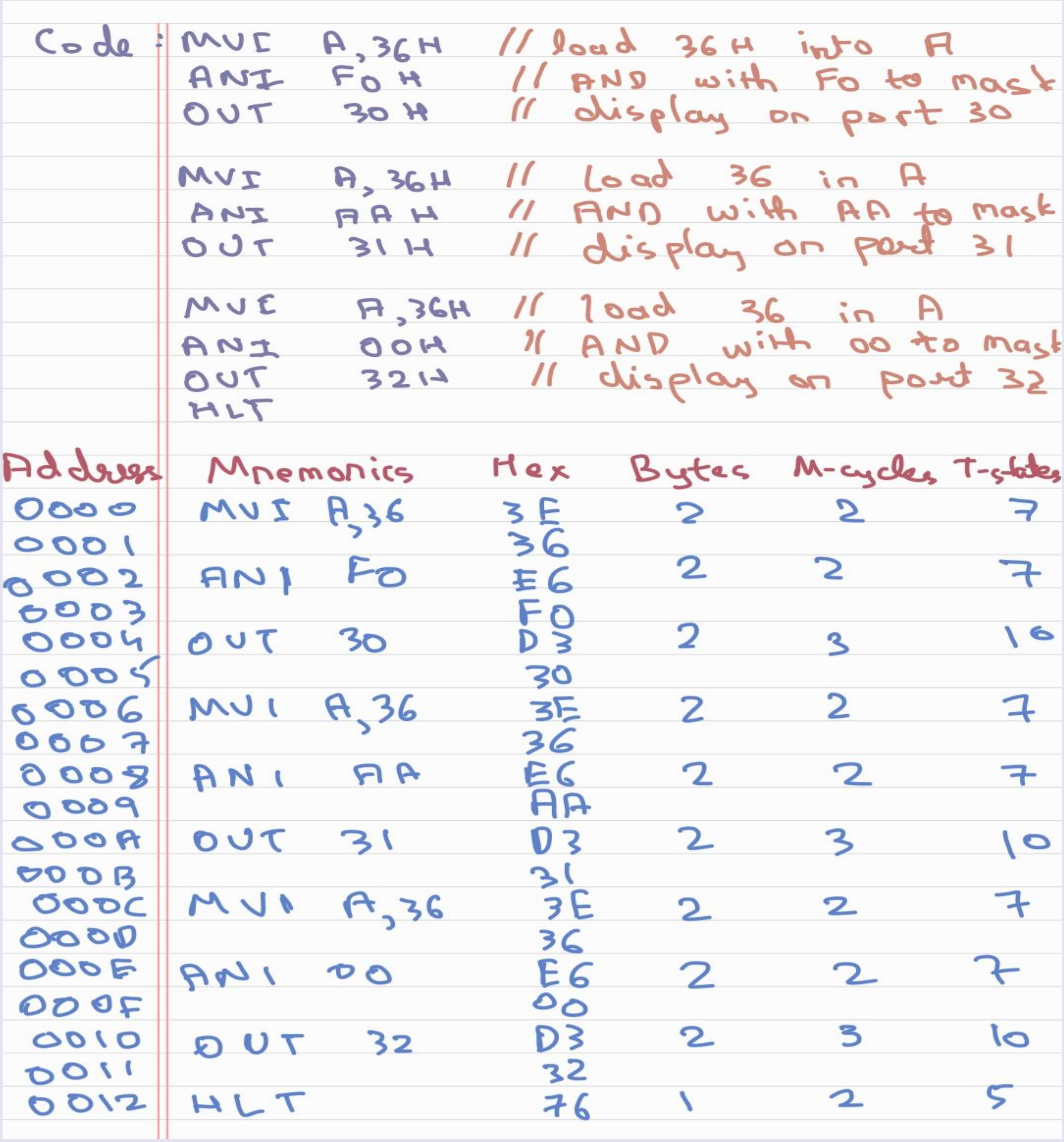
No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

Created by : Jubin Mitra

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2

Contents and comment :



Code :
```
MVI   A,36H   // load 36H into A
ANI   F0 H    // AND with F0 to mask
OUT   30 H    // display on port 30

MVI   A,36H   // Load 36 in A
ANI   AA H    // AND with AA to mask
OUT   31 H    // display on port 31

MVI   A,36H   // load 36 in A
ANI   00H     // AND with 00 to mask
OUT   32H     // display on port 32
HLT
```

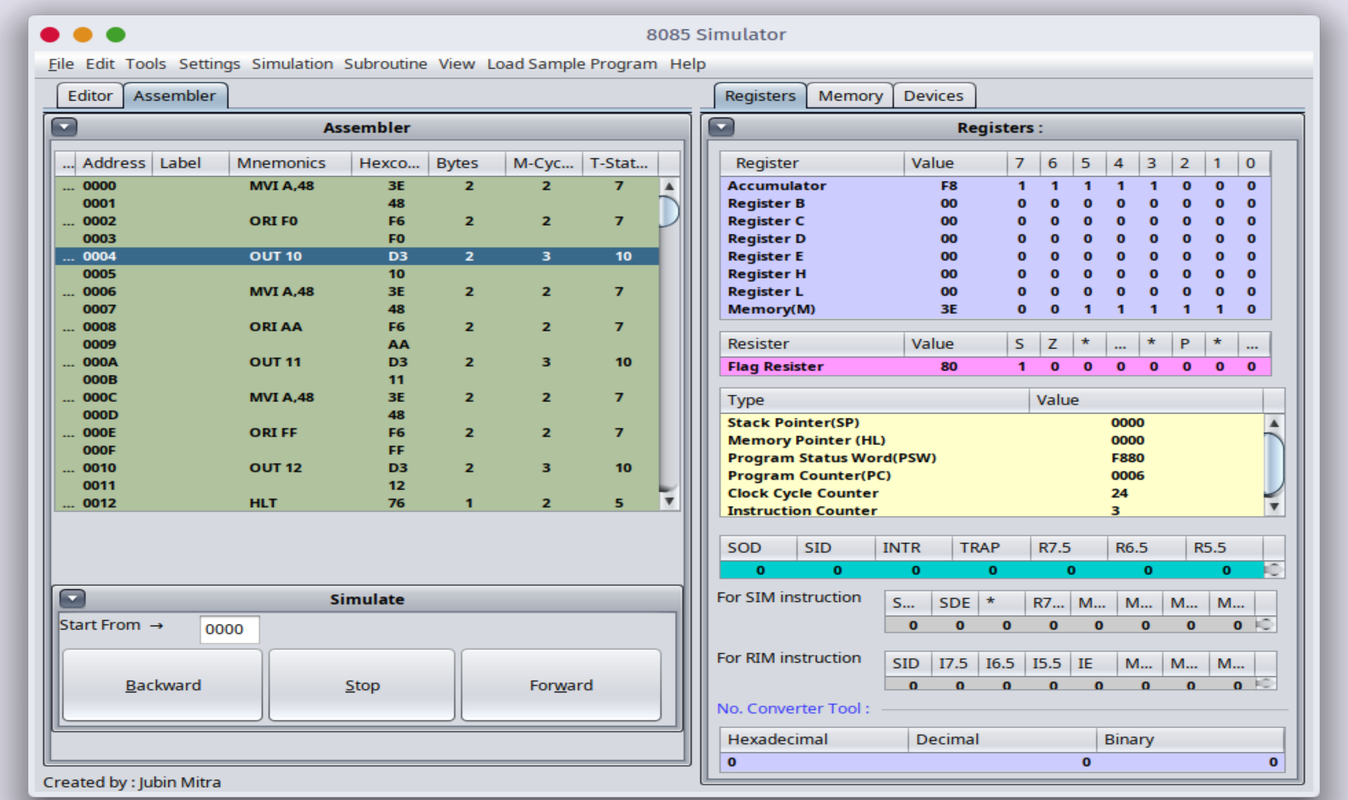
Address	Mnemonics	Hex	Bytes	M-cycles	T-states
0000	MVI A,36	3E	2	2	7
0001		36			
0002	ANI F0	E6	2	2	7
0003		F0			
0004	OUT 30	D3	2	3	10
0005		30			
0006	MVI A,36	3E	2	2	7
0007		36			
0008	ANI AA	E6	2	2	7
0009		AA			
000A	OUT 31	D3	2	3	10
000B		31			
000C	MVI A,36	3E	2	2	7
000D		36			
000E	ANI 00	E6	2	2	7
000F		00			
0010	OUT 32	D3	2	3	10
0011		32			
0012	HLT	76	1	2	5

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2

4. To learn unmasking patterns and hence making specific bits to one. Take one 8-bit that is multiplied by 4 with the last two digits of your enrollment number. Perform operations to result as follows and display on the port 10H, 11H and 12H respectively:

Case 1: Upper nibble should be unmasked and lower nibble should remain unchanged.
Case 2: All odd bits shall be unmasked.
Case 3: Answer after unmasking becomes all bits one.

Screenshots :
Case-1:



...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,48	3E	2	2	7
	0001			48			
...	0002		ORI F0	F6	2	2	7
	0003			F0			
...	0004		OUT 10	D3	2	3	10
	0005			10			
...	0006		MVI A,48	3E	2	2	7
	0007			48			
...	0008		ORI AA	F6	2	2	7
	0009			AA			
...	000A		OUT 11	D3	2	3	10
	000B			11			
...	000C		MVI A,48	3E	2	2	7
	000D			48			
...	000E		ORI FF	F6	2	2	7
	000F			FF			
...	0010		OUT 12	D3	2	3	10
	0011			12			
...	0012		HLT	76	1	2	5

Start From → 0000

Register	Value	7	6	5	4	3	2	1	0
Accumulator	F8	1	1	1	1	1	0	0	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	00	0	0	0	0	0	0	0	0
Register L	00	0	0	0	0	0	0	0	0
Memory(M)	3E	0	0	1	1	1	1	1	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	80	1	0	0	0	0	0	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	0000
Program Status Word(PSW)	F880
Program Counter(PC)	0006
Clock Cycle Counter	24
Instruction Counter	3

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

S...	SDE	*	R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0

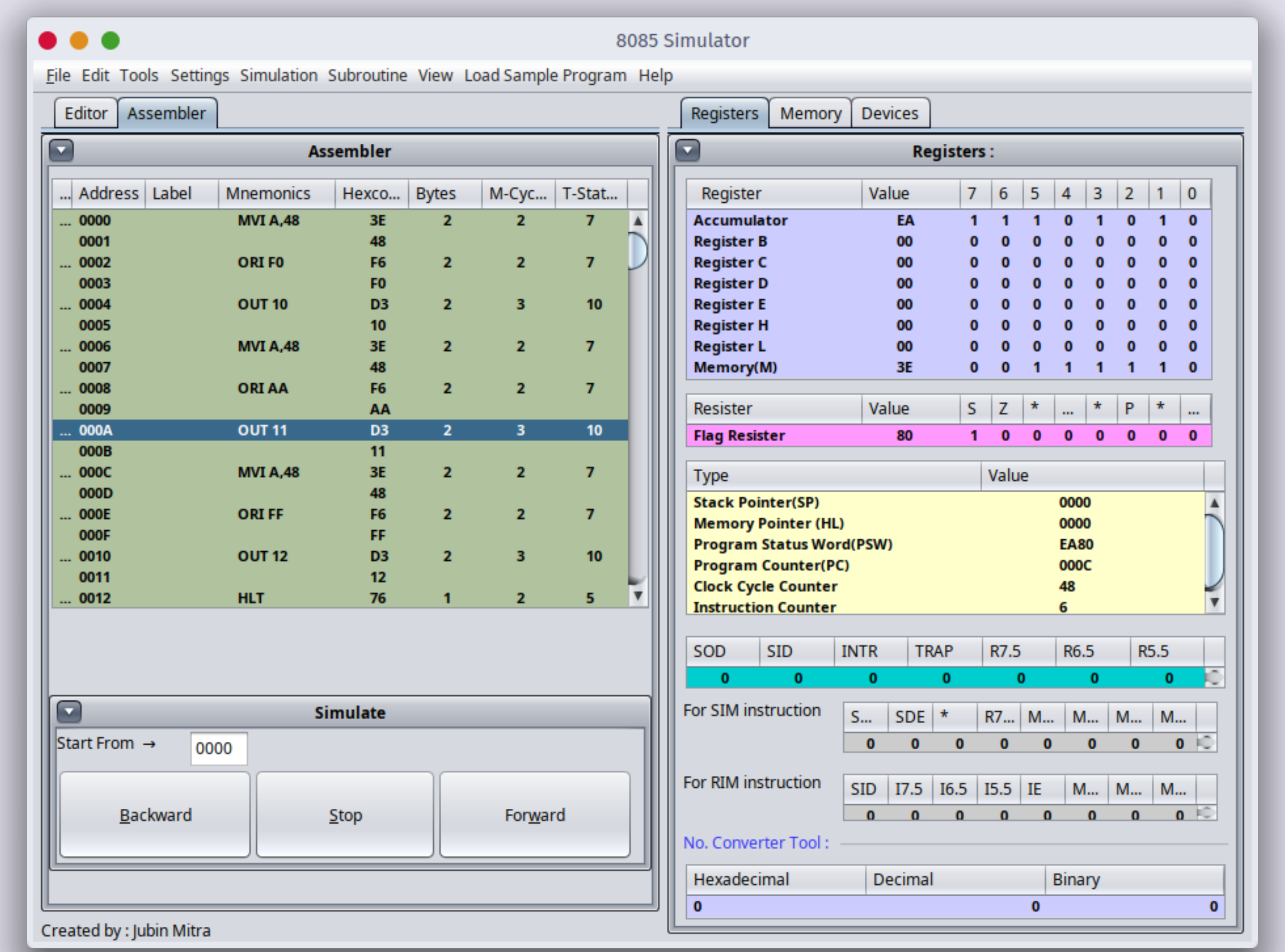
For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

Hexadecimal	Decimal	Binary
0	0	0

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51
M&A Practical 2

Case-2:



Assembler

...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,48	3E	2	2	7
	0001			48			
...	0002		ORI F0	F6	2	2	7
	0003			F0			
...	0004		OUT 10	D3	2	3	10
	0005			10			
...	0006		MVI A,48	3E	2	2	7
	0007			48			
...	0008		ORI AA	F6	2	2	7
	0009			AA			
...	000A		OUT 11	D3	2	3	10
	000B			11			
...	000C		MVI A,48	3E	2	2	7
	000D			48			
...	000E		ORI FF	F6	2	2	7
	000F			FF			
...	0010		OUT 12	D3	2	3	10
	0011			12			
...	0012		HLT	76	1	2	5

Start From → 0000

Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	EA	1	1	1	0	1	0	1	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	00	0	0	0	0	0	0	0	0
Register L	00	0	0	0	0	0	0	0	0
Memory(M)	3E	0	0	1	1	1	1	1	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	80	1	0	0	0	0	0	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	0000
Program Status Word(PSW)	EA80
Program Counter(PC)	000C
Clock Cycle Counter	48
Instruction Counter	6

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

S...	SDE	*	R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0

For RIM instruction

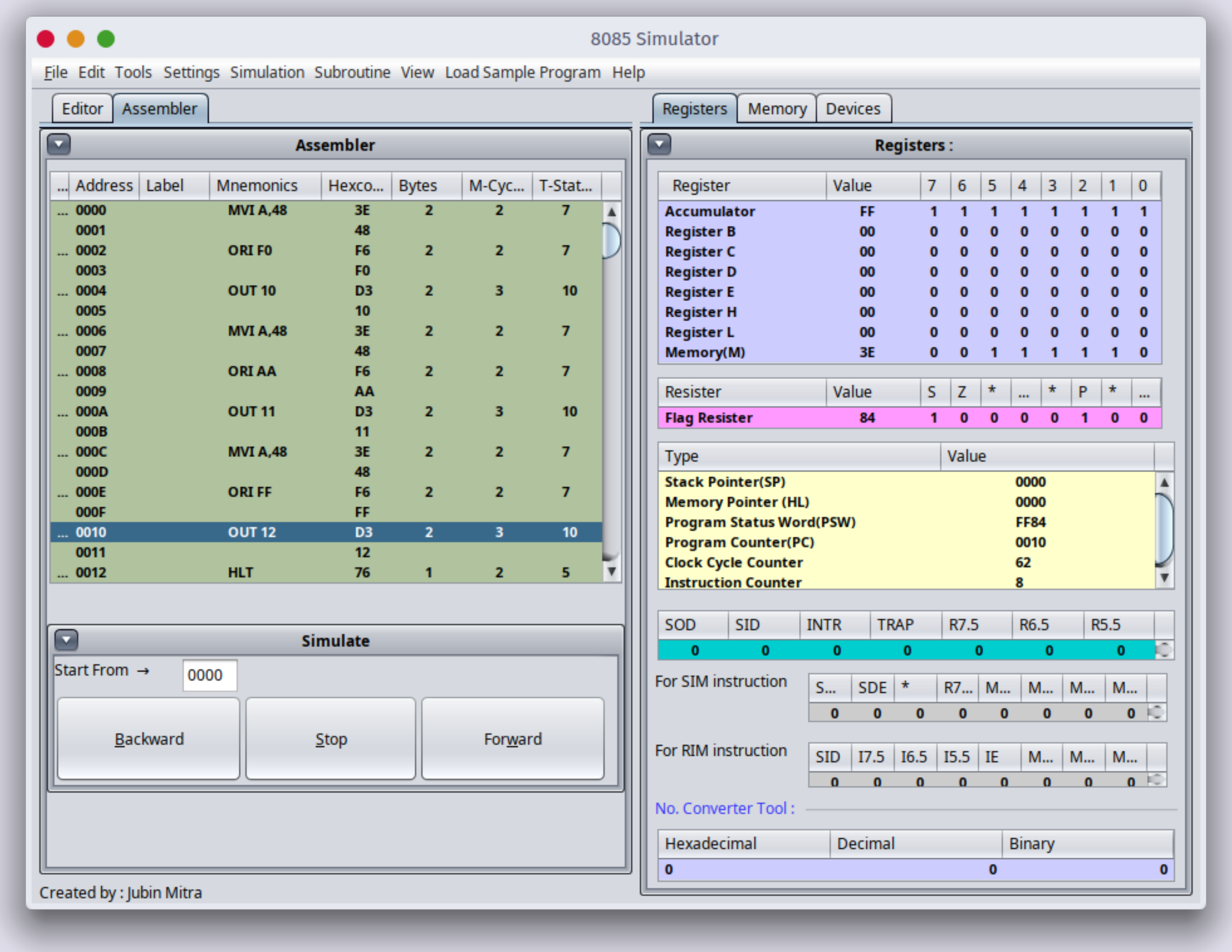
SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51
M&A Practical 2

Case-3:



Assembler

...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,48	3E	2	2	7
	0001			48			
...	0002		ORI F0	F6	2	2	7
	0003			F0			
...	0004		OUT 10	D3	2	3	10
	0005			10			
...	0006		MVI A,48	3E	2	2	7
	0007			48			
...	0008		ORI AA	F6	2	2	7
	0009			AA			
...	000A		OUT 11	D3	2	3	10
	000B			11			
...	000C		MVI A,48	3E	2	2	7
	000D			48			
...	000E		ORI FF	F6	2	2	7
	000F			FF			
...	0010		OUT 12	D3	2	3	10
	0011			12			
...	0012		HLT	76	1	2	5

Start From → 0000

Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	FF	1	1	1	1	1	1	1	1
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	00	0	0	0	0	0	0	0	0
Register L	00	0	0	0	0	0	0	0	0
Memory(M)	3E	0	0	1	1	1	1	1	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	84	1	0	0	0	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	0000
Program Status Word(PSW)	FF84
Program Counter(PC)	0010
Clock Cycle Counter	62
Instruction Counter	8

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

S...	SDE	*	R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0

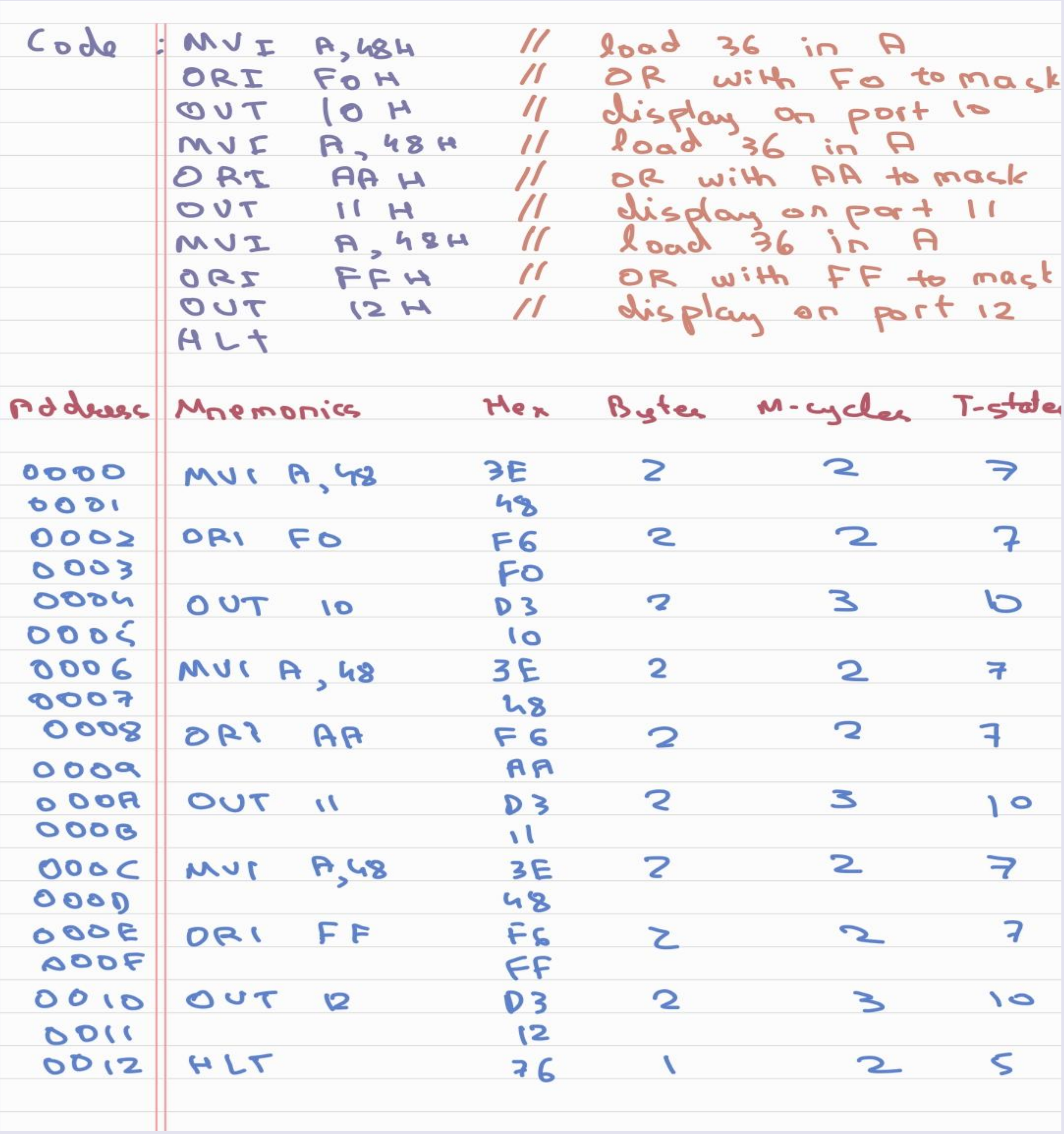
For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

Hexadecimal	Decimal	Binary
0	0	0

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51
M&A Practical 2

Contents and comment :



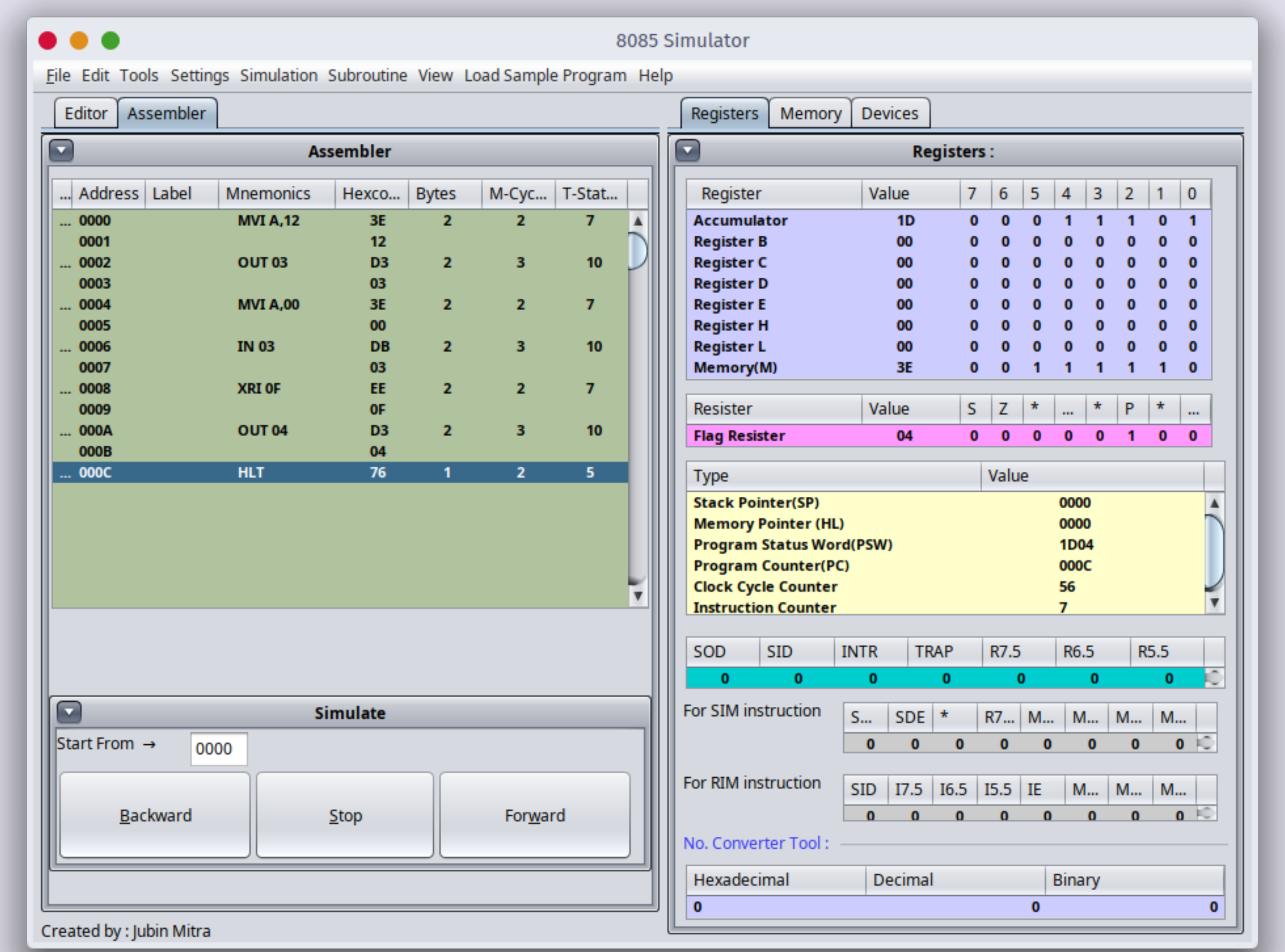
```
Code : MVI  A,48H    // load 36 in A
       ORI  F0H      // OR with F0 to mask
       OUT  10 H     // display on port 10
       MVI  A, 48H   // load 36 in A
       ORI  AA H     // OR with AA to mask
       OUT  11 H     // display on port 11
       MVI  A, 48H   // load 36 in A
       ORI  FFH      // OR with FF to mask
       OUT  12 H     // display on port 12
       HLT
```

Address	Mnemonics	Hex	Bytes	M-cycles	T-states
0000	MVI A, 48	3E	2	2	7
0001		48			
0002	ORI F0	F6	2	2	7
0003		F0			
0004	OUT 10	D3	2	3	6
0005		10			
0006	MVI A, 48	3E	2	2	7
0007		48			
0008	ORI AA	F6	2	2	7
0009		AA			
000A	OUT 11	D3	2	3	10
000B		11			
000C	MVI A,48	3E	2	2	7
000D		48			
000E	ORI FF	F6	2	2	7
000F		FF			
0010	OUT 12	D3	2	3	10
0011		12			
0012	HLT	76	1	2	5

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51
M&A Practical 2

5. Get data byte from input port 03H and complement Lower Nibble. Store the result on the next memory location.

Screenshots :



...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,12	3E	2	2	7
	0001			12			
...	0002		OUT 03	D3	2	3	10
	0003			03			
...	0004		MVI A,00	3E	2	2	7
	0005			00			
...	0006		IN 03	DB	2	3	10
	0007			03			
...	0008		XRI 0F	EE	2	2	7
	0009			0F			
...	000A		OUT 04	D3	2	3	10
	000B			04			
...	000C		HLT	76	1	2	5

Start From → 0000

Register	Value	7	6	5	4	3	2	1	0
Accumulator	1D	0	0	0	1	1	1	0	1
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	00	0	0	0	0	0	0	0	0
Register L	00	0	0	0	0	0	0	0	0
Memory(M)	3E	0	0	1	1	1	1	1	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	04	0	0	0	0	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	0000
Program Status Word(PSW)	1D04
Program Counter(PC)	000C
Clock Cycle Counter	56
Instruction Counter	7

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

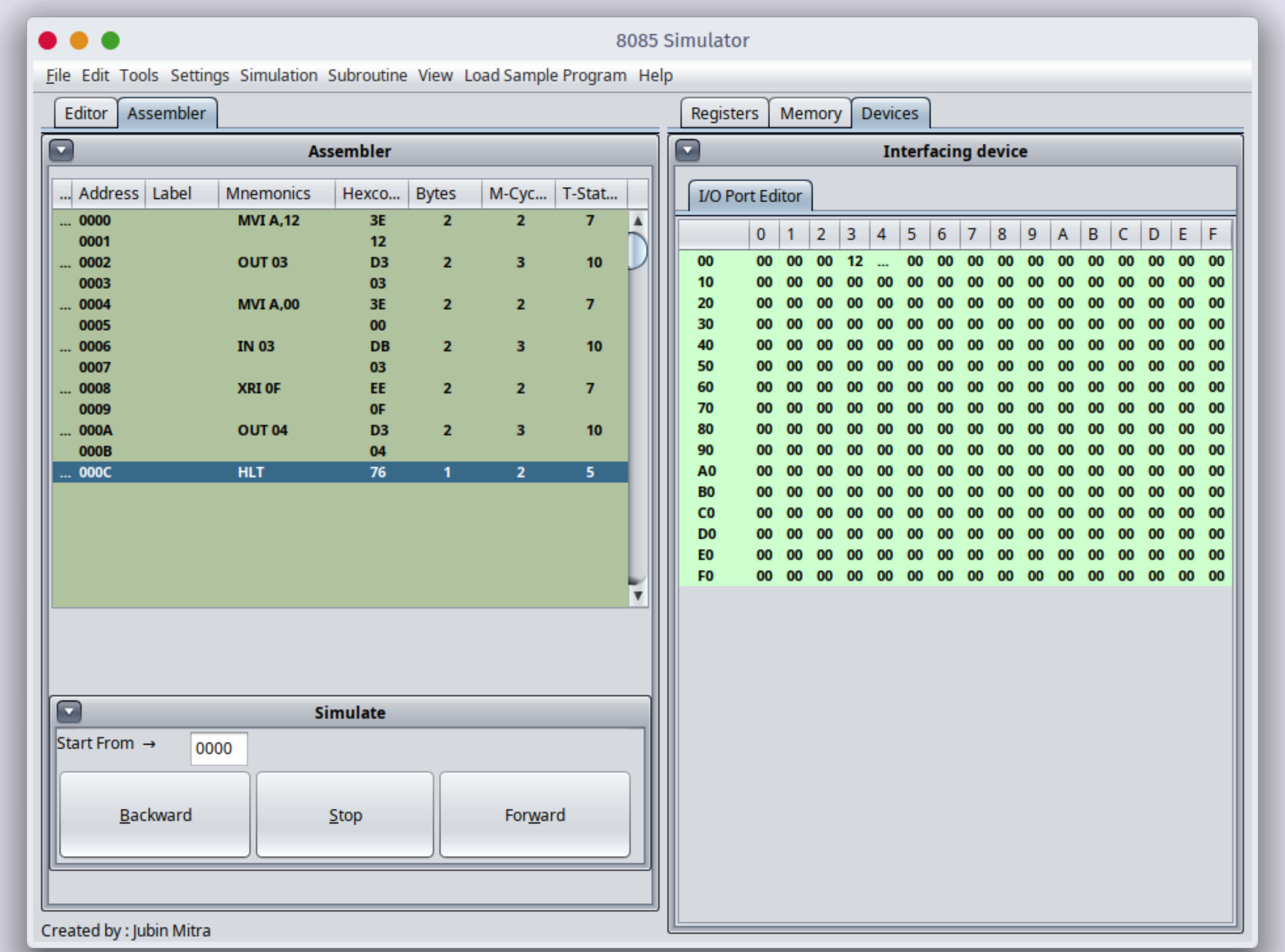
S...	SDE	*	R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

Hexadecimal	Decimal	Binary
0	0	0

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51
M&A Practical 2



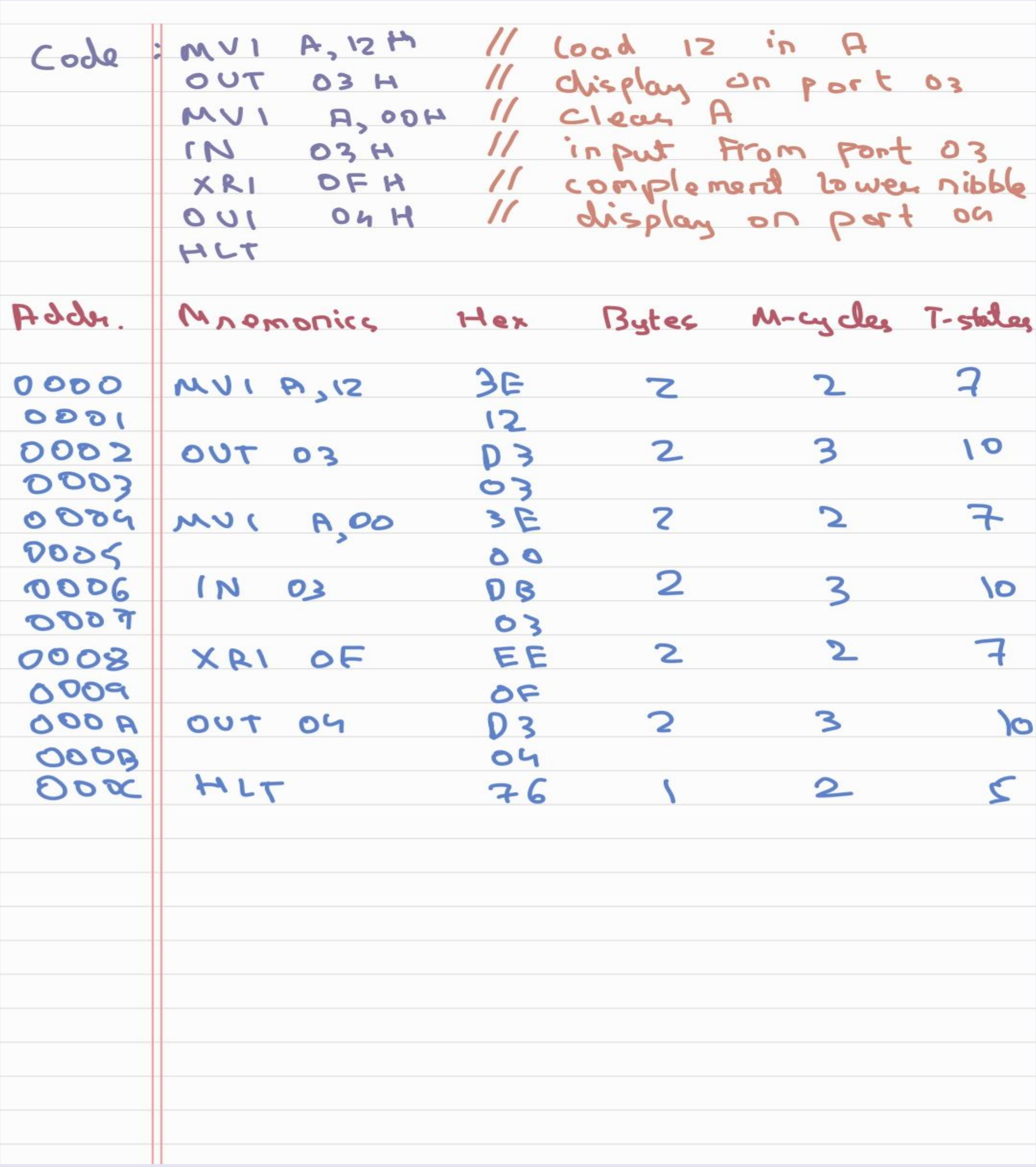
...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,12	3E	2	2	7
	0001			12			
...	0002		OUT 03	D3	2	3	10
	0003			03			
...	0004		MVI A,00	3E	2	2	7
	0005			00			
...	0006		IN 03	DB	2	3	10
	0007			03			
...	0008		XRI 0F	EE	2	2	7
	0009			0F			
...	000A		OUT 04	D3	2	3	10
	000B			04			
...	000C		HLT	76	1	2	5

Start From → 0000

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	00	00	12	...	00	00	00	00	00	00	00	00	00	00	00
10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
A0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
C0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51
M&A Practical 2

Contents and comment :



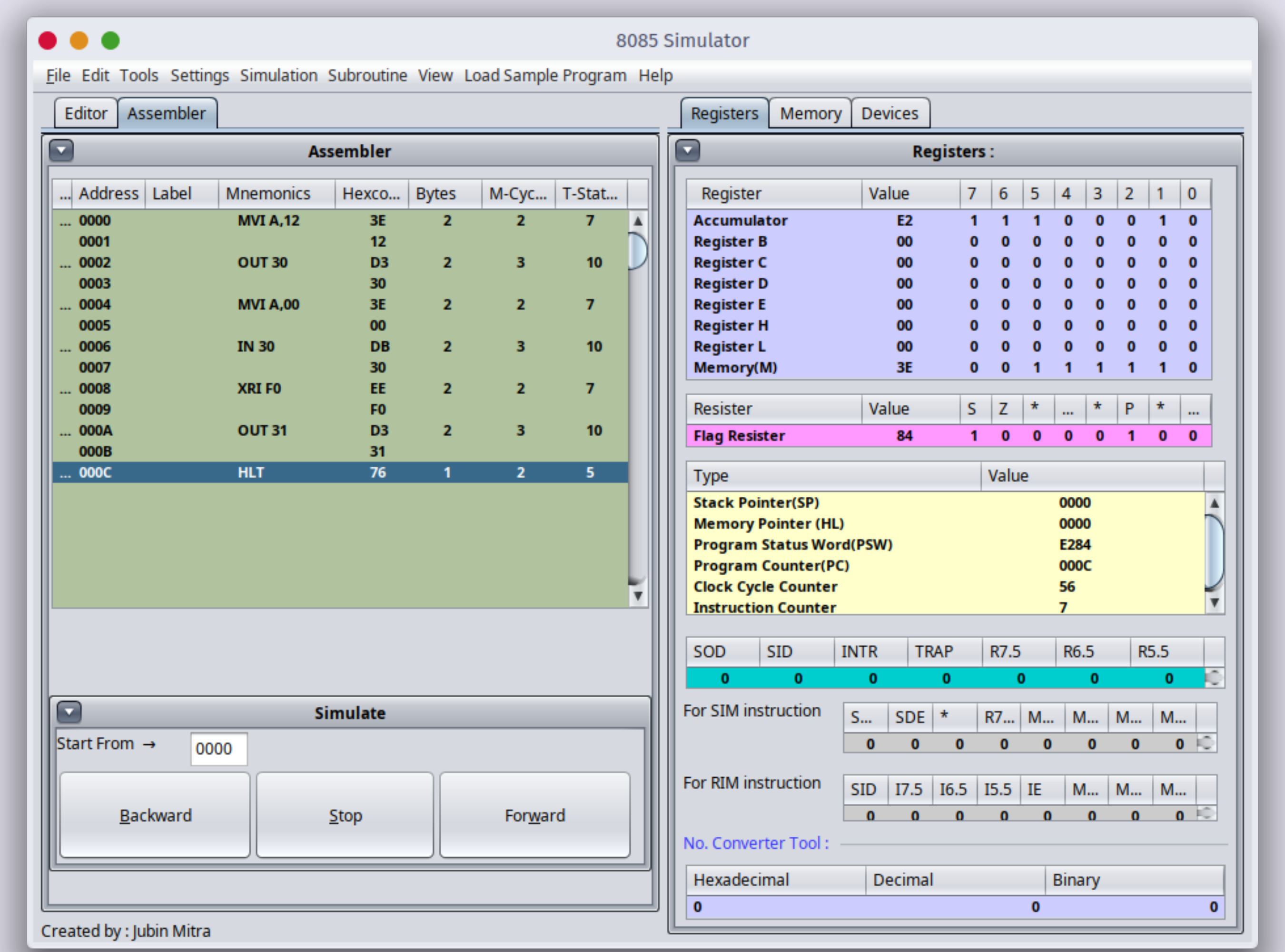
Code :
```
MVI  A, 12 H    // load 12 in A
OUT  03 H       // display on port 03
MVI  A, 00H     // clear A
IN   03 H       // input from port 03
XRI  0F H       // complement lower nibble
OUI  04 H       // display on port 04
HLT
```

Addr.	Mnemonics	Hex	Bytes	M-cycles	T-states
0000	MVI A, 12	3E	2	2	7
0001		12			
0002	OUT 03	D3	2	3	10
0003		03			
0004	MVI A, 00	3E	2	2	7
0005		00			
0006	IN 03	DB	2	3	10
0007		03			
0008	XRI 0F	EE	2	2	7
0009		0F			
000A	OUT 04	D3	2	3	10
000B		04			
000C	HLT	76	1	2	5

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2

6. Get data byte from input port 30H and complement Upper Nibble. Store the result on the next memory location.

Screenshots :



...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,12	3E	2	2	7
	0001			12			
...	0002		OUT 30	D3	2	3	10
	0003			30			
...	0004		MVI A,00	3E	2	2	7
	0005			00			
...	0006		IN 30	DB	2	3	10
	0007			30			
...	0008		XRI F0	EE	2	2	7
	0009			F0			
...	000A		OUT 31	D3	2	3	10
	000B			31			
...	000C		HLT	76	1	2	5

Start From → 0000

Register	Value	7	6	5	4	3	2	1	0
Accumulator	E2	1	1	1	0	0	0	1	0
Register B	00	0	0	0	0	0	0	0	0
Register C	00	0	0	0	0	0	0	0	0
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	00	0	0	0	0	0	0	0	0
Register L	00	0	0	0	0	0	0	0	0
Memory(M)	3E	0	0	1	1	1	1	1	0

Resister	Value	S	Z	*	...	*	P	*	...
Flag Resister	84	1	0	0	0	0	1	0	0

Type	Value
Stack Pointer(SP)	0000
Memory Pointer (HL)	0000
Program Status Word(PSW)	E284
Program Counter(PC)	000C
Clock Cycle Counter	56
Instruction Counter	7

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

S...	SDE	*	R7...	M...	M...	M...	M...
0	0	0	0	0	0	0	0

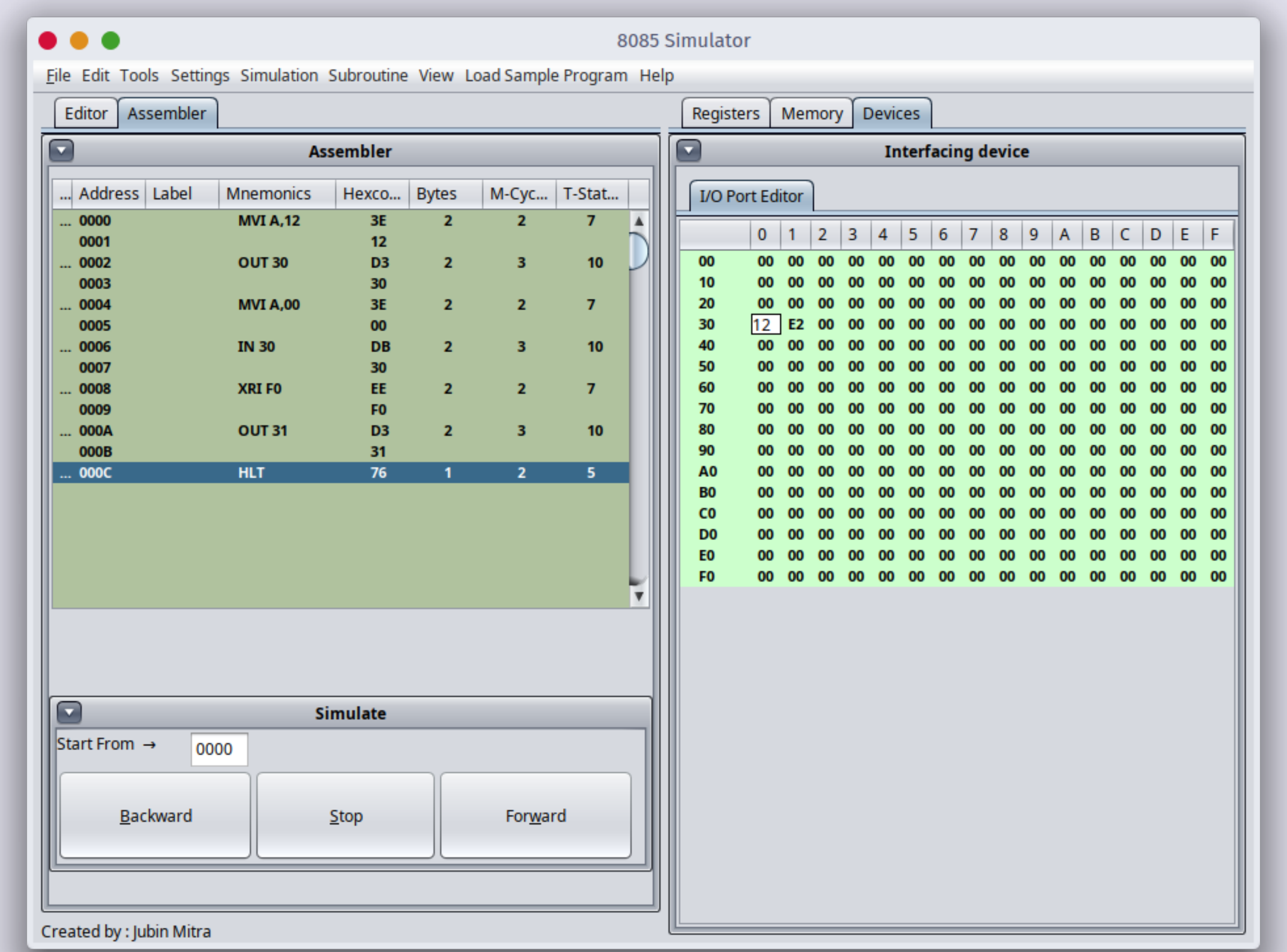
For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M...	M...	M...
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2



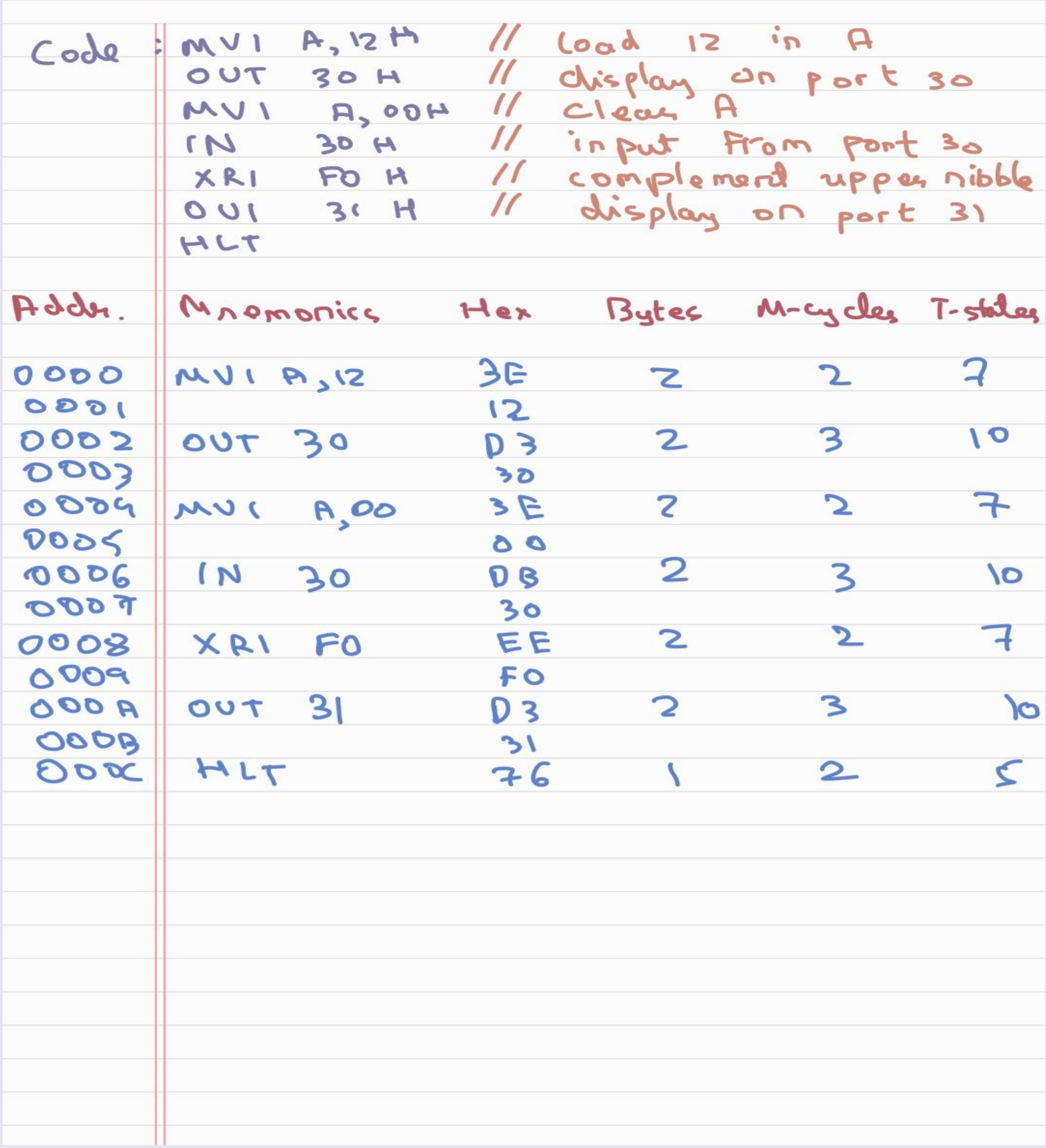
...	Address	Label	Mnemonics	Hexco...	Bytes	M-Cyc...	T-Stat...
...	0000		MVI A,12	3E	2	2	7
	0001			12			
...	0002		OUT 30	D3	2	3	10
	0003			30			
...	0004		MVI A,00	3E	2	2	7
	0005			00			
...	0006		IN 30	DB	2	3	10
	0007			30			
...	0008		XRI F0	EE	2	2	7
	0009			F0			
...	000A		OUT 31	D3	2	3	10
	000B			31			
...	000C		HLT	76	1	2	5

Start From → 0000

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
20	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
30	12	E2	00	00	00	00	00	00	00	00	00	00	00	00	00	00
40	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
50	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
60	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
80	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
90	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
A0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
C0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA   Batch - 51
M&A Practical 2

Contents and comment :



```
Code : MVI  A, 12 H   // load 12 in A
       OUT  30 H      // display on port 30
       MVI  A, 00H    // clear A
       IN   30 H      // input from port 30
       XRI  F0 H      // complement upper nibble
       OUI  31 H      // display on port 31
       HLT
```

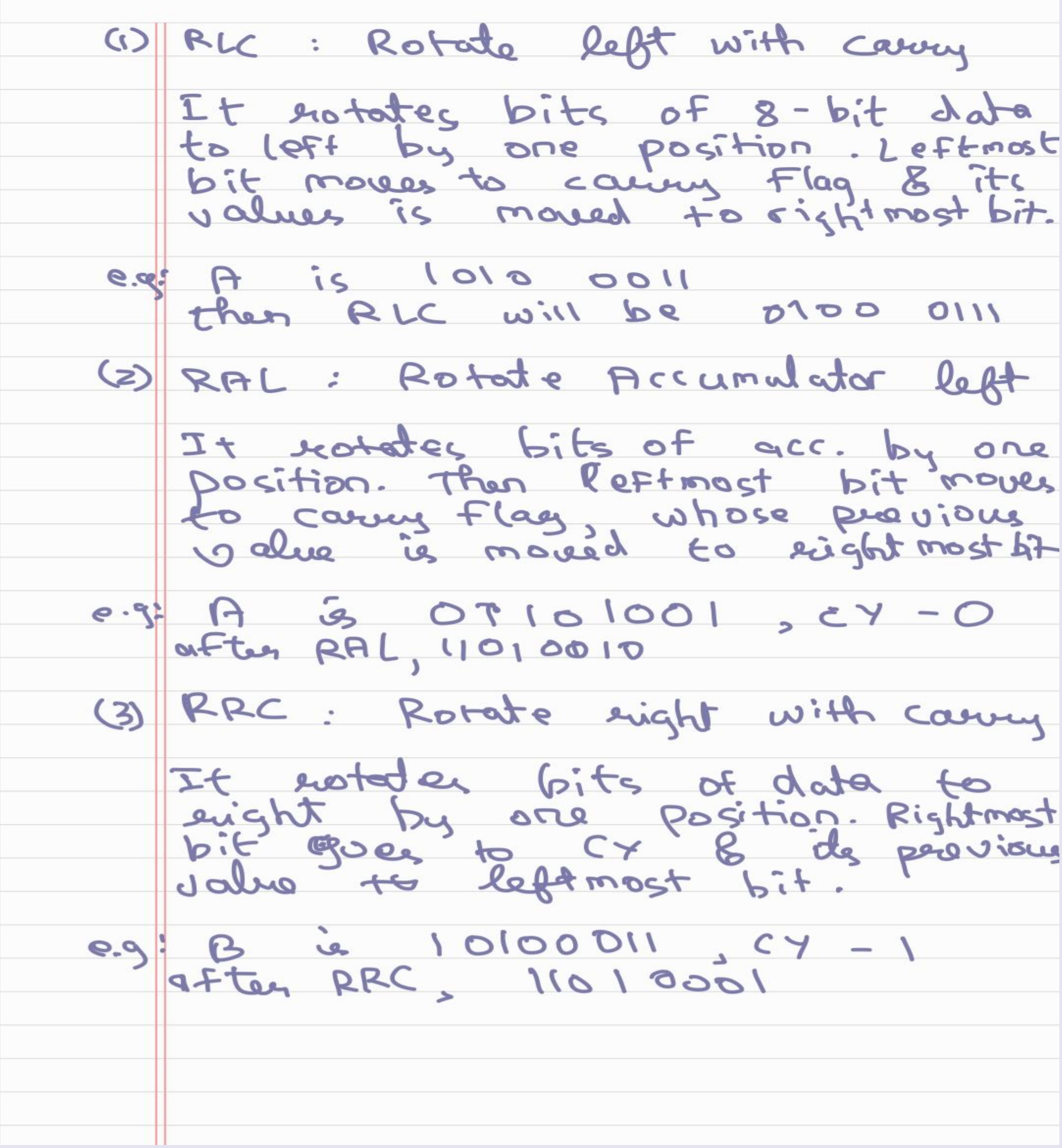
Addr.	Mnemonics	Hex	Bytes	M-cycles	T-states
0000	MVI A,12	3E	2	2	7
0001		12			
0002	OUT 30	D3	2	3	10
0003		30			
0004	MVI A,00	3E	2	2	7
0005		00			
0006	IN 30	DB	2	3	10
0007		30			
0008	XRI F0	EE	2	2	7
0009		F0			
000A	OUT 31	D3	2	3	10
000B		31			
000C	HLT	76	1	2	5

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51

M&A Practical 2

7. Write functionality of following mnemonics/code. Explain with example

- **RLC, RAL, RRC, RAR, CMP, CPI**



(1) RLC : Rotate left with carry

It rotates bits of 8-bit data to left by one position. Leftmost bit moves to carry Flag & its values is moved to rightmost bit.

e.g: A is 1010 0011
then RLC will be 0100 0111

(2) RAL : Rotate Accumulator left

It rotates bits of acc. by one position. Then leftmost bit moves to carry flag, whose previous value is moved to rightmost bit

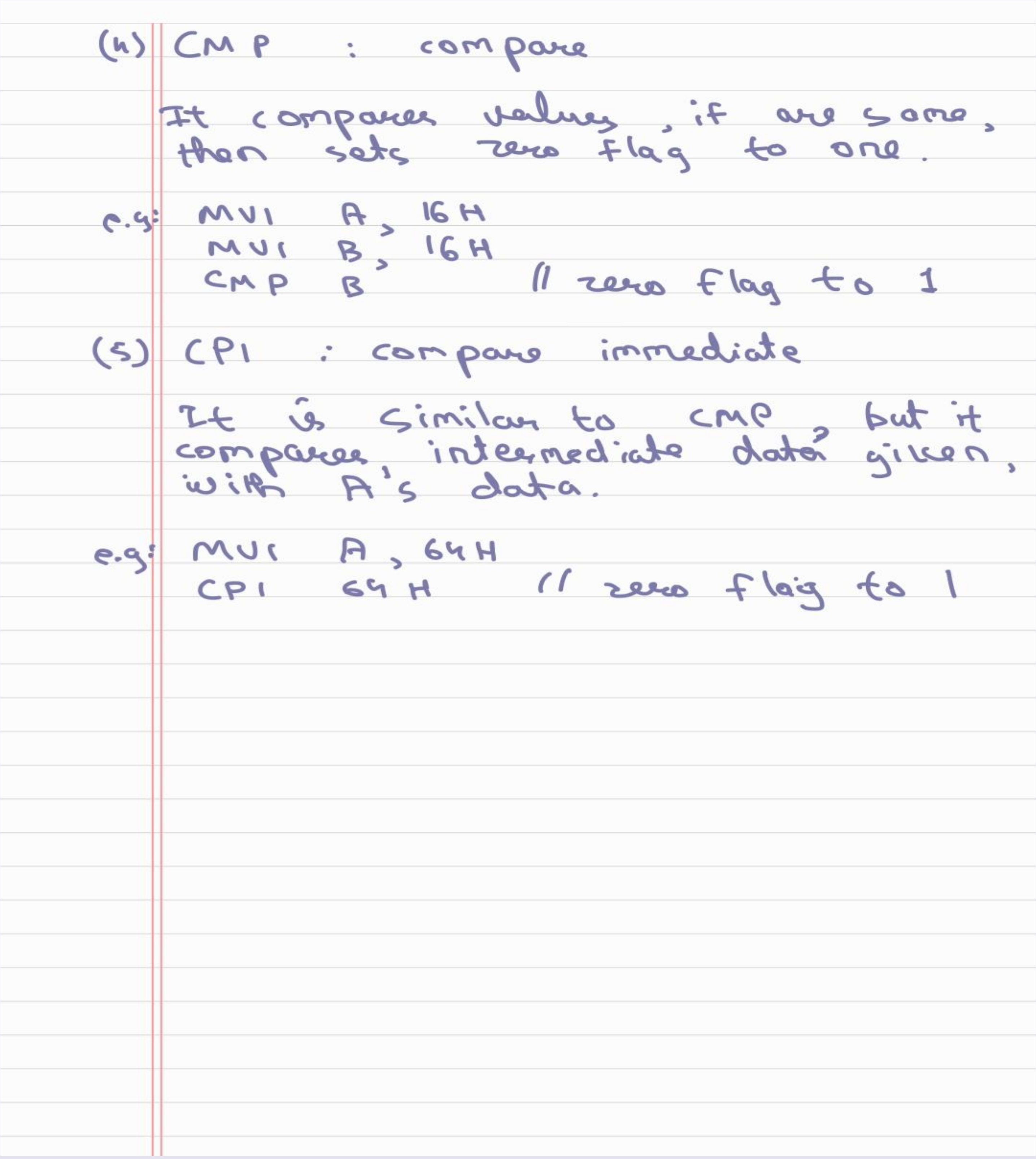
e.g: A is 01101001 , CY - 0
after RAL, 11010010

(3) RRC : Rotate right with carry

It rotates bits of data to right by one position. Rightmost bit goes to CY & its previous value to leftmost bit.

e.g: B is 10100011 , CY - 1
after RRC, 11010001

Name - Yash Lakhtariya
Enrollment number - 21162101012
Branch - CBA Batch - 51
M&A Practical 2



(4) CMP : compare

It compares values, if are same, then sets zero flag to one.

```
e.g: MVI A, 16H
     MVI B, 16H
     CMP B        // zero flag to 1
```

(5) CPI : compare immediate

It is similar to CMP, but it compares, intermediate data given, with A's data.

```
e.g: MVI A, 64H
     CPI 64H      // zero flag to 1
```