SAGARMATHA ENGINEERING COLLEGE

(TU Affiliated)

Sanepa, Lalitpur

LAB NO: 2

A LAB REPORT ON

OBSERVATION OF FLAGS & USE OF BRANCHING INSTRUCTIONS

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MICROPROCESSOR LAB-02

TITLE

OBSERVATION OF FLAGS & USE OF BRANCHING INSTRUCTIONS

Objective

- ✓ To be familiar with the use of flag bits and branching instructions in 8085.
- ✓ To be able to implement loop in assembly for array and table processing.

Hardware/Software Required

- Computer with internet
- Sim8085 online simulator

Related Theory

Flags in 8085: Flag is a flip flop which indicates some condition produced by the execution of an instruction. The flag register of 8085 microprocessor consists of 5 flags. The flag register is connected to ALU. When an operation is performed by ALU the result is transferred to the accumulator and status of result will be stored in flip flops.

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
S	Z	-	AC	-	P	-	CY

Flag register of 8085

Branching Group Instructions: This instruction group branches the normal flow of execution and continues executing machine codes from new location.

- **Conditional Branching**: Program sequence branches only if some condition (*generally flag status*) is satisfied.
- **Unconditional Branching**: Program sequence branches to subroutine unconditionally (without checking any condition/flag status)

Machine Control Instructions: This instruction group controls machine functions such as halt.

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Code and Observations

Effect on Flags by Various Instructions

Please fill up the result (*value of accumulator*) and flags after executing the following code line by line and give your reason why the flags are getting affected.

Please clear all flags before executing the instructions.

Mnemonics	A	Flag (*Binary*)	Reason
MVI C, FFH INR C			
LXI H, FFFFH INX H			
MVI A, FFH ANA 00H			
MVI A, 00H ANI AAH			
MVI A, F0H XRA A			
MVI A, FFH CMA			
MVI A, 01H CPI 02H			
MVI A, 01H CPI 01H			
MVI A, 80H			
RAL			
RAR			
RLC			
RRC			

Rough

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Code and Observations

How Microprocessor Stores Instruction and How Branching Occurs?

```
;Assume [9000H]=01H
        LDA 9000H
        JMP L1
        MVI A, 55H
        NOP
        NOP
L1:     INR A
        STA 9000H
        HLT
```

PC

Address	Value	Remarks
9000H		*Manually loaded content*
0800H		*Op-code of **LDA** instruction*
0801H		
0802H		
0803H		
0804H		
0805H		
0806H		
0807H		
0808H		
0809H		
080AH		
080BH		
080CH		
080DH		
080EH		
9000H		

JMP Vs CALL

```
        LXI SP,08FFH
        CALL L1
        MVI A, FFH
        HLT
L1:     INR A
        RET
```

A	PC

Address	Value	Remarks
08FEH		*Initial Stack Value (Higher)*
08FDH		
0800H		*Op-code of **LXI** instruction*
0801H		
0802H		
0803H		
0804H		
0805H		
0806H		
0807H		
0808H		
0809H		
080AH		
080BH		
A		

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Code and Observations

LOOP Examples

```
      MVI C, 05H
L1:   INR A
      ;Looped Block
      DCR C
      JNZ L1
      HLT
```

Itr.	A	Z	C
1			
2			
3			
4			
5			
6			

Explanation

Observe and write the output for the following code.

```
      MVI C, 08H
      MVI D, 00H
      LDA 9000H
HOME: RLC
      JNC SKIP
      INR D
SKIP: DCR C
      JNZ HOME
      MOV A, D
      STA 9001H
      HLT
```

FLAG REG	INIT	ITERATIONS 1	2	3	4	5	6	7	8	FINAL
A										
CY										
D										
C										
Z										

9000	77
9001	

		RLC OPERATION								Hex
A	CY	D7	D6	D5	D4	D3	D2	D1	D0	

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Practice Questions

Q1. Write a program to multiply 05H and 03H and store result at 9000H.

Q2. Add numbers from one to fifty and store the 16 bit result at 9000H and 9001H.

Q3. Transfer 10 bytes of data from 9020 to 9030 if the data is greater than 7FH.

Result

Hence, All the given instructions are executed and the result is verified.