

Name: Lakhan Kumawat

Roll No: 1906055

Branch: CSE-1

Course: Microprocessors and Microcontrollers.

Course Code: C55469

Date: 28-10-2021

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1.) To perform addition of two 8 bit numbers.

→ MVI C,00 Initialize C register to 00

LDA 4150 Load the value to accumulator

MOV B,A Move the Content of accumulator to register B.

LDA 4151 Load the value to accumulator.

ADD B add the value of registers B to A.

JNC Loop Jump on NO carry

INR C Increment value of given register C.

INN 5 1

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Loop : STA 4152 State the value of Accumulator (SUM).

MOV A,C Move the Content of C to ACC.

STA 4153 State the value of Acc.(Carry).

HLT Halt the program.

INPUT: 80(4150) **OUTPUT:** 00(4152) → SUM

$80(4151)$ $01(4153) \rightarrow \text{Carry}$.

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_____ X _____ X _____

2) Subtraction of two 8 bit numbers.

Solution

MVI	C,00	Initialize C to 00
LDA	4150	Load the value to Acc.
MOV	B,A	Move Content of Acc. to B
LDA	4151	Load the value to Acc.
SUB	B	Subtract value of B from B
JNC	Loop	Jump on no carry
CMA		Complement Acc. Contents
INR	A	Increment value in Acc.
INR	C	Incr. value in C

Loop: STA 4152 Store the value of Acc. to memory address
 Mov A,C Move Contents of C to Acc.

STA 4153 Store the value of Acc. to memory address
 HLT Terminate the program.

INPUT: 06 (4150) OUTPUT: 04 (4152)
 02 (4151) 00 (4153)

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3.) Multiplication of two 8 bit numbers.

→ MVI D,00 Initialize D to 00
 MVI A,00 Initialize Acc. to 00.
 LXI H,4150 Load immediate value to H-L Registers pair.
 MOV B,M Get first no. from mem(M) to B (lower nibble)
 INX Get second nibble from mem(H) to C.
 Mov C,M Get higher nibble from mem(H) to C.

Loop: ADD B Add Content of B to A.
 INC NEXT Jump on No carry to NEXT.
 INR D Increment Content of D.

NEXT: DCR C Decrement Content of C
 JNZ LOOP Jump on no zero to loop.
 STA 4152 Store the result in memory from Acc.
 HFMOV A,D Far Move Contents of D. to Acc.
 STA 4153 Store the MSB of result in Memory.
 HLT Terminate the program.

INPUT: FF (4150) output: 01 (4152)
 FF (4151) FE (4153)

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4) Division of two 8 bit numbers.

Solution.

LXI	H,4150	Load immediate value from add to H.
MOV	B,M	Get the dividend in B-reg.
MVI	C,00	Clear C-reg for quotient.
INX		
MOV	C,M	Get the higher nibble in C-reg. (divisor)

Loop:	CMP	B	Compare Acc. with deg-B
	JC	NEXT	Jump on Carry to NEXT
	SUB	B	Subtract N-deg from B-deg.
	INR	C	Increment Content of register C.
	JMP	Loop	Jump to Loop

NEXT: STA 4152 Store the remainder in memory.
MOV TA A,C Move Contents of C-reg to Acc.
STA 4153 Store the quotient in memory.
HLT Terminate the program.

INPUT: FF (4150) OUTPUT: 00(4152) - Rem
FF (4151) 01 (4153) - DUO

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5) Longest Number in an Array

→ LXI H,4200 Set pointer for array.
 MOV B,M Load the Count
 INX H Increment the pointer
 MOV A,M Set 1st element as largest data.
 DCR B Decrement the Count

Loop: INX H
 CMP M If A-deg > M
 INC AHEAD Go to AHEAD
 MOV A,M Set the new value as largest

AHEAD: DCR B
 JNZ LOOP Repeat Comparisons till Count(B)=0
 STA 4300 Store the largest value at 4300.
 HLT

INPUT: 05 (4200) - Memory size
 0A (4201)
 F1 (4202)
 1F (4203)
 26 (4204)
 FE (4205)

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— X — X —

Q) Smallest Number in an array of data.

Solution →

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LXI H, 4200    Set pointer for array.
MOV B, M      Load the Count.
INX H         Move the pointer.
MOV A, M      Set 1st element as smallest data.
DOR B         Decrement the Count.

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Loop: INX H Move the pointer

CMP M If [A-reg] < M go to AHEAD.

JC AHEAD

MOV A, M Set the new value as smallest.

AHEAD: DCR B

JNZ LOOP Repeat till Count = 0.

STA 4300 Store the smallest value at 4300

HLT.

INPUT: 05 (4200) - Array Size OUTPUT : OA(4300)

OA (4201)

F1 (4202)

JF (4203)

26 (4204)

FE (4205)

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— X — X — X —

7) Arrange an array of data in Ascending order.

Solution:

LXI H,4200 Set the H-L pair as pointer

MOV C,M Get the Count at 4200 into C-deg.

DCR C Decrement C.

REPEAT:

MOV D,C Move contents of C to D-deg.

LXI H,4201 Load H-L pair with address.

LOOP:

MOV A,M Move contents of memory into Acc.

INX H Increment pointer.

CMP M If [M] < [ACC.]

JC SKIP Jump to memory SKIP.

MOV B,M Move contents of memory to B-deg.

Mov M,B Move contents of Acc. to memory.

DCX H Decrement Pointer.

MOV M,B Move contents of B to memory.

INX H Increment pointer

Swapping
Contents
of Acc.
of M.

SKIP: DCR D Decrement D-deg

JNZ Loop Jump to loop till Contents of D = 0.

DCR C Decrement C-deg.

JNZ REPEAT Jump to REPEAT till C=0.

HLT Terminate the program.

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— X — X —

Input: 4200 05 (Array size)	Output:- 4200 05 (Array size)
4201 05	4201 01
4202 04	4202 02
4203 03	4203 03
4204 02	4204 04
4205 01	4205 05

8) Arrange an array of data in DESCENDING order.

Note: Only those steps which are different from program 7 has been explained.

Solution: LXI H, 4200

MOV C, M

DCR C

REPEAT: MOV D, C

LXI H, 4201

LOOP: MOV A, M

INX H

CMP M

JNC SKIP

[If contents of memory is greater than
Acc. → JUMP to SKIP]

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— x — x — x —

MOV B,M

MOV M,A

DCX H

MOV M,B

INX H

SKIP:

DCR *D*

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JNZ Loop

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DCR C

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JNZ REPEAT

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HLT

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Input: 4200 05(Array size) Output: 4200 05 (Array Size)

4201 01

4201 05

4202 02

4202 04

4203 03

4203 03

41204 04

4204 02

100% 05

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97 BCD to HEX Conversion:

Solution LXI H,4150 Set memory pointed H to address.

MOV A,M Move Contents of Most Significant bits.
(MSD) from memory to Acc.

Multiply MSD by ID by repeated addition	ADD	A	MSDx2
	MOV	B,A	Store value of Acc. to B
	ADD	A	MSDx4
	ADD	A	MSDx8
	ADD	B	Contents of A $\leftarrow A + B$.
	INX	H	Points to Least Significant bits (LSB)
	ADD	M	Add LSB to Acc.
	INX	H	Increment the pointers
	MOV	M,A	Store the result.
	HLT		Terminate the program

INPUT: 4150 : 02 (MSD)

4151 : 09 (LSD)

Output: 4152 : 1D (H)

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— X — X — X —

10) * HEX to BCD Conversion :-

→ LXI H, 4150 Initialize memory pointer

MVI D,00 Clear D-reg for MSB.

MVI A,00 Clear Acc.

MOV C,M Get HEX Data.

Loop 2: ADI 01 Count the number one by one

DAA Adjust for BCD Count.

JNC Loop1 Jump on no Carry to Loop

INR D Increment D-reg.

Loop1: DCR C

JNZ LOOP2

STA 4151 Store the LSB

MOV A,D Move Contents of D to Acc.

STA 4152 Store the MSB

HLT Terminate the program.

INPUT: 4150: FF

4151: 55 (LSB)

4152: 02 (MSB)