8085 MICROPROCESSOR LAB MANUAL

IV SEMESTER B.E (TCE)

(For Private Circulation Only)

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MICROPROCESSOR LAB MANUAL

CONTENTS

31. Program to control the speed and direction of stepper motor

1. Write an ALP to move data block starting at location 'X' to location 'Y' without overlap.

PROGRAM		ALGORITHM
START:	LXI H, F000H	; Initialize HL rp* with source addr*.
	LXI D, F100H	; Initialize DE rp with destination addr.
	MVI C, 04	; move the block length into reg.C
LOOP :	MOV A, M	; move the data from memory location as pointed by HL rp to reg. A
		; Store the data from reg. A into the dest*.
	STAX D	whose addr. is pointed by DE rp.
		; Increment the src*. addr.
	INX H	; Increment dest addr.*
	INX D	; Decrement the counter.
	DCR C	; If counter is zero terminate the program
	JNZ LOOP	Else repeat the program for next data.
		; Terminate the program.
	HLT	

NOTE: * denotes

Addr ⟶ Address
rp ⟶ register pair
dest ⟶ Destination
src ⟶ Source

RESULT:

STARING SRC. ADDR.= F000

STARTING DEST. ADDR.= F100

BLOCK LENGTH= 04

BEFORE EXECUTION			
Src.addr.	Data	Dest.addr.	Data
F000	01	F100	XX
F001	02	F101	XX
F002	03	F102	XX
F003	04	F103	XX

AFTER EXECUTION			
Src.addr.	Data	Dest.addr.	Data
F000	01	F100	01
F001	02	F101	02
F002	03	F102	03
F003	04	F103	04

SIGNATURE OF STAFF-IN-CHARGE

2. Write an ALP to move a block starting at location 'X' to location 'Y' with overlap.

PROGRAM	ALGORITHM
START: LXI H, F109	; Initialize HL rp* with last location of source addr.
LXI D, F10E	; Initialize DE rp with last location of Destination addr*.
MVI C, 0A	; Move the block length into reg.C
LOOP: MOV A, M	; move the data from memory location as Pointed by HL rp to reg. A
STAX D	; Store the data from reg. A into the dest*. whose addr. is pointed by DE rp.
DCX H	; Decrement the src*. addr.
DCX D	; Decrement dest addr.*
DCR C	; Decrement the counter.
JNZ LOOP	; If counter is zero terminate the program else repeat the program for next data.
HLT	; Terminate the program.

RESULT:

STARING SRC. ADDR.= F100

STARTING DEST. ADDR.= F105

BLOCK LENGTH= 0A

BEFORE EXECUTION AFTER EXECTION

Src.addr.	Data	Dest.addr.	Data
F100	00	F105	00
F101	01	F106	01
F102	02	F107	02
F103	03	F108	03
F104	04	F109	04
F105	05	F10A	05
F106	06	F10B	06
F107	07	F10C	07
F108	08	F10D	08
F109	09	F10E	09

SIGNATURE OF STAFF-IN-CHARGE

3. Write an ALP to arrange set of 8 bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in address-data field.

PROGRAM	ALGORITHM
START: MVI B, (N-1)	; Load register B with (N-1), No. of passes
MVI C, (N-1)	; Load register C with (N-1) comparisons
NXTPASS: LXI H, F100	; Move starting address of the Data into HL rp.
LOOP: MOV A, M	; Move data to register A
INX H	; Increment the pointer.
CMP M	; Compare with the next element
JC NOSWAP	; If carry jump to NOSWAP, else interchange the data
	; Interchange two data
SWAP: MOV D, M	; Consecutive elements
MOV M,A	; Decrement the memory location
DCX H	
MOV M, D	; Increment register pair.
INX H	; Decrement register C (No. of comparisons)
NOSWAP: DCR C	; If not zero jump to loop, else
JNZ LOOP	; decrement register B (No. of passes)
DCR B	; The data in register B is moved to register C
MOV C, B	; If not zero, jump to next pass
JNZ NXTPASS	; Initialize HL pair with address of the list
DISPLAY: LXI H, F100	(ascending/descending)
	; Initialize counter.
MVI C, N	; Load the element in register A.
NEXT: MOV A, M	; Store the content of register A in FFF1.
STA FFF1	; Push addr, of the data into the Stack
PUSH H	; Push the content into the Stack.
PUSH B	; Display the data on data sheet.
CALL UPDDT	; Wait for some time.
CALL DELAY	; Pop the counter
POP B	; Pop the addr. of the list.
POP H	; Increment pointer
INX H	; Decrement counter
DCR C	; If Counter=0 terminate the program, else take
JNZ NEXT	next data for comparison.
	; Terminate the program.

SIGNATURE OF STAFF-IN-CHARGE

HLT	; Load reg. pair BC with the count for 0.5s delay.
DELAY: LXI B, F424	; Decrement count
WAIT: DCX B	; Check if count is zero
MOV A, C	; Clear the Accumulator contents
ORA B	; If count is not zero jump to WAIT, else return to
JNZ WAIT	main program
RET	

RESULT SHEET:

N = 07

AFTER EXECUTION:

Src.addr.	Data
F100	30
F101	12
F102	A3
F103	04
F104	46
F105	71
F106	23

Data Field
04
12
23
30
46
71
A3

NOTE: "For Descending order Change JC to JNC "

SIGNATURE OF STAFF-IN-CHARGE

4. Write an ALP to add N one byte binary numbers stored from location X+1' where N is stored at location X. Store the result in location Y & Y+1. Display the result in address field.

PROGRAM	ALGORITHM

START: LXI H, F100
MOV C, M
SUB A
MOV B,A
LOOP: INX H
ADD M
JNC LOOP1
INR B
LOOP1: DCR C
JNZ LOOP
MOV H,B
MOV L,A
SHLD F2OO
CALL UPDAD
HLT
	STEP 1: Initialize the starting address of the Data block
	STEP 2: Initialize the count.
	STEP 3: Initialize the initial sum to zero.
	STEP 4: Add the data bytes one by one.
	STEP 5: Increment the memory pointer one by One for one each addition.
	STEP 6: Decrement the count by one for each Condition. Check for zero condition.
	STEP 7: If the count is not zero, repeat step 4 to 6.
	STEP 8: If the count is zero halt the processor.

NOTE: Store the program starting from F000H.
Store the count at location F100H.
Store the data starting from F101H.
Execute the program. The result will be displayed in the display field.
The result is also in location F200H & F201H

- Address for UPDAD is 06BFH

RESULT:

LENGTH OF BLOCK = 04

STORE AT LOCATION F100

BEFORE EXECUTION:	
Data Addr.	Data
F101	01
F102	02
F103	03
F104	04

AFTER EXECUTION:	
Result Addr.	Data
F200	0A
F201	00

ADDRESS FIELD:

0	0	0	A

SIGNATURE OF STAFF-IN-CHARGE

5. Write an ALP to add two multi-byte binary number starting at locations 'X' and 'Y' and store the result at location 'Z'.

PROGRAM	ALGORITHM
START: LXI H, F100 LXI B, F200 LXI D, F300 STC CMC MVI A, 04 LOOP: STA F400 LDAX B ADC M STAX D INX H INX B INX D LDA F400 DCR A JNZ LOOP MVI A,00 RAL STAX D HLT	STEP 1: Initialize the starting address of the two multi-byte numbers at result Location (F100, F200 & F300). STEP 2: Reset the carry flag STEP: 3: Add the multi-byte numbers byte by byte by considering the carry Condition. STEP 4: Check the byte count logically without affecting the status. STEP 5: If the byte count is not zero, repeat the steps 3 & 4 STEP 6: If the byte count is zero, count the final carry, mean time store the result. STEP 7: Halt the processor.

NOTE:

- Store the program starting from F000H.
- Store the first 32 bit number d ata starting from F100H.
- Store the second 32 bit number data starting from F200H.
- Store the result starting from F300.
- Execute the program. The result will be displayed in the display field.
- The result is also in location F200H & F201H

SIGNATURE OF STAFF-IN-CHARGE

RESULT:

BEFORE EXECUTION:					
Addr. Of 1st multibyte number	Data	Addr. Of 2nd multibyte number	Data	Addr. Of the result	Data
F100	01	F200	AA	F300	XX
F101	02	F201	BB	F301	XX
F102	03	F202	CC	F302	XX
F103	04	F203	DD	F303	XX

AFTER EXECUTION:					
Addr. Of 1st multibyte number	Data	Addr. Of 2nd multibyte number	Data	Addr. Of the result	Data
F100	01	F200	AA	F300	AB
F101	02	F201	BB	F301	BD
F102	03	F202	CC	F302	CF
F103	04	F203	DD	F303	E1

SIGNATURE OF STAFF-IN-CHARGE

6. Write an ALP to add N 2-digit BCD numbers store the result at location X and store the same in address/data field.

PROGRAM	ALGORITHM

START: LXI H,F100H
MOV C,M
SUB A
MOV B,A
RPT: INX H
ADD M
DAA
JNC NOF
PUSH PSW
MOV A,B
ADI 01H
DAA
MOV B,A
POP PSW
NOF: DCR C
JNZ RPT
MOV L,A
MOV H,B
SHLD F200H
CALL UPDAD
HLT
	STEP1. Initialize the starting address of the data block where the two digits BCD numbers are stored.
	STEP2. Initialize the counter.
	STEP3. Initialize the sum 00H.
	STEP4. Add the data bytes one by one mean time convert the sum into the decimal value
	STEP5. Decrement the counter one by one and check for the zero condition.
	STEP6. If the counter is not zero repeat step 4 to 6
	STEP7. If the counter is zero display the result
	STEP 8.Halt the processor.

NOTE:

- Store the program starting from F000h.
- Store the counter at F100H
- Store the 2-digit BCD numbers starting at the location F101H
- Execute the program.
- Result will be displayed in the display field and the same will stored at location F200H and F201H

ADDRESS FOR UPDAD is 06BFh.

SIGNATURE OF STAFF-IN-CHARGE

RESULT:

BEFORE EXECUTION

Address	Data	Address for result	Data
F100	04(cnt)	F200	X X
F101	11	F201	X X
F102	22		
F103	33		
F104	44		

AFTER EXECUTION

Address	Data	Address for result	Data
F100	04(cnt)	F200	10
F101	11	F201	01
F102	22		
F103	33		
F104	44		

ADDRESS FIELD :

0	1	1	0

SIGNATURE OF STAFF-IN-CHARGE

7. Write an ALP to subtract a 16-bit binary number stored at location 'X' & 'X+1' from another 16-bit number at location 'Y' & 'Y+1". Display the result in address field.

PROGRAM	ALGORITHM

START : LHLD F100
XCHG
LHLD F102
MOV A,L
SUB E
MOV L,A
MOV A,H
SBB D
MOV H,A
SHLD F104
CALL UPDAD
HLT
	STEP 1: Load the two 16-bit BCD numbers from respective locations
	STEP 2: Using suitable instructions in Decimal mode finds the numbers.
	STEP 3: Store the result in the address field.
	STEP 4: Halt the processor.

NOTE:

- Address for UPDAD is 06BFH
- Store the program starting from F000H
- Store the 16-bit data's at LOC F100H, F101H and F102H, F103H
- Respectively.
- Executive the program.
- Result will be displayed in address field.

RESULT:

BEFORE EXECUTION			
Addr. For 1st data	Data	Addr. For 2nd data	Data
F100H	3C	F102H	C3
F101H	3C	F103H	C3

AFTER EXECUTION

Address field:

8	7	8	7

CY=0. Therefore answer is positive.

SIGNATURE OF STAFF-IN-CHARGE

8.Write an ALP to check the fourth bit of a byte stored at location 'X' is a '0' or '1'. If '0' store '00H' else store 'FFH' at location 'Y'. Display the same in ADDRESS/DATA field.

PROGRAM	ALGORITHM
START: LDA F100H ANI 10H JZ STRO MVI A,FFH STRO: STA F1O1H CALL UPDDT: HLT	STEP 1: Load the data byte from LOC 'X' to ACC. STEP 2: Check the fourth bit using suitable Instruction. STEP 3: Check the respective flag Condition. STEP 4: Store result/ decision at LOC 'Y'. STEP 5: Display the same in DATA field. STEP 6: Halt the processor.

NOTE:

- Store the data type in LOC 'X' (F100H).
- Execute the program. Result will be displayed in DATA field and also stored
- in LOC 'Y' (F101H)

for UPDAD: is 06BFH.

for UPDAD: is 06D6H

RESULT:

BEFORE EXECUTION	
Addr. of LOC X	DATA
F100H	07
F100H	90

AFTER EXECUTION		
Addr. of LOC Y	DATA	Data in Data field
F101H	00	00
F101H	FF	FF

SIGNATURE OF STAFF-IN-CHARGE

9. Write an ALP to generate resultant byte whose 7th bit is given by:

$A_7 = A_2 \oplus A_5 \oplus A_6$

PROGRAM	ALGORITHM

START: LDA F100H
MOV B,A
RRC
RRC
ANI 01H
MOV C,A
MOV A,B
RLC
RLC
ANI 01H
MOV D,A
MOV A,B
RLC
RLC
RLC
ANI 01H
XRA D
XRA C
RRC
STA F300H
CALL UPDDT:
HLT
	STEP 1: Load the data byte from LOC 'X' to ACC.
	STEP 2: Check the fourth bit using suitable Instruction.
	STEP 3: Check the respective flag Condition.
	STEP 4: Store result/ decision at LOC 'Y'.
	STEP 5: Display the same in DATA field.
	STEP 6: Halt the processor.

NOTE:

- Store the program from F000h., Store the data at F100h., Execute the program.
- Result will be stored in the memory location F101h, and the same will be
- displayed in the data field.
- If A7 bit is '1', DATA field will always display '80H'
- If A7 bit is '0', DATA field will always display '00H'

Address for UPDAD: is 06BFH.

RESULT:

BEFORE EXECUTION	
Addr. of LOC 'X'	DATA
F100H	17H

AFTER EXECUTION		
Addr. of LOC 'Y'	DATA	Data in Data field
F300H	80H	80H

SIGNATURE OF STAFF-IN-CHARGE

10.Write a ALP to find the product of two unsigned binary numbers stored at location 'X' and 'X+1' using successive addition and display the result in address field.

PROGRAM	ALGORITHM

START: LDA F100H
MOV E,A
MVI D,00H
LDA F101H
MOV C,A
LXIH, 0000H
MOV A,E
CPI 00H
JZ DISPLY
MOV A,C
CPI 00H
JZ DISPLY
LOC: DAD D
DCR C
JNZ LOC
DISPLY: SHLD FE73H
CALL UPDAD
HLT
	STEP 1: Load the data from locations 'X' and 'X+1'.
	STEP 2: Find the product using successive Addition method.
	STEP 3: Display the result in ADDRESS field
	STEP 4: Halt the processor.

NOTE:

- Store the program starting from F000H
- Store the data at LOC F100H and F101H
- Executive the program.
- Result will be displayed in address field.

Address for UPDAD is 06BFH.

RESULT:

BEFORE EXECUTION			
Addr. For 1st multiplier	Data	Addr. For 2nd multiplier	Data
F100H	06	F101H	05

AFTER EXECUTION:

Address Field:

0	0	1	E

SIGNATURE OF STAFF-IN-CHARGE

11. Write an ALP to find the product of two unsigned binary numbers stored at location 'X' and 'X+1' by shift left and add method and display the product in address field.

PROGRAM	ALGORITHM

START: LXI H, F100H
MOV E,M
MVI D,00H
INX H
MOV A,M
LXI H,0000H
MVI B,08H
MULT: DAD H
RAL
JNC SKIP
DAD D
SKIP: DCR B
JNZ MULT
SHLD FE73
CALL UPDAD
HLT
	STEP 1: Load the data's from locations 'X' and 'X+1'.
	STEP 2: Find the product using Shift Left method.
	STEP 3: Display the result in ADDRESS field
	STEP 4: Halt the processor.

NOTE:

- Store the program starting from F000H
- Store the data at LOC F100H and F101H
- Executive the program.
- Result will be displayed in address field.

Address for UPDAD is 06BFH.

RESULT:

BEFORE EXECUTION			
Addr. For 1st multiplier	Data	Addr. For 2nd multiplier	Data
F100H	06	F101H	05

AFTER EXECUTION:

Address Field:

0	0	1	E

SIGNATURE OF STAFF-IN-CHARGE

12. Write an ALP to divide a 16 bit number at location X and X+1 by an 8 bit number at loc Y. Display the Quotient in address field and remainder in data filed.

PROGRAM	ALGORITHM

START: LHLD FIOOH
XCHG
LDA FI02H
MOV L, A
MVI H,00H
LXI B, 0000H
RPTS: MOV A,E
SUB L
MOV E,A
MOV A,D
SBB H
MOV D,A
INX B
JNC RPTS
DCX B
DAD D
MOV A, L
MOV L,C
MOV H,B
PUSH H
CALL UPDDT
POP H
CALL UPDAD
HLT
	STEP 1; Load the 16 bit number from the specified memory location that is F100H and F101H
	STEP2: Load 8 bit number from specified memory location (F102H)
	STEP3: Using successive subtraction principle find the quotient and remainder
	STEP4: Display the result in Data field and address field.
	STEP 5: Terminate the program.

NOTE:

- Store the program starting from F000H
- Store the 16 bit number at F100H and F101H(Numerator)
- Store the 8 bit number at F102H(denominator)r)
- Execute the program, result will be displayed in the display field & addresses for UPDDT: is 06D6H

RESULT:

SIGNATURE OF STAFF-IN-CHARGE

BEFORE EXECUTION:	
Data Addr.	Data(Numerator)
F100	0A
F101	00

BEFORE EXECUTION	
Data Addr	Data(Denominator)
F102	05

AFTER EXECUTION:

Address field:

0	0	0	2

Data field:

0	0

SIGNATURE OF STAFF-IN-CHARGE

13. Write an ALP to implement a counter to count from '00 – 99' (UPCOUNTER) in BCD. Use a subroutine to generate a delay of one second between the counts.

PROGRAM	ALGORITHM
START: MVI A,00H	STEP 1: Initiate the minimum number in
RPTD: PUSH PSW	accumulator
CALL UPDDT	STEP 2: Display in the DATA field
CALL DELAY	STEP 3: Add 01 to the present value
POP PSW	displayed
ADI 01H	STEP 4: Use decimal conversion
DAA	Instruction.
JMP RPTD	STEP 5: Repeat the steps 2-4.
HLT	STEP 6: Provide proper display between
	Each display.
DELAY: LXI B, F424H	STEP 7: Terminating Point.
WAIT: DCX B	
MOV A,C	
ORA B	
JNZ WAIT	
RET	

NOTE:

- Store the program starting from F000H.
- Execute the program; the result will be displayed in the DATA field.

Address for UPDAD: is 06BFH.

RESULT:

It counts from 00 to 99 with the given delay in DATA field.

0	0
0	1

. .

9	8
9	9

SIGNATURE OF STAFF-IN-CHARGE

14. Write a program for decimal down counter 99-00
(DOWN COUNTER) and display the count in DATA/ADDRESS field

PROGRAM		ALGORITHM
START:	MVI A,99H	Step 1: Initiate the maximum count Acc
DSPLY:	PUSH PSW	Step 2: Display the present counting data
	CALL UPDDT	field
	CALL DELAY	Step3: Provide proper delay using
	POP PSW	subroutine techniques
	ADI 99H	Step4: Decrement the counting decimal
	DAA	mode(Use 10's complement
	JMP DSPLY	method)
	HLT	Step5: Repeat steps 2, 3, and 4
DELAY:	LXI D, FFFFH	
REPEAT:	DCX D	Step6: Terminate the program
	MOV A, E	
	ORA D	
	JNZ REPEAT	
	RET	

NOTE:

- Store the program starting from LOC F000H
- Execute the program
- Observe the result on the data field
- # Address for UPDDT: 06D6H

RESULT:

It counts from 99 to 00 with the given delay on data field.

DATA FIELD

9	9
9	8

0	1
0	0

SIGNATURE OF STAFF-IN-CHARGE

15. Write an ALP to implement a counter to count from '00 – FF' (UPCOUNTER) in HEX. Use a subroutine to generate a delay of one second between the counts.

PROGRAM	ALGORITHM
START: MVI A,00 RPTD: PUSH PSW CALL UPDDT CALL DELAY POP PSW ADI 01 H JMP RPTD HLT DELAY: LXI B, F424H WAIT: DCX B MOV A,C ORA B JNZ WAIT RET	STEP 1: Initiate the minimum number in accumulator STEP 2: Display in the DATA field STEP 3: Add 01 to the present value displayed STEP 4: Repeat the steps 2-4. STEP 5: Provide proper display between Each display. STEP 6: Terminating Point.

NOTE:

- Store the program starting from F000H.
- Execute the program; the result will be displayed in the DATA field.

Address for UPDAD: is 06BFH.

RESULT:

It counts from 00 to FF with the given delay in DATA field.

0	0
0	1

F	E
F	F

SIGNATURE OF STAFF-IN-CHARGE

16. Write an ALP to implement a counter to count from 'FF – 00' (DOWN COUNTER) in HEX. Use a subroutine to generate a delay of one second between the counts.

PROGRAM	ALGORITHM
START: MVI A,FFH	STEP 1: Initiate the minimum number in
RPTD: PUSH PSW	accumulator
CALL UPDDT	STEP 2: Display in the DATA field
CALL DELAY	STEP 3: Subtract 01 to the present value
POP PSW	Displayed.
SBI 01H	STEP 4: Repeat the steps 2-4.
JMP RPTD	STEP 5: Provide proper display between
HLT	Each display.
	STEP 6: Terminating Point.
DELAY: LXI B, F424H	
WAIT: DCX B	
MOV A,C	
ORA B	
JNZ WAIT	
RET	

NOTE:

- Store the program starting from F000h.
- Execute the program; the result will be displayed in the DATA field.

Address for UPDAD: is 06BFH.

RESULT:

It counts from FF to 00 with the given delay in DATA field.

F	F
F	E

. .

0	1
0	0

SIGNATURE OF STAFF-IN-CHARGE

17. Write an ALP to check whether the 8-bit numbers stored at location 'X' belongs to '2 out of 5 code' or not. Display '00' if invalid and 'FF' if valid, on the data field.

PROGRAM	ALGORITHM
START: LDA F100H ANI E0H JNZ DISPLAY LDA F100H JPO DISPLAY MVI C,05H MVI B,00H	STEP 1: Load the data to be checked for Code status. STEP 2: Check the 3 MSB's are zero or not. STEP 3: If zero proceed further else Display error and halt the processor.
RPT1: RRC JNC NEXT1 INR B	STEP 4: Count the number of ones in the 5-bits STEP 5: Check the count with '02'
NEXT1: DCR C JNZ RPT1 MOV A,B CPI 02H MVI A,FFH JZ NEXT2	STEP 6: If count=02, display 'FFH' on the Data filed and halt the processor. STEP 7: If count ≠ 02 display '00' on the Data field and halt the processor.
DISPLAY: MVI A,00H	
NEXT2: STA FE75H CALL UPDDT HLT	STEP 8: Halt the processor.

NOTE:

- Store the program starting from F000H, Store the data at LOC F100H., Execute the program.
- Result will be displayed in data field, Displays FF on Data filed for valid condition.
- Displays 00 on Data filed for invalid condition.

Address for UPDDT is 06D6H

RESULT:

Eg1:

BEFORE EXECUTION	
Address	Data
F100H	12H

Eg2:

BEFORE EXECUTION	
Address	Data
F100H	19H

AFTER EXECUTION:

Data Field:

F	F

AFTER EXECUTION

0	0

SIGNATURE OF STAFF-IN-CHARGE

18. WAP to find the smallest of 'N' 1-byte numbers. Value of 'N' is stored in location 'X' & numbers from 'X+1'. Display the number in data field & its address in address field.

PROGRAM	ALGORITHM

START: LXI H,F500H
MOV C,M
INX H
MOV A,M
DCR C
LOOP1: INX H
CMP M
JC AHEAD
MOV A,M
AHEAD: DCR C
JNZ LOOP1
STA F300H
LXI H,F500H
MOV C,M
INX H
LOOP3: CMP M
JZ LOOP2
INX H
DCR C
JNZ LOOP3
LOOP2: SHLD F301H
CALL UPDAD
LDA F300H
CALL UPDDT
HLT
	STEP 1: Initialize the starting address of
	The array of N elements.
	
	STEP 2: Load the count N.
	
	STEP 3: Find the smallest number by
	comparing the elements given by
	Verifying the carry flag.
	
	STEP 4: Store the address of smallest
	Number at F301.

RESULT:

Length of Block = 04

BEFORE EXECUTION	
Address	Data
F500H(cnt)	04
F501H	A1
F502H	11
F503	01
F504	B2

AFTER EXECUTION:

Address			
F	5	0	3

Data
01

SIGNATURE OF STAFF-IN-CHARGE

19. WAP to realize real time clock. Display seconds in data field, minutes and hours in address field.

PROGRAM	ALGORITHM

START: LXI H,0000H
MIN : MVI A,00H
SEC: PUSH PSW
PUSH H
PUSH H
CALL UPDDT
POP H
CALL UPDAD
LXI D,FFFFH
CALL DELAY
CALL DELAY
POP H
POP PSW
ADI 01H
DAA
CPI 60
JNZ SEC
MOV A,L
ADI 01H
DAA
MOV L,A
CPI 60
JNZ MIN
MVI L,00
MOV A,H
ADI 01H
DAA
MOV H,A
CPI 24H
JNZ MIN
JMP START
HL T
	STEP 1: Initialize the data for seconds in acc...
	STEP 2: Initialize the data for minutes in L reg.
	STEP 3: Initialize the data for hours in H reg
	STEP 4: Display the data in the display field
	STEP 5: Call proper delay of one second.
	STEP 6: Increment the second by 01 and compare it with the value 60 suitably if it is equal increment the minute by one and compare it with the value 24 suitably, if not for all the above increment the second Value and repeat the steps 4-5. STEP7: Termination.

RESULT: AFTER EXECUTION

Address field	
Hours	Min
00	00
..	..
..	..
..	..

Data field
Sec
01
..
..
..

SIGNATURE OF STAFF-IN-CHARGE

20. Write an ALP to convert a BINARY numbers stored at LOC X to its BCD equivalent and display it in the data/ addr field.

PROGRAM	ALGORITHM

START: LDA F100H
MOV B,A
MVI D, 64H
CALL BCD
MOV H,C
MVI D,0AH
CALL BCD
MOV A,C
RLC
RLC
RLC
RLC
ORA B
MOV L,A
CALL UPDAD
HLT
BCD: MVI C,00H
MOV A,B
RPTS: SUB D
JC NC
INR C
JMP RPTS
NC: ADD D
MOV B,A
RET
	STEP 1: Load the number to be converted
	STEP 2: On the basis of successive subtraction find the Co-efficient in BCD form.
	STEP 3: Display the result in Address Field.
	STEP4: Halt the processor

NOTE:

- Store the program starting from LOC F000H
- Store the program starting from LOC F100H
- Execute the program
- Observe the result on the address field

SIGNATURE OF STAFF-IN-CHARGE

RESULT:

EXAMPLE 1:

BEFORE EXECUTION:

F100H ~~FFH~~ →

AFTER EXECUTION:

BINARY NUMBER BCD NUMBER

FFH →

0	2	5	5

EXAMPLE 2:

BEFORE EXECUTION:

F100H → ACH

AFTER EXECUTION:

BINARY NUMBER BCD NUMBER

ACH →

0	1	7	2

SIGNATURE OF STAFF-IN-CHARGE

21. Write an ALP to convert a BINARY NUMBER stored at location 'X' to its ASCII EQUIVALENT and display in DATA field.

PROGRAM	ALGORITHM

START: LDA F100H
MOV B,A
CALL ASCII
MOV L,A
MOV A,B
RRC
RRC
RRC
RRC
CALL ASCII
MOV H,A
MOV A,B
PUSH H
CALL UPDDT
POP H
CALL UPDAD
HLT
ASCII: ANI 0FH
CPI 0AH
JC BUS
ADI 07H
BUS: ADI 30H
RETURN: RET
	STEP 1: Load the binary number from LOC 'X'
	STEP 2: Separate the nibbles
	STEP 3: Convert each nibble to its ASCII Equivalent.
	STEP 4: Add the two converted values.
	STEP 5: Display the result in the DATA Field.
	STEP 6: Halt the processor.

NOTE:

- Store the program starting from F000h.
- Store the binary number at F100h.
- Execute the program; the result will be displayed in the data field.

Address for UPDDT: is 06D6H.

Address for UPDAD: is 06BFH.

RESULT:

BEFORE EXECUTION		
Addr. of LOC 'X'		DATA
1.	F100H	01H
2.	F100H	ABH

AFTER EXECUTION	
Data in Data field	
30	31
41	42

SIGNATURE OF STAFF-IN-CHARGE

22. Write an ALP to convert a ASCII NUMBER stored at location 'X' to its BINARY EQUIVALENT and display in DATA field.

PROGRAM	ALGORITHM
START: LDA F100H CPI 40H JC RPT JZ HALT SUI 40H ADI 09H JMP DISP RPT: SUI 30H DISP: CALL UPDDT HALT: HLT	STEP 1: Load the ASCII number from LOC 'X'. STEP 2: Check for digit / alphabets. STEP 3: Using suitable logic and instructions convert the ASCII Number into binary. STEP 4: Display it in the DATA field. STEP 6: Halt the processor.

NOTE:

- Store the program starting from F000h.
- Store the ASCII number at F100h.
- Execute the program; the result will be displayed in the data field.

Address for UPDDT: is 06D6H.

RESULT:

BEFORE EXECUTION		
Addr. of LOC 'X'		DATA
1.	F100H	30H
2.	F100H	34

AFTER EXECUTION
Data in Data field
00
04

SIGNATURE OF STAFF-IN-CHARGE

23. Write a program to convert a BCD number stored at LOC X to its BINARY equivalent & display it in data field

PROGRAM	ALGORITHM
START: LDA F100H	STEP 1:Load the BCD numbers from
MOV B,A	LOC x to ACC
ANI F0H	
RRC	STEP 2: Separate the higher & lower
RRC	nibbles
RRC	
RRC	STEP 3:Convert the nibbles in to binary
MOV D,A	values by multiplying their
MVI C,0AH	nibbles by its factor
SUB A	
RPTA: ADD D	STEP 4:ADD the two binary numbers
DCR C	
JNZ RPTA:	STEP 5:Display the result in the DATA
MOV D,A	field
MOV A,B	
ANI 0FH	STEP 6:Halt the processor
ADD D	
CALL UPDDT	
HALT: HLT	

NOTE:

- Store the program starting from F000H
- Store the BCD number at F100H
- Execute the program, result will be displayed in the display field

RESULT:

BEFORE EXECUTION:

Eg1: F100H → 45

Eg2: F100H → 04

AFTER EXECUTION:

DATA FIELD

Eg1:

2	D

Eg2:

4	0

SIGNATURE OF STAFF-IN-CHARGE

INTERFACING

24. WAP to generate square wave of given duty cycle using DAC
Display the waveform on a CRO & verify the same.

PROGRAM			ALGORITHM
START:	MVI	A,80	STEP 1:Write the control word in to the PPI of the kit
	OUT	CWR	
RPT:	XRA	A	
	OUT	P_a	STEP 2: Pass the data's for square wave towards PPI words
	OUT	P_b	
	CALL	OFFCOUNT	
	MVI	A,FF	
	OUT	P_a	STEP 3: Pass the alternative data's for LOW & HIGH alternatively with proper delay according to the duty cycle given
	OUT	P_b	
	CALL	ONCOUNT	
	JMP	RPT	
	HLT		
ONCOUNT:	LXI	H,08	
LOOP:	DCX	H	S TEP 4: Keep the processor in a continuous loop till termination
	MOV	A,L	
	ORA	H	
	JNZ	LOOP	
	RET		STEP 5: Terminating point
OFFCOUNT:	LXI	H,03	
LOOP1:	DCX	H	
	MOV	A,L	
	ORA	H	
	JNZ	LOOP	
	RET		

NOTE:

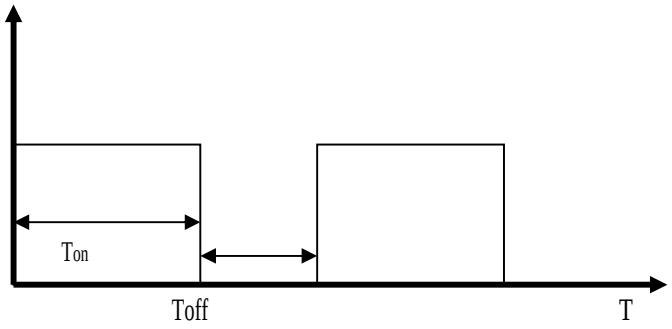
- Store the program starting from F000H
- Connect the interfacing unit to the kit
- Execute the program
- Observe the waveform on the CRO

SIGNATURE OF STAFF-IN-CHARGE

PORT ADDRESS:

FOR P3		FOR P4	
PORT	ADDRESS	PORT	ADDRESS
PORT A	D8	PORT A	F0
PORT B	D9	PORT B	F1
PORT C	DA	PORT C	F2
CWR	DB	CWR	F3

OUT PUT WAVEFORM:



CALUCLATIONS:

Duty cycle=70%,f=1kHz,T=1/f=1m sec

D=Ton/T

0.7=Ton/1m sec

Ton=0.7msec, T=Ton+Toff

There fore Toff=0.3m Sec

(i) Ton(delay)=0.7msec

Total number of T state=$0.7x10^{-3}/0.33x10^{-6}$=2121

Total number of T state=10+(count-1)24+21

2121=10+(count-1)24+21

2121=10+(count -1)24+21=88.09

on count=0058H

(ii) Toff(delay)=0.3msec

Total number of T state=$0.3x10^{-3}/0.33x10^{-6}$=909

Total number of T state=10+(count-1)24+21

2121=10+(count-1)24+21

2121=10+(count -1)24+21=37.5

on count=0025H

Note: Caluclate for80, 60%,50% duty cycles

SIGNATURE OF STAFF-IN-CHARGE

25. WAP to generate a triangular wave using a DAC. Display the Waveform and measure the slope.

PROGRAM	ALGORITHM
START: MVI A, 80 OUT CWR REP: XRA A VP: OUT P_a OUT P_b INR A CPI FF JNZ UP DN: DCR A OUT P_a OUT P_b JNZ DN JMP REP	STEP 1:Write the control word in to the control register of PPI STEP 2:Send the data's towards PPI to generate triangular wave STEP3:send the data's for positive slope & negative slope alternatively STEP 4:Keep the processor in the continuous loop, till termination STEP 5: Terminating point

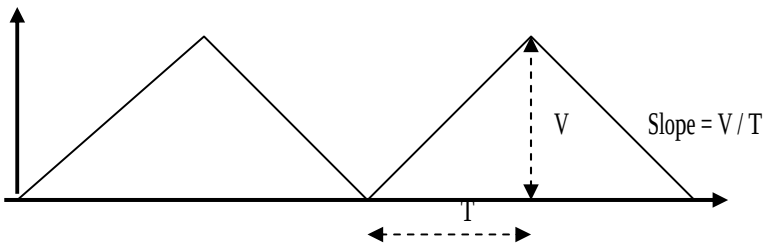
NOTE:

- Store the program starting from F000H
- Connect the interfacing unit to the kit
- Execute the program
- Observe the waveform on the CRO

PORT ADDRESS:

FOR P3		FOR P4	
PORT	ADDRESS	PORT	ADDRESS
PORT A	D8	PORT A	F0
PORT B	D9	PORT B	F1
PORT C	DA	PORT C	F2
CWR	DB	CWR	F3

OUTPUT WAVEFORM:



SIGNATURE OF STAFF-IN-CHARGE

26. WAP to generate a staircase waveform using DAC.

PROGRAM	ALGORITHM
START: MVI A,80 OUT CWR GF: MVI A,00 NF: OUT P_b PUSH PSW CALL DELAY POP PSW ADI 33 JNC NF JMP GF DELAY: MVI B,FF BACK: DCR B JNZ BACK RET	Step 1: Write the control word in to the control register of PPI. Step 2: Send the data's towards PPI to generate staircase wave. Step 3:send the data's for positive slope & negative slope alternatively Step 4:Keep the processor in the continuous loop, till termination Step 5: Terminating point

NOTE:

- Store the program starting from F000H
- Connect the interfacing unit to the kit
- Execute the program
- Observe the waveform on the CRO

PORT ADDRESS:

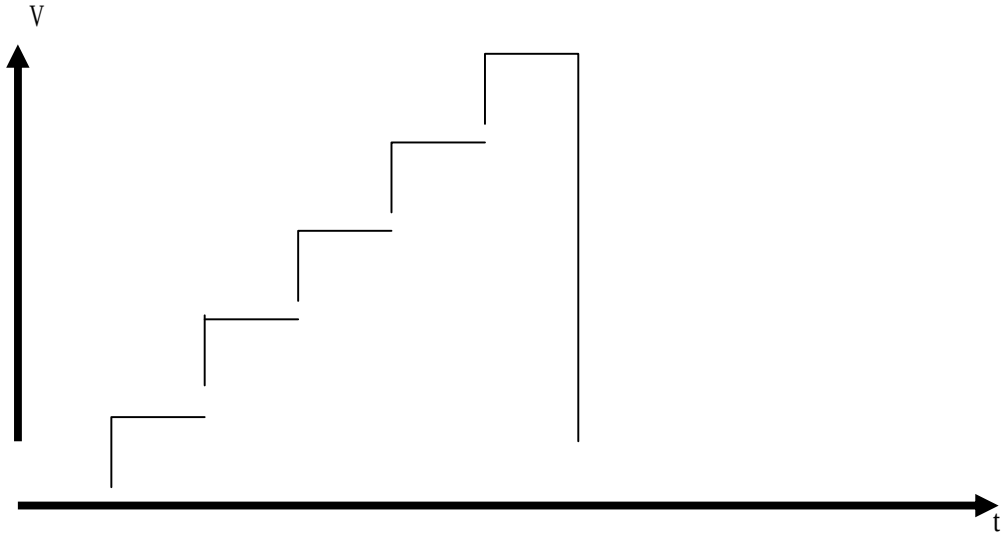
FOR P3		FOR P4	
PORT	ADDRESS	PORT	ADDRESS
PORT A	D8	PORT A	F0
PORT B	D9	PORT B	F1
PORT C	DA	PORT C	F2
CWR	DB	CWR	F3

SIGNATURE OF STAFF-IN-CHARGE

CALCULATION OF STEP SIZE:

NUMBER OF STEPS = N;
STEP SIZE = (MAX. AMPL.) / N

Note: MAX. AMPL. For DAC = 5v (FFH)
Ex.: For 5 steps
FF / N = 255 / 05 = 51 = 33H
[ADI 33H]



SIGNATURE OF STAFF-IN-CHARGE

27. Write an Assembly Language Program to Sense a Key board.

PROGRAM	ALGORITHM

START: MVI A, 90H
OUT CWR
BGN: MVI A, 07H
OUT PORT C
DEBOUNCE: IN PORT A
ORA A
JZ DEBOUNCE
CALL DELAY
IN PORT A
ORA A
JZ DEBOUNCE
MVI A, 01H
MVI C, 00H
SCAN: MOV B, A
OUT PORT C
IN PORT A
ORA A
JNZ NXTKEY
MOV A, C
ADI O8H
MOV C, A
MOV A, B
RLC
CPI 08H
JZ BGN
JMP SCAN
NXTKEY: RRC
	STEP 1: Write the control word into the control register of PPI.
	STEP 2: Initialize the key board row using suitable data.
	STEP 3 Identify any key closure, if any key closure find the code of the key closed using suitable logic.
	STEP 4: Display the key code in the display field.
	STEP 5: Repeat the steps 2-4 till termination.
	STEP 6: Terminating point.

SIGNATURE OF STAFF-IN-CHARGE

JC FOUND INR C JMP NXTKEY FOUND: MOV A, C STA F200H CALL UPDDT JMP BGN DELAY: LXI H,00FFH LOOP: DCX H MOV A, L ORA H JNZ LOOP RET	

NOTE:

- Store the program starting from F000H.
- Connect the interfacing unit to the kit.
- Execute the program.
- Press any key in the key board.
- Result will be displayed in the display field.

SIGNATURE OF STAFF-IN-CHARGE

28. Write an ALP to implement a moving display of a given string of digits on a display interface with a suitable delay.

PROGRAM	ALGORITHM
START: MVI A,CW OUT CWR: MVI C,04H RPTCD: MVI A,FFH CALL DISP LXI D,FFFFH CALL DELY DCR C JNZ RPTCD LXI D,FFFFH CALL DELY LXI H, F100H MVI C, 04H RPDIS: MOV A,M CALL DISP INX H PUSH H PUSH B LXI D,FFFFH CALL DELY POP B POP H DCR C JNZ RPDIS LXI D,FFFFH CALL DELY JMP START DISP: MVI E,08H MOV B,A RPTR: MOV A,B OUT PB RRC MOV B,A	STEP 1: Initialize all ports STEP 2: Make all rows high STEP 3: Sense the Key board STEP 4: Is any Key Pressed , if Yes call delay STEP 5: If No, Check the Key Pressed STEP6: Initialize counter Step 7: Set Row High. Step 8:Is any Key Pressed Check first column, If No increment the counter by 8 and enable next Row. Step 9: If Yes Display the counter.

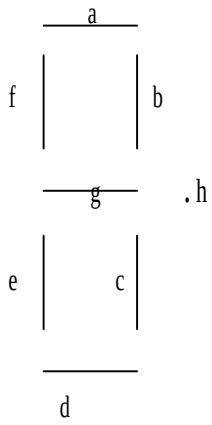
SIGNATURE OF STAFF-IN-CHARGE

MVI A,00H OUT PC CMA OUT PC DCR E JNZ RPTR RETURN: RET	

NOTE:

- Store the program from F000H.
- Store the string of data from F100h.
- Connect the interfacing unit to the PPI of the kit.
- Execute the program.
- Observe the result in the display interface unit.

LED DISPLAY:



String for SSIT:

A	b	c	d	e	f	g	h	
0	1	0	0	1	0	0	1	49H(S)
0	1	0	0	1	0	0	1	49H(S)
1	0	0	1	1	1	1	1	9FH(i)
1	1	1	0	0	0	0	1	E1H(t)

SIGNATURE OF STAFF-IN-CHARGE

29. Write a program to display the ASCII equivalent of the key pressed using 8279.

PROGRAM	ALGORITHM

START: MVI A, 0EH
SIM
EI
CALL RDKBD
PUSH PSW
MOV B, A
CALL ASCII
MOV L, A
RRC
RRC
RRC
RRC
CALL ASCII:
MOV H, A
POP PSW
PUSH H
CALL UPDDT
POP H
CALL UPDAD
JMP START
HALT: HLT
ASCII: ANI 0FH
CPI 0AH
JC BAT
ADI 07H
BAT: ADI 30H
RET
	Step 1: Initialise the 8279 IC & initialize the interrupt system by suitable data
	Step 2: Convert the received data from the key pressed in to its ASCII equivalent
	Step 3: Display the same in the display field
	Step 4: Repeat the steps 1-4 for each key pressed till termination
	Step 5: Terminating point

NOTE:

- Store the program from F000H
- Execute the program
- Press any key in the key board other than the RESET key
- The result will be displayed in the display field

The address for RDKBD: is 0634H

SIGNATURE OF STAFF-IN-CHARGE

30. Write an ALP to simulate 'THROW OF A DICE' using interrupts.

PROGRAM	ALGORITHM
START: MVI A,0BH SIM EI CAR: MVI A,01H RPT: INR A CPI 06H JNZ RPT JMP CAR INRTS: DI PUSH PSW CALL UPDDT POP PSW EI RETRN: RET FFB1: C3 0F F0	STEP 1: Initialize the interrupt system by proper data. STEP 2: Write the interrupt service routine at proper location (memory location) STEP 3: Interrupt service routine is a program for dice simulation (counting from 0-6). STEP 4: Loop the program control in a continuous mode. STEP 5: Terminating point.

NOTE:

- Store the program starting from F000H.
- Store the interrupt service routine starting from INRTS: address in F00FH.
- Store the instruction JMP INRTS: at memory location FFB1H
- Execute the program.

RESULT:

Press the 'Vect intr' button in the keyboard, for each pressing a display will be there in the display field (data field). I t displays from 00 to 06.

SIGNATURE OF STAFF-IN-CHARGE

MICROPROCESSOR PROGRAM CODING SHEET

TITLE OF THE PROGRAM :

VERIFIED BY :

ADDRESS		OP-CODE			LABEL	MNEMONIC	OPERAND	COMMENTS
ha.	la.	fb.	sb.	tb.				

REMARKS:

SIGNATURE OF STAFF-IN-CHARGE