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1st semester

Sub: computer organisation lab

7.) a.) Design and implement counters.

COUNTERS: A special type of sequential circuit used to count the pulse is known as a counter, or a collection of flip flops where the clock signal is applied is known as counters. The counter is one of the widest applications of the flip flop. Based on the clock pulse, the output of the counter contains a predefined state. The number of the pulse can be counted using the output of the counter. There are the following types of counters: 1. Asynchronous counters 2.

Synchronous counters 1. Asynchronous counter: In asynchronous counter we don't use universal clock, only first flip flop is driven by main clock and the clock input of rest of the following flip flop is driven by output of previous flip flops. We can understand it by following diagram

2. Synchronous counter: unlike the asynchronous counter, synchronous counter has one global clock which drives each flip flop so output changes in parallel. The one advantage of synchronous counter over asynchronous counter is, it can operate on higher frequency than asynchronous counter as it does not have cumulative delay because of same clock is given to each flip flop.

7.) b.) Write a 8085 program for Arrange data in Ascending order.

AIM:

ALGORITHM:

1. Initialize HL pair as memory pointer
2. Get the count at 4200 into C - register
3. Copy it in D - register (for bubble sort (N-1) times required)
4. Get the first value in A - register
5. Compare it with the value at next location
6. If they are out of order, exchange the contents of A - register and Memory
7. Decrement D - register content by

1

8. Repeat steps 5 and 7 till the value in D- register become zero
9. Decrement C - register content by 1
10. Repeat steps 3 to 9 till the value in C - register becomes zero

PROGRAM:

```
LXI H,5000 Set pointer for array
MOV C,M Load the count
DCR C Decrement count
REPEAT: MOV D,C
LXI H,5001
LOOP: MOV A,M copy content of memory location to Accumulator
INX H
CMP M
JC SKIP jump to skip if carry generated
MOV B,M copy content of memory location to B - Register
MOV M,A copy content of Accumulator to memory location
DCR H Decrement content of HL pair of registers
MOV M,B copy content of B - Register to memory location
INX H Increment content of HL pair of registers
SKIP: DCR D Decrement content of Register - D
JNZ LOOP jump to loop if not equal to zero
DCR C Decrement count
JNZ REPEAT jump to repeat if not equal to zero
HLT Terminate Program
```

INPUT:

Data 0: 05H in memory location 5000 --> array size
Data 1: 05H in memory location 5001
Data 2: 04H in memory location 5002
Data 3: 03H in memory location 5003
Data 4: 02H in memory location 5004
Data 5: 01H in memory location 5005

OUTPUT:

Data 0: 05H in memory location 5000 --> Array size

Data 1: 01H in memory location 5001

Data 2: 02H in memory location 5002

Data 3: 03H in memory location 5003

Data 4: 04H in memory location 5004

Data 5: 05H in memory location 5005

7.)c.) Write a 8085 Program for division of two 16bit numbers

AIM:

ALGORITHM:

1. Initialise register BC as 0000H for Quotient.
2. Load the divisor in HL pair and save it in DE register pair.
3. Load the dividend in HL pair.
4. Subtract the content of accumulator with E register.
5. Move the content A to C and H to A.
6. Subtract with borrow the content of A with D.
7. Move the value of accumulator to H.
8. If CY=1, goto step 10, otherwise next step.
9. Increment register B and jump to step 4.
10. ADD both contents of DE and HL.
11. Store the remainder in memory.
12. Move the content of C to L & B to H.
13. Store the quotient in memory

PROGRAM:

8pt; > MEMORY ADDRESS	MNEMONICS	COMMENTS
2000	LPI B, 0000H	INITIALISE QUOTIENT AS 0000H 2003
	LHLD 2052H	LOAD THE DIVISOR IN HL
2006	XCHG	EXCHANGE HL AND DE
2007	LHLD	2050 LOAD THE DIVIDEND
200B	MOV A, L	A ← L

INPUT:

(2050H) = 04H
 (2051H) = 00H
 (2052H) = 02H
 (2053H) = 00H

OUTPUT:

(2054H) = 02H
 (2055H) = 00H
 (2056H) = 7EH
 (2057H) = 77H