NORTH SOUTH UNIVERSITY

Department of Electrical and Computer Engineering

Assignment – 02

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Course No.	: CSE 331
Course Title	: Microprocessor Interfacing & Embedded System
Section	: 6
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Section - 5

Set - 1

1|

f | a | b
  | g |
e | d | c   Dh
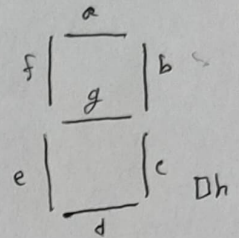
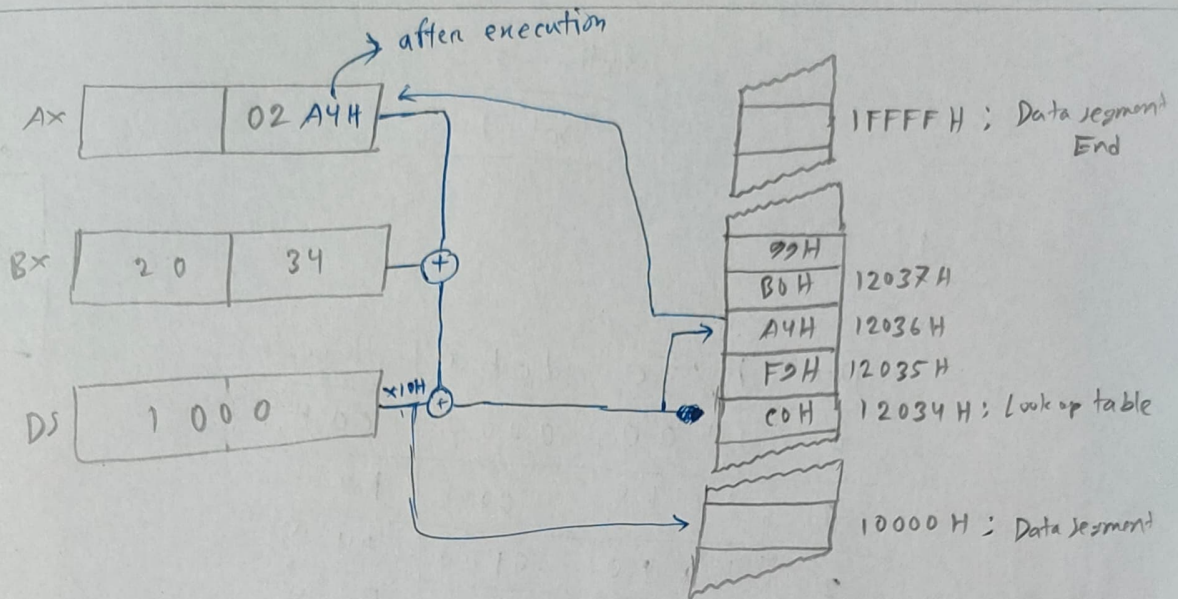| Dec	h g f e	d c b a	Hexa.
0	1 1 0 0	0 0 0 0	C0 H
1	1 1 1 1	1 0 0 1	F9 H
2	1 0 1 0	0 1 0 0	A4 H
3	1 0 1 1	0 0 0 0	B0 H
4	1 0 0 1	1 0 0 1	99 H
5	1 0 0 1	0 0 1 0	92 H
6	1 0 0 0	0 0 1 0	82 H
7	1 1 1 1	1 0 0 0	F8 H
8	1 0 0 0	0 0 0 0	80 H
9	1 0 0 1	0 0 0 0	90 H

Table   C0H, F9H, A4 H, B0 H, 99H, 92H, 82H, F8 H, 80H, 90H

MOV   AL, 2   ; load al with 2

~~MOV   BX,~~

LEA   BX, Table   ; load address of lookup table

XLAT   ; converting 2 to A4 H.

→ after execution

AX | | 02 A4H |

IFFFF H : Data segment End

BX | 20 | 34 | → (+)

99H
B0H | 12037 H
A4H | 12036 H
F9H | 12035 H
C0H | 12034 H : Look up table

×10H

DS | 1 0 0 0 | (+)

10000 H : Data segment

2]

When POPA instruction executes, data will copied from stack segment reffered by SP to all register in this eq sequence
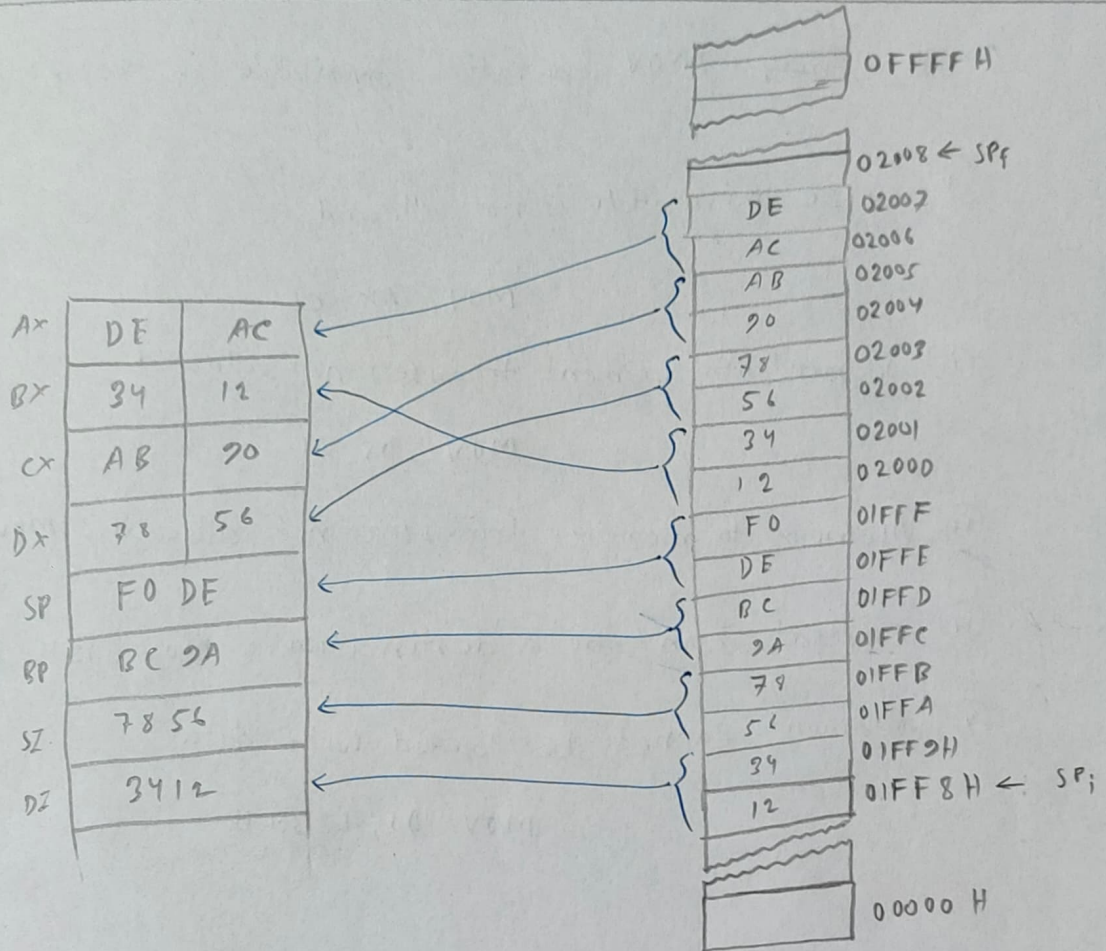
DI, SI, BP, SP, BX, DX, CX, AX

Given,

SP = 1FF8 H } before execution
SS = 0000 H

initial address or stack pointer = SS ×10H + SP

$= 0000H \times 10H + 1FF8 H$

$= 00000 H + 1FF8 H$

$= 01FF8 H$

Registers and stack diagram:

Reg		
Ax	DE	AC
Bx	34	12
Cx	AB	70
Dx	78	56
SP	FO DE	
BP	BC 2A	
SI	78 56	
DI	3412	

Memory (right column):

value	address
	OFFFF H
	02008 ← SPf
DE	02007
AC	02006
AB	02005
70	02004
78	02003
56	02002
34	02001
12	02000
FO	01FFF
DE	01FFE
BC	01FFD
2A	01FFC
78	01FFB
56	01FFA
34	01FF9H
12	01FF8H ← SPi
	00000 H

3]

Given,

$$\text{Physical address} = 5C4BE\ H$$

top address of the segment $= 60EF0\ H$

∴ starting address of the segment, base $= (60EF0 - FFFF)H$

$$= 050EF1\ H$$

We know,

$$\text{Physical address} = \text{base} + \text{offset}$$

∴ offset $= \text{Physical address} - \text{base}$

$$= (5C4BE - 050EF1)H = B5CD\ H$$

5 illegal ~~mov~~ MOV operation available in 8086:

① Size mismatch is not allowed

MOV Ax, CL

② Segment to segment transfer not allowed

MOV DS, CS

③ Memory to memory transfer not allowed ; MOV [BX], [BX+1]

④ Constant can't be a destination ; MOV 12H, BL

⑤ Segment cannot be loaded with data

MOV DS, 1234H

Set - 2

1]

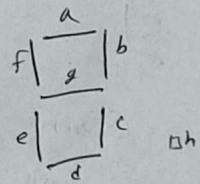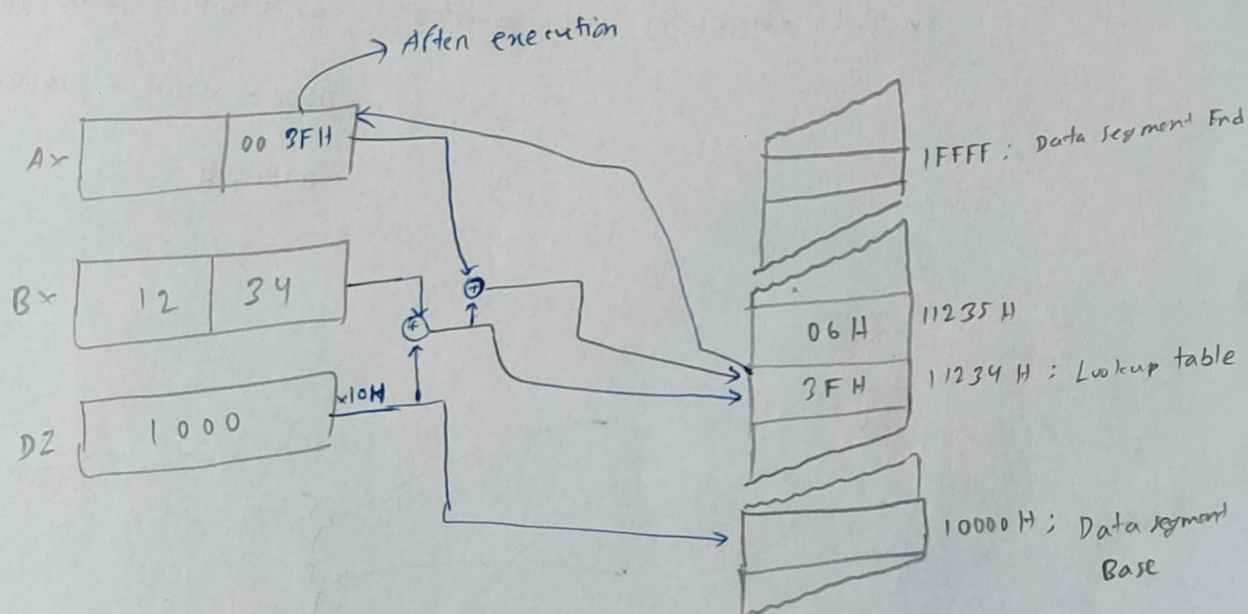| Dec	h g f e	d c b a	Hexa.
0	0 0 1 1	1 1 1 1	3F H
1	0 0 0 0	0 1 1 0	06 H
2	0 1 0 1	1 0 1 1	5B H
3	0 1 0 0	1 1 1 1	4F H
4	0 1 1 0	0 1 1 0	66 H
5	0 1 1 0	1 1 0 1	6D H
6	0 1 1 1	1 1 0 1	7D H
7	0 0 1 0	0 1 1 1	27 H
8	0 1 1 1	1 1 1 1	7F H
9	0 1 1 0	1 1 1 1	6F H

Table   3FH, 06H, 5BH, 4FH, 66H, 6DH, 7DH, 27H, 7FH, 6FH

MOV AL, 0   ; load AL with 0

LEA BX, Table ; load starting address of lookup table

XLAT   ; convert 0 to 3FH

→ After execution

A× [00 3FH]

B× [12 | 34]

D2 [1000]

×10H

06H   11235 H
3FH   11234 H : Lookup table

1FFFF : Data segment End

10000 H : Data segment Base

2)

When ~~POP~~ PUSHA instruction executes, data will copied from all register to stack segment reffered by SP in this sequence,

AX, C~~X~~, DX, BX, SP, BP, SI, DI

Given,

SP = 1008 H } after execution
SS = 0000 H

↓ ~~initial address~~ = SS x
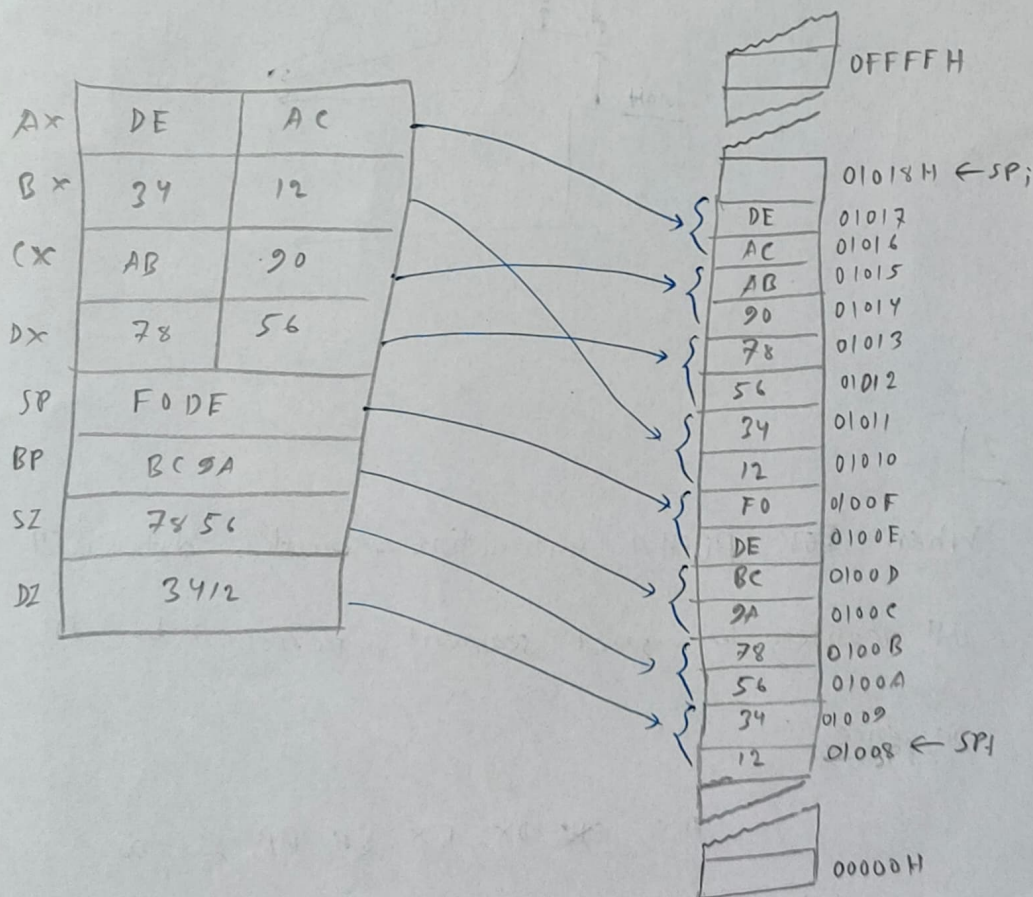
∴ before execution.

$$SP = 1008 \ H + 10H$$

$$= \text{OFF8 H}$$

$$= 1018 \ H$$

initial address of stack pointer = SS × 10H + ~~offie~~ SP

$$= 0000 \ H \times 10H + 1018H$$

$$= 01012 \ H$$

3|

Given,

Physical address = 5D4E0 H

top address of segment = 60EF0 H

.·. Base address or segment = $(60EF0 - FFFF)$ H

$= 50EF1$ H

.·. offset address = Physical address - Base address

$= (5D4E0 - 50EF1)$ H

$= C5EF$ H

two exceptional instruction that available in 8086 which support memory to memory transfer

PUSH
POP

and string related instruction.

Section - 7

Set - 1

1]

Given' that,

$$address = 0C4B : ADE0 \ H$$

∴ Base address $= (0C4B \times 10) H$

$$= 0C4B0 \ H$$

∴ top address of segment $= (0C4B0 + FFFF)H$

$$= 1C4AF \ H$$

∴ Physical address = Base + offset

$$= (0C4B0 + ADE0) H$$

$$= 17290 \ H$$

Segment	Offret
CS	IP
SS	SP or BP
DS	BX, DI, SI, 8-bit or 16 bit number
ES	DI for string instruction

2)

a) MOV [SZ], DS

this instruction is right.

the content of DS register will be copied to a memory location reffered by the offset SI and data segment.

b) INS B

this instruction is right.

this instruction will stone a string in ES: DZ came from I/O Devices which is defined in Dx register. String size is 1 Byte.

c) MOV SS, DS

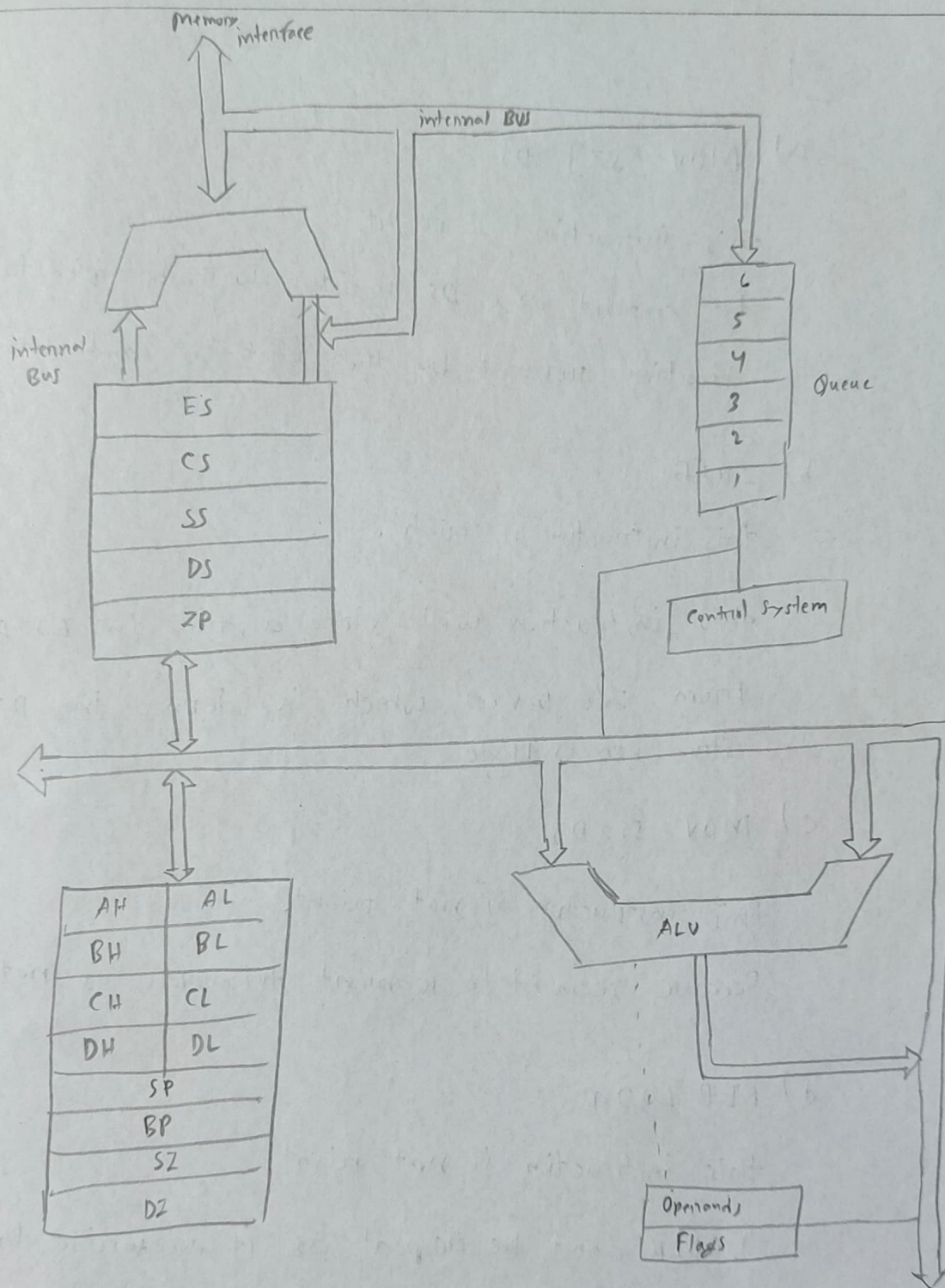this instruction is not right.

Because, segment to segment transfer is not allowed.

d) REP LODSB

this instruction is not right.

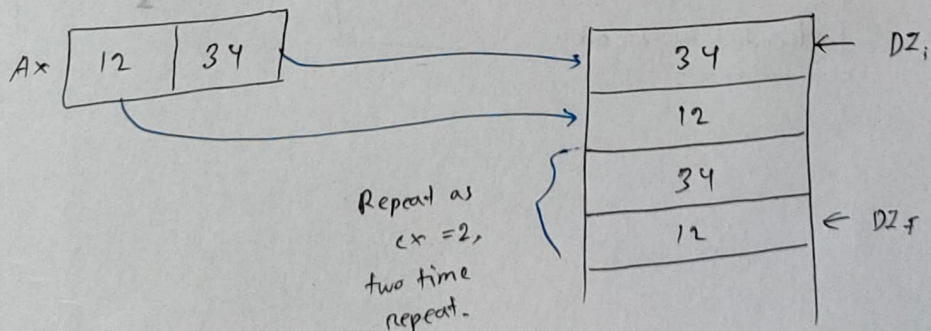LODSB can't be repeat as, it overwride the destination data at Ax AL.

3]

Memory interface

internal Bus

internal Bus

ES
CS
SS
DS
ZP

6
5
4
3
2
1

Queue

Control System

AH | AL
BH | BL
CH | CL
DH | DL
SP
BP
SZ
DZ

ALU

Operands
Flags

Set - 2

1)

Given that,

address = 04AB : AEFO H

∴ Base address = $(04AB \times 10)$ H

= 04AB0 H

∴ top address of this segment = $(04AB0 + FFFF)$ H

= 14AAF H

∴ Physical address = Base + offset

= $(04AB0 + AEFO)$ H

= 0F9A0 H

For

REP STOSW ; where, $cx = 2$

$D = 1$; Decrement

Ax [12 | 34] → [34] ← DZi

[12]

[34]

[12] ← DZf

Repeat as
$cx = 2$,
two time
repeat.

2)

Same Question as set - 1

3)

From memory

Execute it with data bytes decoded by decoder

Yes

is it single byte

No

Decode first byte to decide opcode length and update queue

Data

Update opcode queue

Take second byte from queue as opcode. Decode second byte

Execute it with data bytes as decoded by decoder

Repeat the same procedure for