

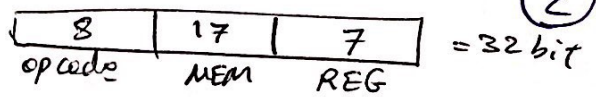
(1)

PC	R <sub>1</sub>	R <sub>2</sub>	MEM[100]
308	0100	FF00	20
309	0100	FF00	20
310	1000	FE01	20

$$2^{16} \times 2 \text{ (بیت، بیت، بیت)} = 2^{17} \xrightarrow{\text{by}} 17 \text{ bit}$$

opcode 64  $\xrightarrow{\text{by}}$  8 bit

شماره، د:

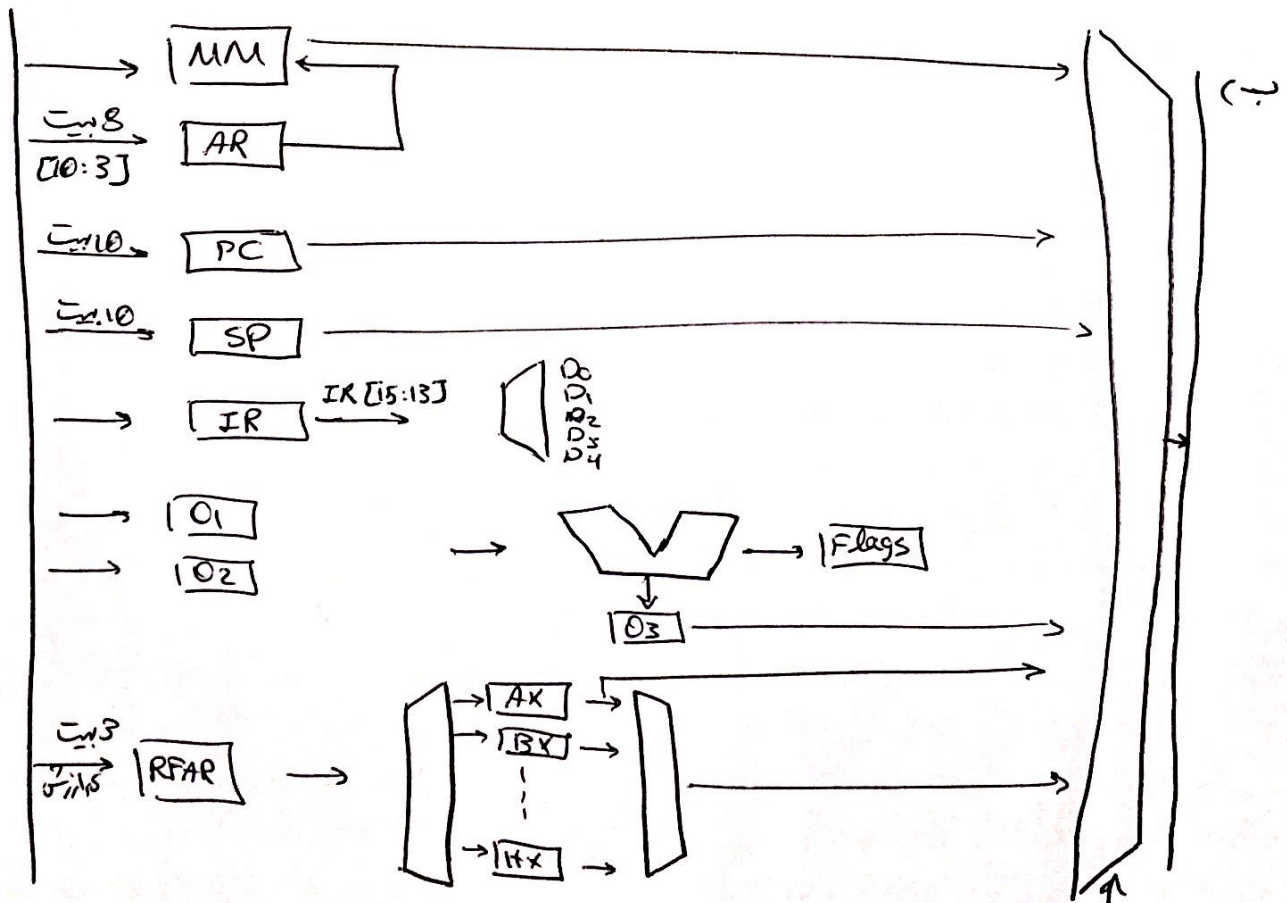


(2)

MOV R <sub>1</sub> , R <sub>2</sub>	000	xxxxxxR <sub>1</sub> R <sub>1</sub> R <sub>2</sub> R <sub>2</sub>
LDI R <sub>n</sub> Imm	001	xxRRR i i i i i i i i
STO [A], R	010	x a a a a a a a R R R R
ADD R <sub>1</sub> , R <sub>2</sub>	011	xxxxxxR <sub>1</sub> R <sub>1</sub> R <sub>2</sub> R <sub>2</sub>
PUSH R	100	xxxxxxR R R

(3) الف

$$MM = 2^8 \xrightarrow{\text{by}} 8 \text{ bit} / \text{شماره} \xrightarrow{\text{by}} \text{opcode: } 3 \text{ bit} / 8 \text{ Reg} \xrightarrow{\text{by}} 3 \text{ bit}$$



Ins Fetch

$T_0: AR \leftarrow PC$

$T_1: IR \leftarrow MEM[AR], PC \leftarrow PC + 1$

Decode

$T_2: \text{Decode } IR[15:13] \text{ into } D_0, D_1, D_2, D_3, D_4$

MOV

$T_3.D_0: AX \leftarrow BX, SC \leftarrow 0$

~~ADD~~  $T_3.D_1: AX \leftarrow IR[7:0], SC \leftarrow 0$

STO

$T_3.D_2: \text{MEM}[AR] \leftarrow IR[10:3]$

$T_4.D_2: \text{MEM}[AR] \leftarrow AX, SC \leftarrow 0$

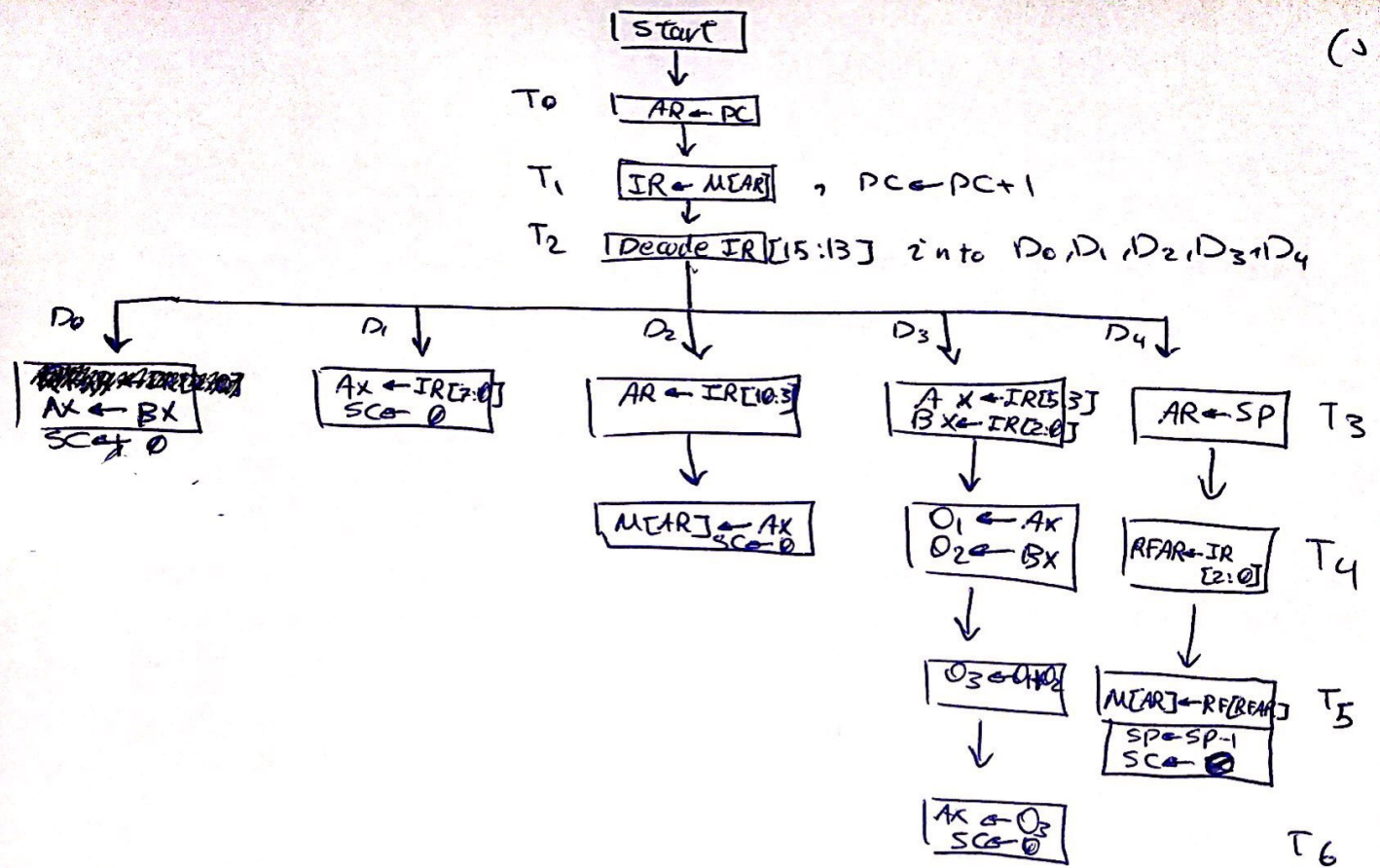
ADD

$T_3.D_3: AX \leftarrow IR[5:3], BX \leftarrow IR[2:0]$

$T_4.D_3: O_1 \leftarrow AX, O_2 \leftarrow BX, T_6.D_3 \leftarrow O_3, SC \leftarrow 0$

$T_7.B_3: O_3 \leftarrow \sim O_1 + O_2$

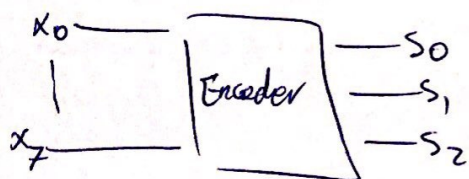




MOV, LDI : ربع ترین

ADD : یک دوازدهم ترین

Register I	x <sub>7</sub>	x <sub>6</sub>	x <sub>5</sub>	x <sub>4</sub>	x <sub>3</sub>	x <sub>2</sub>	x <sub>1</sub>	x <sub>0</sub>	s <sub>2</sub>	s <sub>1</sub>	s <sub>0</sub>
MM	0	0	0	0	0	0	0	1	0	0	0
PC	0	0	0	0	0	0	1	0	0	0	1
SP	0	0	0	0	0	1	0	0	0	1	0
O <sub>3</sub>	0	0	0	0	1	0	0	0	0	1	1
IR	0	0	0	1	0	0	0	0	1	0	0
AX	0	0	1	0	0	0	0	0	1	0	1
REG	0	1	0	0	0	0	0	0	1	1	0



$$X_0 = T_1 + T_4 \cdot D_2 + T_5 \cdot D_4$$

$$X_1 = T_0, \quad X_2 = T_5 \cdot D_4, \quad X_3 = T_5 \cdot D_3 + T_6 \cdot D_3$$

$$X_4 = T_1 + T_2 + T_3 \cdot D_0 + T_3 \cdot D_1 + T_3 \cdot D_2 + T_3 \cdot D_3 + T_4 \cdot D_4$$

$$X_5 = T_3 \cdot D_0 + T_3 \cdot D_1 + T_3 \cdot D_3 + T_4 \cdot D_2 + T_4 \cdot D_3 + T_6 \cdot D_3$$

$$X_6 = T_3 \cdot D_0 + T_3 \cdot D_3 + T_4 \cdot D_4 + T_5 \cdot D_5$$