L-6   Microprogramming and microperation

* **Micro-operation**

   The operations executed on values stored in register.

   → Symbolic Notation to describe the micro-ops: Register Transfer Language (RTL)

   o **Register Transfer :** Copy Content from R2 to R1

   Symbol = $R1 \leftarrow R2$ or $R2 \rightarrow R1$

   o **Comma** = $R1 \leftarrow R2$, $PC \leftarrow PC+1$

   both micro-operation can be performd simaltaneously only when both required mutually exclusive set of components

   o **Memory Transfer →**

   └ Read — read content from memory to CPU Reg.

   $R1 \leftarrow M[Address] \Rightarrow R1 \leftarrow M[IO AC]$

   $R1 \leftarrow M[AR]$ ↓

   └ register name   memor add.

Write :-

$$M[address] \leftarrow R2$$

data is flowing from register to Memory.

Ques if the content of register R1 is 5 and content of memory address 1000 is 20 then the content of register R2 after the following code execution?

$$R1 \leftarrow \underset{5}{\underline{R1}} + 1 - 6$$

$$R2 \leftarrow R1 + M[000]$$
$$\qquad\qquad \downarrow \qquad\quad \downarrow$$

Ans $\quad 26 \leftarrow 6 + 20$

The value of R2 is 26

Ques Same Ques Statement as Ques 1

$$R2 \leftarrow M[\overset{20}{\overbrace{1000}}] \quad = R2 = 20$$

$$R2 \leftarrow R2 - 1 \qquad = R2 = 19$$
$$M[1000] \leftarrow R2 \qquad = M[1000] = 19$$
$$R2 \leftarrow \underline{R1} + \underline{M[1000]}$$

Ans $\quad 24 \leftarrow 5 + 19$

Ques 3 Consider the following program segment. Here R1 and R2 are the G.R.R . Assume the content of memory location 2000 is 32. All number are in decimal. After the execution of this program

the value of memory location 2000 is?

Instruction (Assembly)	operations
MOV R1, 15	$R1 \leftarrow 15$
MOV R2, (2000)	$R2 \leftarrow M[2000]$
SUB R2, R1	$R2 \leftarrow R2 - R1$
MOV (2000), R2	$M[2000] \leftarrow R2$
HALT	Stop

$R1 = 15$ | $R2 = 32 - 15$ | $M[2000] = R2$

$R2 = 32$. | $R2 = 17$ | $M[2000] = 17$

Ans : 17