R-Type instruction

Op_code	Rc	Rb	а	С	fn
15 – 12	11–9	8–6	5–3	2	1–0

S0 PC → MEM → IR $PC \rightarrow PC+1$ **S1** $IR(8-6) \rightarrow RF_A1$ $IR(5-3) \rightarrow RF A2$ $RF_D1 \rightarrow RES A$ RF D2 \rightarrow RES B **S2** RES $A \rightarrow ALU A$ RES $B \rightarrow ALU B$ ALU OUT → RES C **S**3 $IR(11-9) \rightarrow RF_A3$

$$IR(11-9) \rightarrow RF_A3$$

RES_C $\rightarrow RF_WD$

I-Type instruction

ADI:-

Op_code	Rb	Ra	IMM-6BIT
15 – 12	11 – 9	8 – 6	5 — 0

LW:-

Op_code	Rb	Ra	IMM-6BIT
15 – 12	11 – 9	8 – 6	5 — 0

SW:-

Op_code	Rb	Ra	IMM-6BIT
15 – 12	11 – 9	8 – 6	5 — 0

S₀ $PC \rightarrow MEM \rightarrow IR$ PC → PC+1 **S4** $IR(8-6) \rightarrow RF_A1$ $IR(5-0) \rightarrow SE-16 \rightarrow ALU B$ $RF_D1 \rightarrow RES_A$ **S5** RES $A \rightarrow ALU A$ SE-16 \rightarrow ALU B $ALU_OUT \rightarrow RES_C$ **S7** RES C → ADDRM $IR(11-9) \rightarrow RF_A2$ RF D2 \rightarrow RES B RES $B \rightarrow WD$

BEQ:-

Op_code	Rb	Ra	IMM-6BIT
15 – 12	11 – 9	8 – 6	5 — 0

JLR:-

Op_code	Ra	Rb	IMM-6BIT
15 – 12	11 – 9	8 – 6	000000

J-Type instruction:-

LHI:-

Op_code	Ra	IMM-9BIT
15 – 12	11 – 9	8 – 0

PC
$$\rightarrow$$
 MEM \rightarrow IR
PC \rightarrow PC+1

$$\downarrow$$
S13

IR(8-0) \rightarrow SE16 \rightarrow S7 \rightarrow RF_WD
IR(11-9) \rightarrow RF_A3

JRI:-

Op_code	Ra	IMM-9BIT
15 – 12	11 – 9	8 – 0

PC
$$\rightarrow$$
 MEM \rightarrow IR
PC \rightarrow PC+1

$$\downarrow$$
S14

IR(11-9) \rightarrow RF_A2
IR(8-0) \rightarrow SE16 \rightarrow ALU_B
RF_D2 \rightarrow ALU_B
ALU_OUT \rightarrow PC

LM:-

Op_code	Ra	IMM-9BIT	
15 – 12	11 – 9	8 – 0	

SM:-

Op_code	Ra	IMM-9BIT	
15 – 12	11 – 9	8 – 0	

JAL:-

 Op_code
 Ra
 IMM-9BIT

 15 - 12
 11 - 9
 8 - 0

PC \rightarrow MEM \rightarrow IR PC \rightarrow PC+1 \downarrow S11

PC \rightarrow ALU_A
+1 \rightarrow ALU_B
IR(11-9) \rightarrow RF_A3
ALU_OUT \rightarrow RF_WD

S19

 $\begin{array}{c} \mathsf{PC} \to \mathsf{ALU_A} \\ \mathsf{IR}(8\text{-}0) \to \mathsf{SE}16 \to \mathsf{ALU_B} \\ \mathsf{ALU_OUT} \to \mathsf{RES_C} \\ \mathsf{RES_C} \to \mathsf{PC} \end{array}$