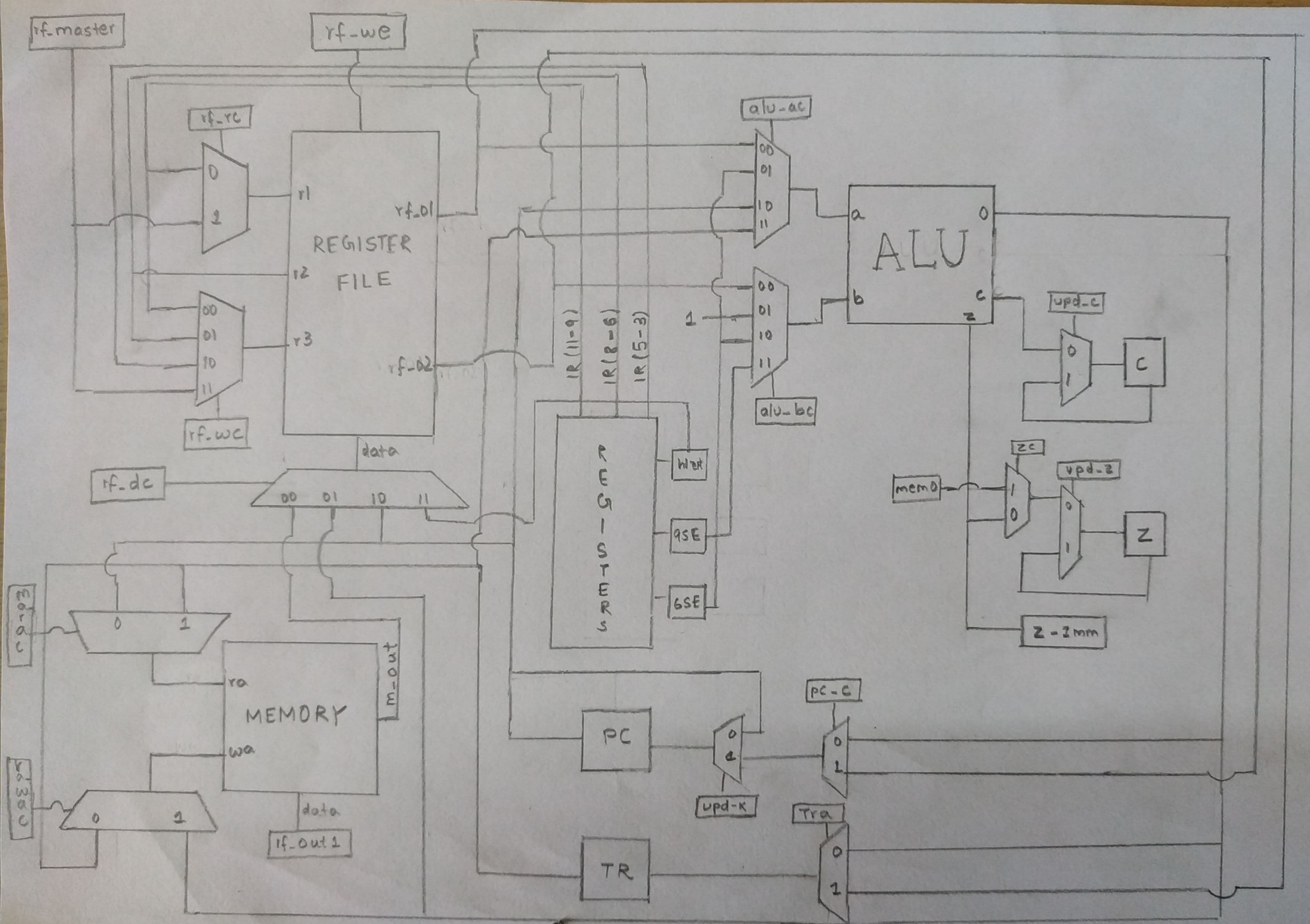
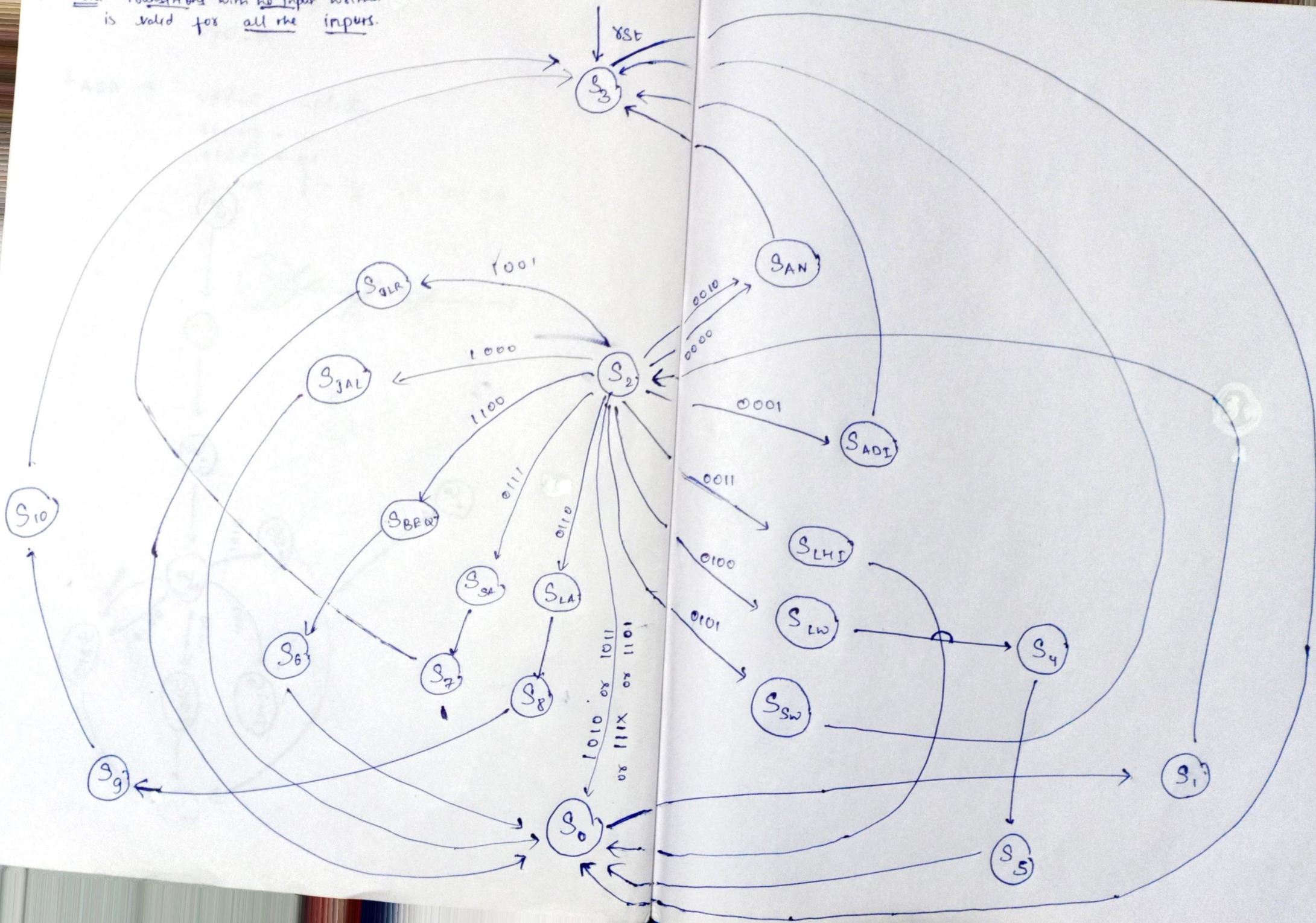


UHCUJHH AHGRRAM



State Diagram

Note: Transitions with no input written is valid for all the inputs.



States in the ~~FSM~~ FSM.

Page No. :

Date :

→ ADD/ADC/ADZ

(S_{ADD}) ⇒ upd-c, upd-z (0000)
 rf-we = 10 alu-op.
 rf-dc = 01
 rf-we } if c & z are set.

→ ADI

(S_{ADI}) ⇒ upd-c, upd-z (0001)
 rf-we = 01
 rf-dc = 01
 rf-we
 alu-bc = 10

(S₃) ⇒ alu-ac = 10
 alu-bc = 01
 upd-pc

NDV → (S_{NDV}) ⇒ upd-z, rf-we (0010)
 NDC
 NDZ rf-we = 10 alu-op
 rf-dc = 01 rf-we.

LHI → (S_{LHI}) ⇒ rf-dc = 11 alu-ac = 10 (0011)
 rf-we alu-bc = 01
 upd-pc.

lw →

 S_{lw}

alu-ac = 01

↗

~~S4~~ S_4

m-rac

→ S_5

alu-ac = 10

alu-bc = 01

upd-pc

~~rt-we~~

rf-we

~~0100~~ 0100

sw →

 S_{sw}

alu-ac = 01

alu-a = 10

alu-bc = 01

m-wac

m-we

upd-pc

 0101

beq →

 S_{beq}

alu-cin

→ S_6 → S_7

alu-ac = 10

upd-pc

 1100 if $Z-imm = 0 \rightarrow$ alu-bc = 01else \rightarrow alu-bc = 10

jal →

 S_{jal}

rf-dc = 10 , rf-we

alu-ac = 10

alu-bc = 11

upd-pc

 1000

SLR \rightarrow S_{SLR} $rd - dc = 10$ $rd - we$ $pc - c$ $upd - pc$ 1001 LA \rightarrow S_{LA} $etc = 1$ 0110 SA \rightarrow S_{SA} $etc = 1$ 0111

PS:

\rightarrow S_{ADD} is equivalent to S_{ND} so we can use S_{AN} as a common state.

\rightarrow These states are the extra states added other than those already in the code.

$$(S_4) \quad m_rac = 1$$

$$(S_5) \quad \begin{aligned} rf_we &= 1 & upd_pc &= 1 \\ zc &= 1 \\ alu_ac &= 10 \\ alu_bc &= 01 \end{aligned}$$

$$(S_6) \quad \begin{aligned} alu_pc &= 10 & alu_bc &= \begin{cases} 10 & \text{if } z_imm = 1 \\ 01 & \text{else} \end{cases} \\ upd_pc &= 1 \end{aligned}$$

$$(S_7) \quad \begin{aligned} rf_rc &= 1 & alu_ac &= 11 \\ m_we &= 1 & alu_bc &= 01 \end{aligned}$$

$$(S_8) \quad \begin{aligned} m_rac &= 1 \\ alu_ac &= 11 \\ alu_bc &= 01 \end{aligned}$$

$$(S_9) \quad \begin{aligned} m_rac &= 1 & rf_we &= 1 \\ alu_ac &= 11 & rf_wc &= 11 \\ alu_bc &= 01 \end{aligned}$$

$$(S_{10}) \quad \begin{aligned} rf_we &= 1 \\ rf_wc &= 11 \end{aligned}$$