STATES

S1
PC → mem-A, alu-A
mem-D → ir
+1 → alu-B
alu-out → PC

S2
ir_{11-9} → rf-a_1
ir_{8-6} → rf-a_2
rf-d_1 → t_1
rf-d_2 → t_2

S_3
t_1 → alu-A
t_2 → alu-B
alu-out → t_3

S_4
ir_{5-3} → rf-A_3
t_3 → rf-D_3

S_5
(shift left)
t_2 → sl → alu-B
t_1 → alu-A
alu-out → t_3

S6
t_1 → alu-A
ir_{5-0} → SE6 → alu-B
alu-out → t_3

S7
t_3 → rf-D_3
ir_{8-6} → rf-A_3

S8
ir_{8-0} → S7 → rf-D_3
ir_{11-9} → rf-A_3

S9
t_2 → alu-A
ir_{5-0} → SE6 → alu-B
alu-out → t_3

S10
t_3 → mem-A
mem-D → t_3

S11
t_3 → rf-D_3
ir_{11-9} → rf-A_3

S12
PC → alu-A
ir_{5-0} → SE6 → alu-B
alu-out → PC

S13
PC → alu-A, t_1
ir_{8-0} → SE9 → alu-B
alu-out → PC

S14
t_1 → alu-A
+1 → alu-B
alu-out → t_3

S15
PC → alu-A
+1 → alu-B
alu-out → t_3

S16
t_3 → rf-D_3
ir_{11-9} → rf-A_3
t_2 → PC

S17
t_1 → alu-A
ir_{8-0} → SE9 → alu-B
alu-out → PC

S18
t_1 → mem-A
mem-D → t_2

S19
t_2 → rf-D3
PE-out → rf-A3
T1 → alu-A
+1 → alu-B
alu-out → T1

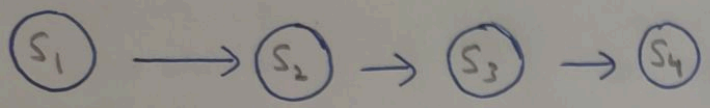
S20
PE-out → rf-a_1
rf-d_1 → T2

S21
T2 → mem-D
t_1 → mem-A, alu-A
+1 → alu-B
alu-out → T2

S22 $t_2 \rightarrow PC$

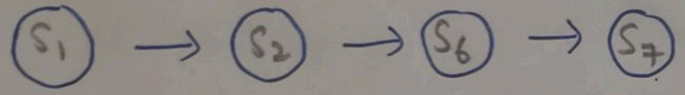
⇒ STATE-TRANSITION-DIAGRAMS ⇐

1. ADD / ADC / ADZ / NDU / NDC / NDZ :



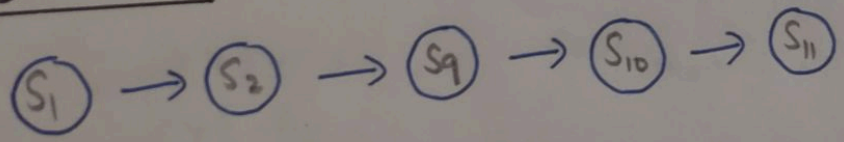
2. ADL :

3. ADI :

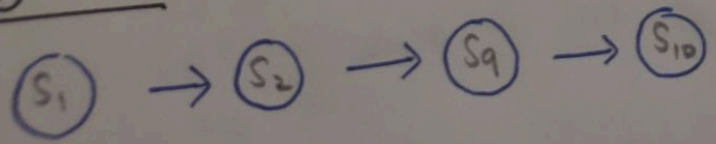


4. LHI :

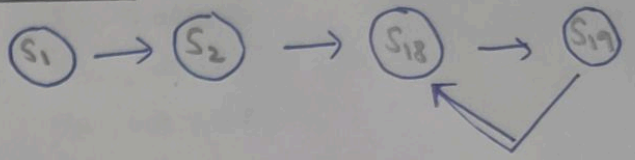
5. LW :



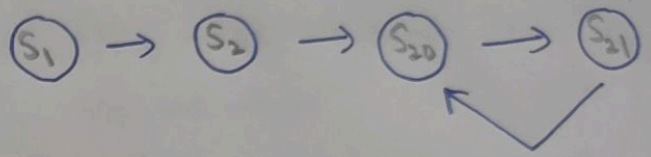
6. SW :



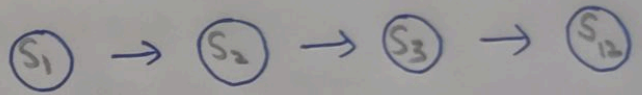
7. LM :



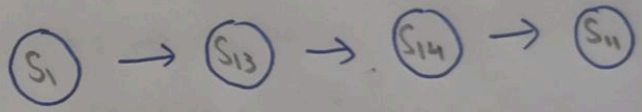
8. SM :



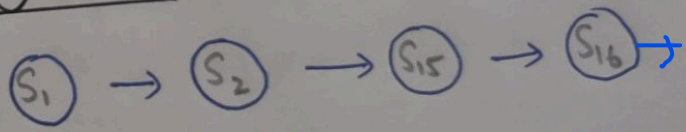
9. BEQ :



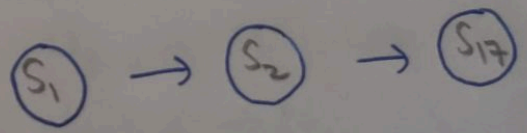
10. JAL :

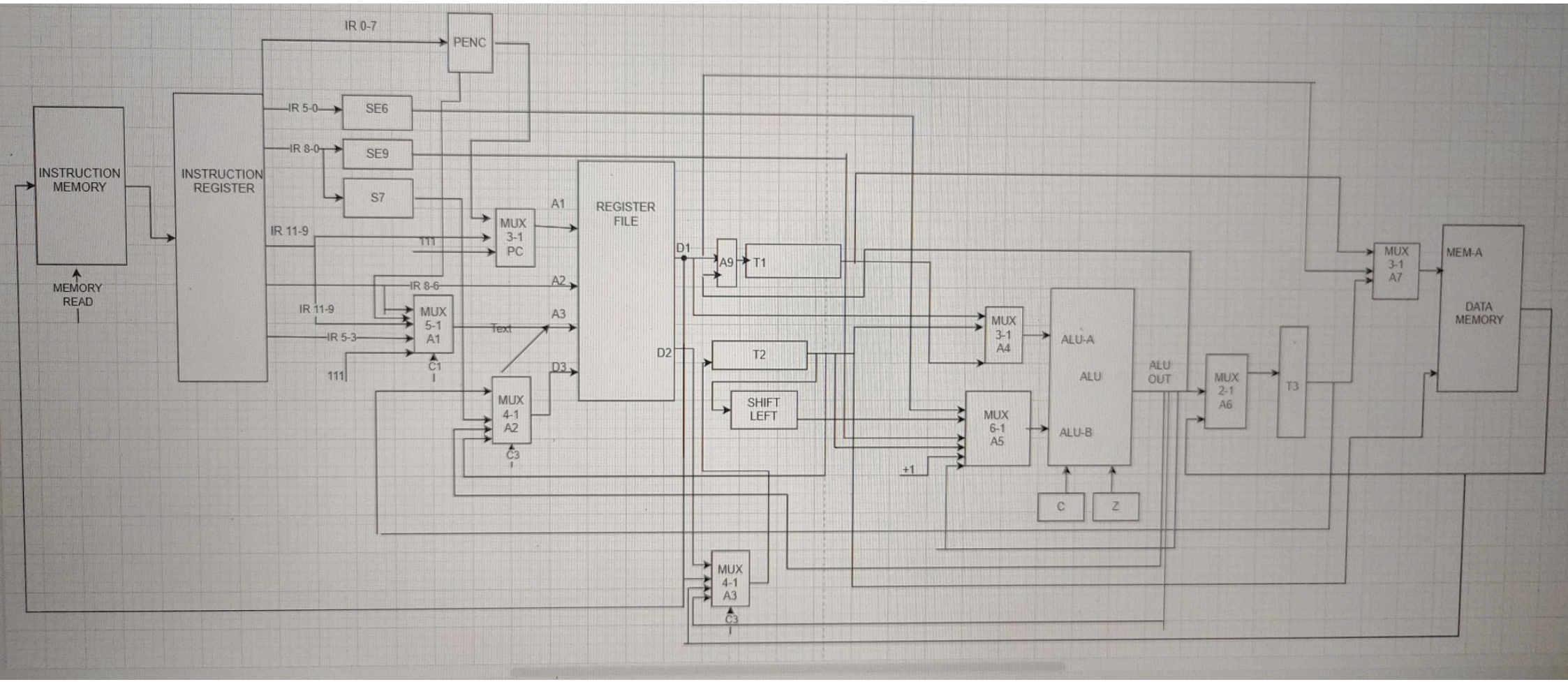


11. JLR :



12. JRI :




IR 0-7
PENC
INSTRUCTION MEMORY
INSTRUCTION REGISTER
IR 5-0
SE6
IR 8-0
SE9
S7
IR 11-9
111
MUX 3-1 PC
A1
REGISTER FILE
D1
A9
T1
MEMORY READ
IR 8-6
A2
IR 11-9
MUX 5-1 A1
Text
A3
IR 5-3
111
C1
D3
D2
T2
MUX 4-1 A2
C3
SHIFT LEFT
MUX 3-1 A4
ALU-A
ALU
ALU-B
MUX 6-1 A5
+1
C
Z
ALU OUT
MUX 2-1 A6
T3
MUX 3-1 A7
MEM-A
DATA MEMORY
MUX 4-1 A3
C3