

Q1) Explain different types of Arithmetic & Logical Instructions. →

Ans → Arithmetic Instructions are used to perform Addition, Subtraction, Increment & decrement operations.

i) ADD → ADD R/m This instruction is used to add given Register Contents to Acc. Reg. & result is automatically stored in Acc. All flags are Modified.

If the operand is m → means the contents of Memory shown by HL Reg. Pair.

Exam ADD B, ADD D, ADD M etc.

ii) ADI (data) → The operand is 8-Bit Data.
Operation $A \leftarrow A + 8\text{Bit Data}$

iii) ADC R/m → Add Reg./mem. with Carry with Accumulator.

iv) DAD Rp → Add Specified Reg. Pair with HL Reg. Pair.

v) SUB R/m → Sub. Reg./mem from Acc.

vi) SUI 8Bit Data → $A \leftarrow A - (8\text{Bit Data}$

vii) SBB R/m → Sub. given Reg./mem. ^{& Borrow Flag (CY)} from Acc.

- (vii) INR R \rightarrow Increase given Reg. contents by 1.
- (vii) INX Rp \rightarrow Increases given Reg. Pair contents by 1.
(Rp is H, B, D)
- (viii) DCR R/m \rightarrow Decreases given R/m by 1.
- (viii) DCX Rp \rightarrow Decreases given Reg. Pair by 1.

② Logical Instructions \rightarrow These instructions are used to perform logical, Rotate, Compare & complement operations \rightarrow

(i) ANA R/m \rightarrow Logical And given Reg. or Memory contents with Acc. & Result is stored into Acc.

(ii) ANI 8Bit Data \rightarrow Logically AND 8Bit Data with Acc. & result is stored in Acc

Example If $A \leftarrow AAH$

ANI 0FH

$$\begin{array}{r} \text{AND} \quad 10101010 \\ \quad \quad 00001111 \\ \hline \quad \quad 00001010 \rightarrow 0AH \end{array}$$

$A \leftarrow 0AH$

- (iii) XRA R/m \rightarrow Logically XOR R/m with Acc.
- (iv) ORA R/m \rightarrow " OR " " "
- (v) XRI 8Bit data " XOR 8Bit data " "
- (vi) ORI " \rightarrow " OR " " "

(vii) CMP R/m \rightarrow Compare given Reg/m with Acc.
as follows \rightarrow

Internally perform $A - B$ operation

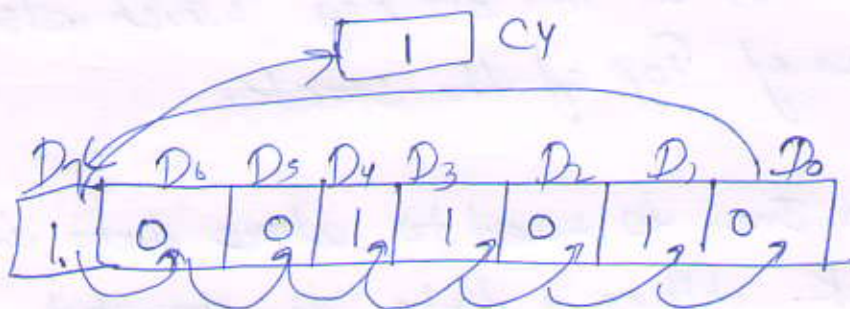
(a) If $A > B$	$\xrightarrow{\text{Carry flag}}$ $CY = 0$	$\xrightarrow{\text{zero flag}}$ $Z = 0$
(b) If $A < B$	$CY = 1$	$Z = 0$
(c) If $A = B$	$CY = 0$	$Z = 1$

Other Ins. \rightarrow CMC, CMA etc.

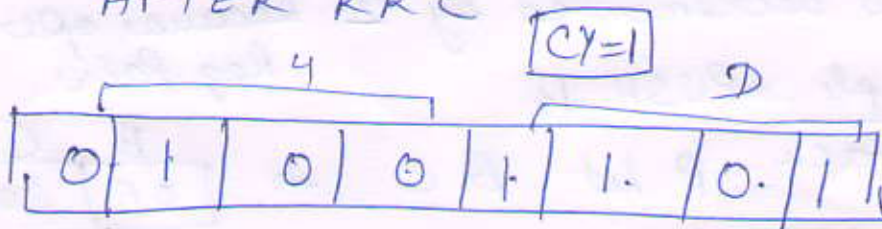
(viii) Rotate \rightarrow

RLC \rightarrow Rotate Left \bar{C} out Carry
 RRC \rightarrow Rotate Right \bar{C} out Carry
 RAL \rightarrow " Left with Carry
 RAR \rightarrow " Right " " "

Example \rightarrow RRC Let $A = 9AH$ $CY = 1$
 $A = 1001\ 1010$



AFTER RRC

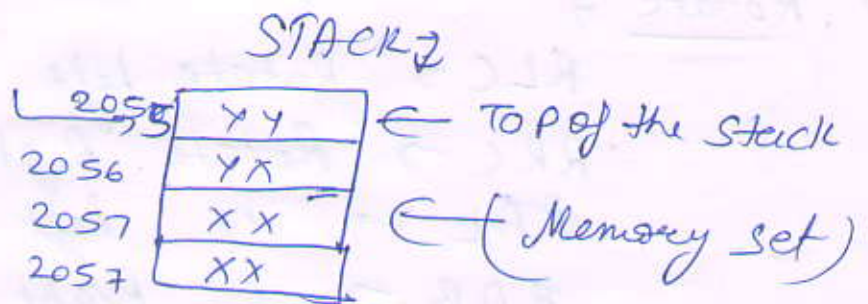


$A \leftarrow 4DH$

Q2) What is Stack? Explain PUSH & POP instructions using examples.

Ans → Stack is a portion of R/W Memory set used to store data temporarily. It works on LIFO (Last in first out process).

PUSH & POP are used to store & fetch Data from a stack.



Stack Pointer

SP 2055

SP is a 16-bit Reg. which stores the address of Top of the stack.

PUSH → Push Ins. is used to store data into the stack. When a data is stored SP is decremented by 2 because operand is Reg. Pair.

Example → PUSH B

For above stack B let B C →

B	C
0F	20

After PUSH



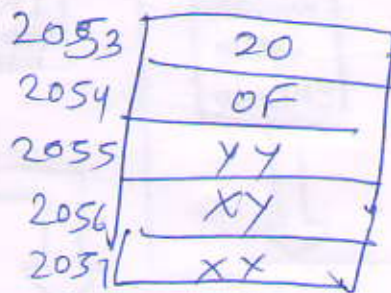
Now
SP ← 2053H

POP → This Insn. Copies the ^{Data of} Top of stack into lower byte of given R_p & ~~the~~ SP by one. After then again data of ~~SP~~ ^{SP} ~~at~~ top of stack is copied into higher order ~~to~~ Reg. & SP is ~~to~~ ^{to} ~~be~~ ^{de} incremented by 1. Finally we can say After POP SP is ~~to~~ ^{de} incremented by 2.

For above example

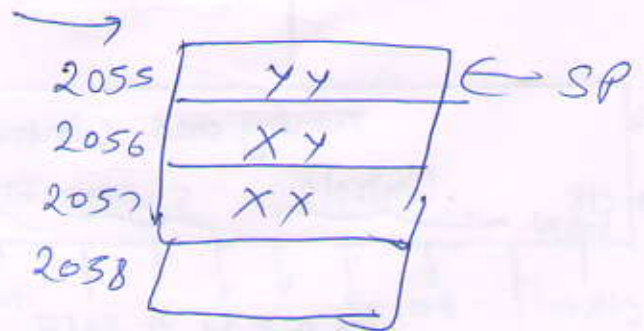
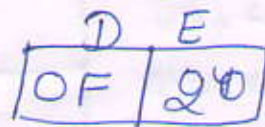
Let D →

D	E
05	04



← SP

After POP D



← SP

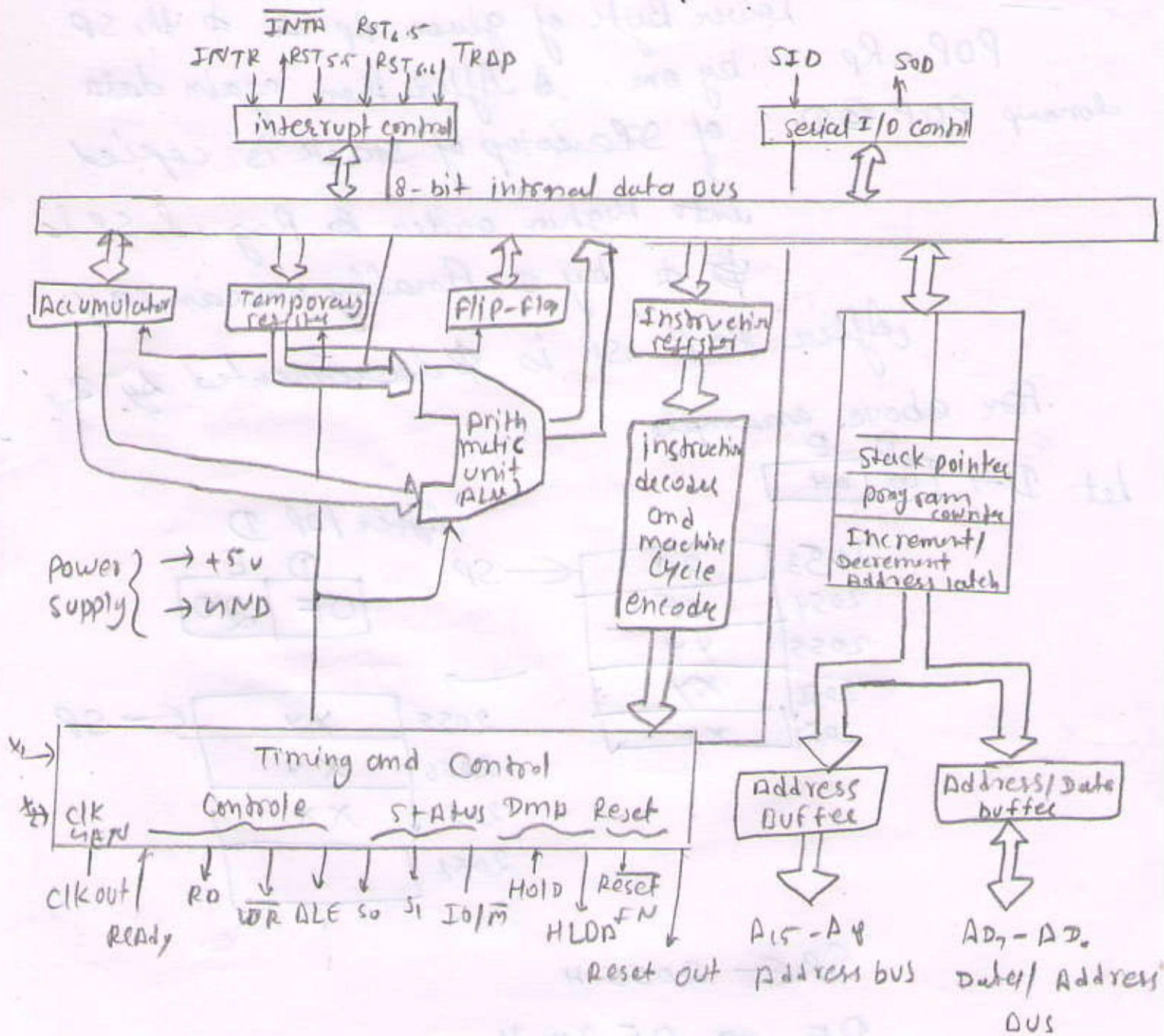
SP ← 2055 H

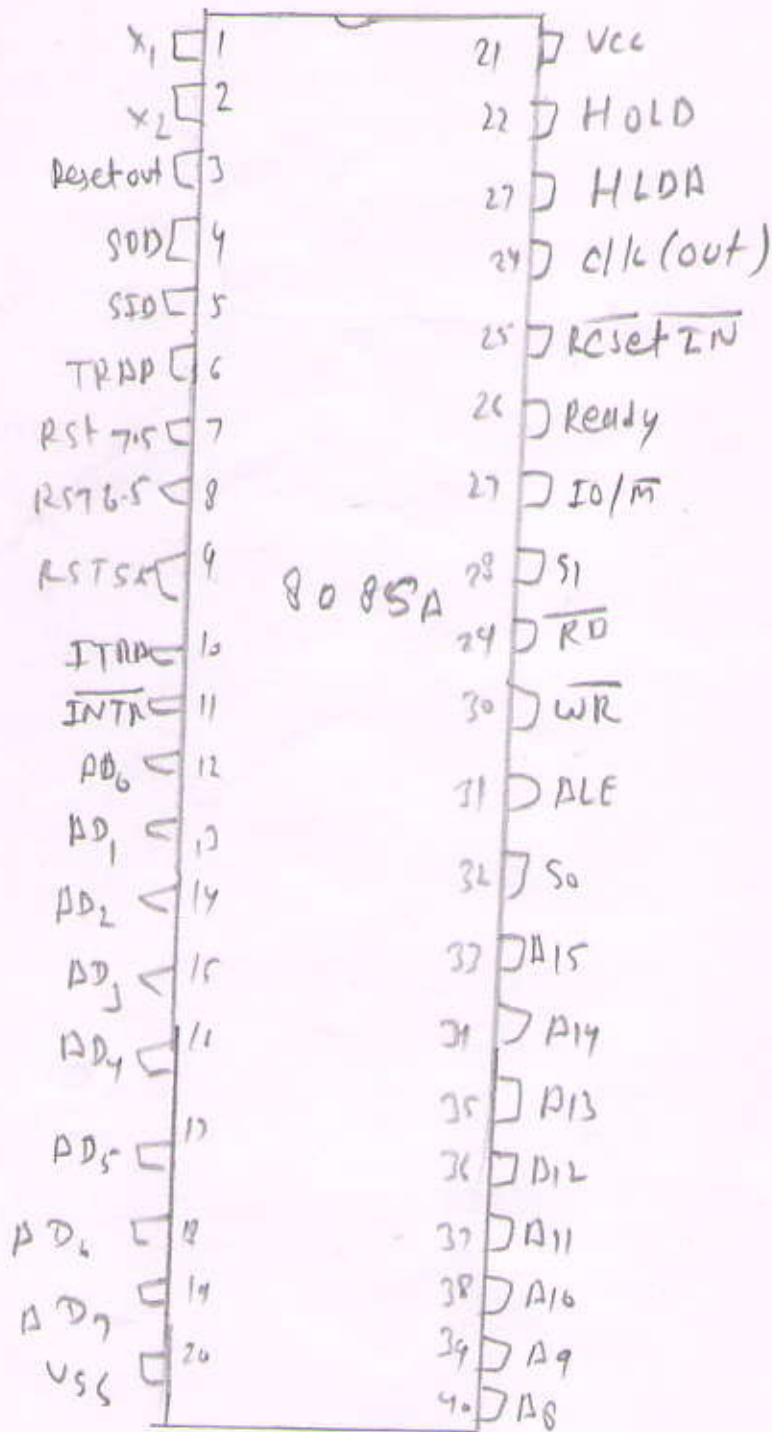
DE → 0F20 H

PUSH/POP PSW → PSW means Programme Status Word. This is used to PUSH or POP as usually from or into stack PSW →

PSW = Accumulator + Flag

Q(3) Draw the Block Diag. & PIN Diag. of 8085 MP.





pin configuration