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1- a SPHL instruction copies the content of HL register pair to the stack pointer. It means SP will now point to memory location whose address was given in the HL register pair.

e.g. If $HL = 2030H$ then SPHL; This instruction will copy $2030H$ into SP. So SP will point to memory location $2030H$.

XTHL This instruction exchanges the content of the memory location pointed by stack pointer with the contents of the L register and contents of the next memory location with the content of H register.

e.g. if $HL = 5601H$, $SP = 2000H$, $(2000H) = 30H$ and $(2001H) = 20H$ then

XTHL; This instruction will exchange the contents of memory location $2000H$ i.e. $30H$ with contents of L register i.e. $01H$ and content of $2001H$ memory location i.e. $20H$ with H register i.e. $56H$.

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- ④ a - (ii) AC flag is used in BCD number system (0-9). If after any arithmetic operation D(3) generates any carry and passes on to B(4) this flag becomes set i.e. 1

e.g. MOV A 2BH (load 2BH in reg A)
 MOV B 39H (load 39H in reg B)
 ADD B (A = A + B)

These set of instruction will set the auxiliary carry flag to 1, as on adding 2B and 39, addition of lower order nibbles B and 9 will generate a carry

- ④ (iii) we can use rotate left in a program to reverse 16 bit number

e.g. LHLD 2050
 MOV A, L
 RLC shift content of A left by 1 bit
 MOV L, A without carry
 MOV A, H
 RLC
 MOV H, L
 MOV L, A
 SHLD 2050
 HLT

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a- i. ① "JMP 4000H" will unconditionally jump to the memory address 4000H and then RET is used to return.

1-6 The CC instruction i.e. the call if carry instruction has 3 bytes for the memory.

In the question given we have memory

2007 CC NEW

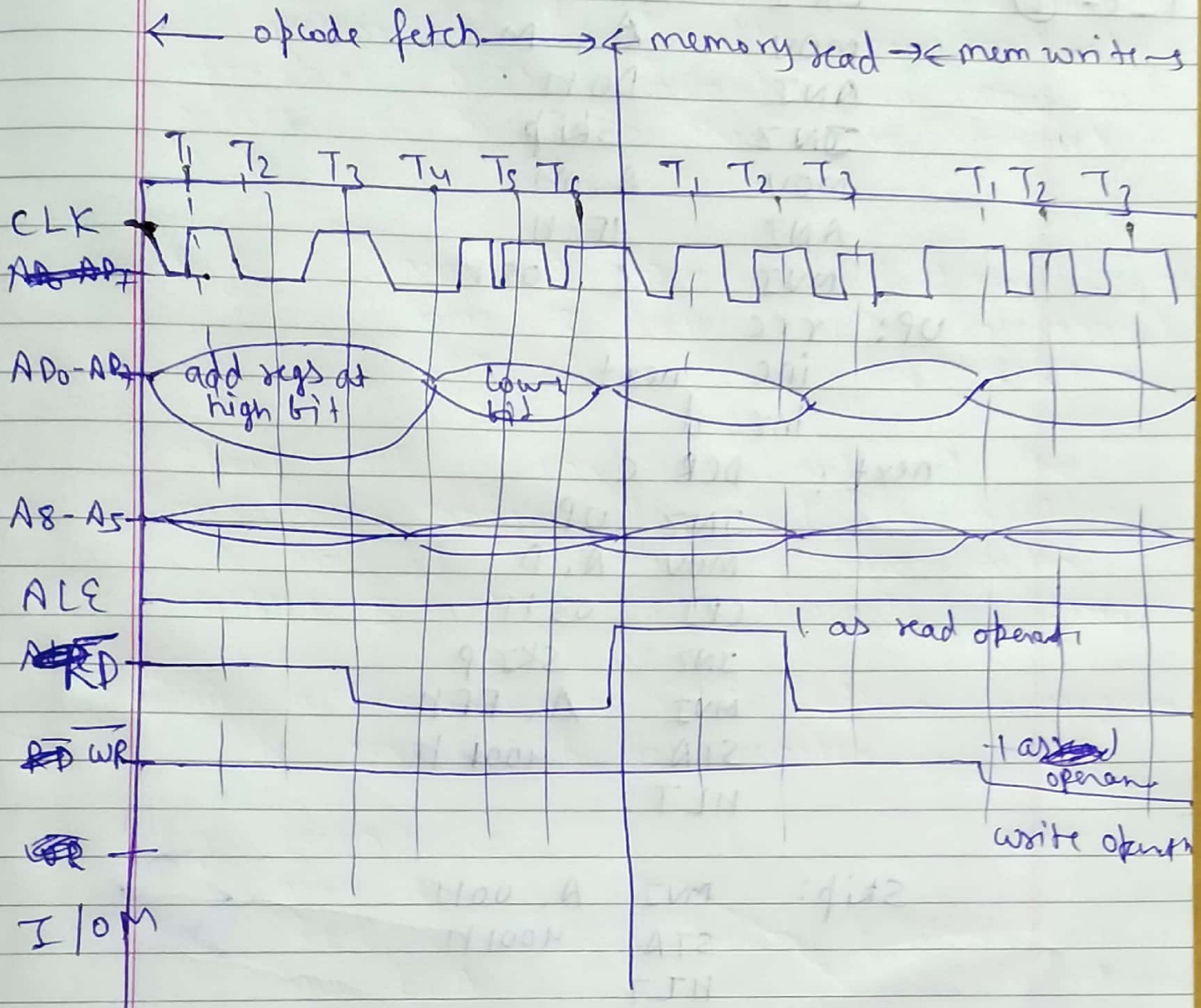
NEW;

we have at 2003 LXI B, FF7AH
MOV A, C
ADD B
CC NEW

The LXI B will store value 7A in C and FF in B register from here. MOV A, C will make value of A as 7A & after adding B i.e. FF, this will cause a carry $Cy = 1$

So the program jumps to label for this the opcode of CC is decoded
This timing diagram is

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We have 2 memory read cycle (only) (shown)
and 2 memory write

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1-C ①

LXI H, 4000H

MOV A, M

ANI 00H

~~JNZ~~ skip

MOV A, M

ANI 0FH

MVI C, 08H

UP: rrc

inc next

inc d

next: DCR C

JNZ UP

MOV A, D

CPI 03H

JNZ skip

MVI A, FFH

STA 4000H

HLT

skip: MVI A, 00H

STA 4001H

HLT



C - ii Lxi h, 30ff h
 mov c, m
 Lxi h, 4000h
 mov a, m
 inx h
 cmp m

