Q1 Add A0H to E2H & store result in Memory address 2050 H & if There is any borrow (carry) store in 2051 H.

Address	Mnemonics	Opcode	Operand	Remarks
2100	MVI A, E2H	3E	E2	(A) ← (E2)
2102	MVI B, A0H	06	A0	(B) ← A0
2104	ADD B	81	—	(A) ← (A) + (B)
2105	STA 2050	32	50,20	(A) → (2050)
2108	MVI A, 00H	3E	00	(A) ← 00
210A	ADC A	8F	—	(A) ← (A) + (A) + cy
210B	STA 2051	32	51,20	(A) → (2051)
210E	RST 5	EF		

Algorithm :-

1. Move E2H to Register A (accumulator)

2. Move A0H to Register B.

3. Add the contents of B (A0H) to contents of A (E2H) & store in A

4. Store contents of A in memory address 2050.

5. Empty A i·e store 00H in A

6. Add content of A with it self and with carry flag.

7. Store content of A in Memory address 2051

2. Subtraction A0H from E2H store the result in memory address 2050H & if there is any borrow storing in 2051 H.

Address	Mnemonics		Opcode	Operand	Remarks
2100	MVI	A, E2H	3E	E2	$\langle A \rangle \leftarrow E_2$
2102	MVI	B, A0H	D6	A	$\langle B \rangle \leftarrow A0$
2104	SUB	B	90	—	$\langle A \rangle \leftarrow \langle A \rangle - \langle B \rangle$
2105	STA	2050	32	50, 20	$\langle A \rangle \leftrightarrow (2050)$
2108	MVI	A, 00H	3E	0	$\langle A \rangle \leftarrow 00$
210A	ADC	A	8F	—	$\langle A \rangle \leftarrow \langle A \rangle + \langle A \rangle + cy$
210B	STA	2051	32	51, 20	$\langle A \rangle \leftrightarrow (2051)$
210E	RST	5	EF	—	

Algo:-

1. Move E2H to register A (accumulator)

2. Move A0H to register B.

3. Subtract the contents of B(A0H) from Contents of A(E2H) & store in A.

4. Store contents of A in memory address 2050

5. Empty A i.e store 00H in A.

6. Add content of A with itself and with carry flag

7. Store content of A in memory Address 2051

3. Perform OR, AND & EX-OR on memory Address 2500H & 2501 H containing f5 & 36 Respectively.

Address	Mnemonics	Opcode	Operand	Remarks
2100	LDA 2500	3A	00, 25	$(A) \leftarrow (2500)$
2103	MOV C, A	4F	—	$(C) \leftarrow (A)$
2104	LDA 2501	3A	01, 25	$(A) \leftarrow (2501)$
	OR			
2107	ORA C	81	—	$(A) \leftarrow (A) OR (C)$
2108	STA 2600	32	00, 26	$(2600) \leftarrow (A)$
210 B	LDA 2501	3A	01, 25	$(A) \leftarrow (2501)$
	AND			
210 E	ANA C	A1	—	$(A) \leftarrow (A) AND (C)$
210 F	STA 2601	32	01, 26	$(2601) \leftarrow (A)$
2112	LDA 2501	3A	01, 25	$(A) \leftarrow (2501)$
	EX-OR			
2115	XRA C	A9	—	$(A) \leftarrow (A) XOR (C)$
2116	STA 2602	32	02, 26	$(2602) \leftarrow (A)$
2119	RST 5	EF		

Algo:-

1. Load content of 2500 in A.

2. Move content of A to C

3. Load content of 2501 in A.

OR

4. Store the result OR operation b/w content of C & A in A

5. Store content of A in 2600.

6. Load content of 2501 back in A for next operation

AND

7. Store the result of AND operation b/w contents of C & A in A.

8. Store content of A in 2601

9. Load content of 2501

Ex-oR

10. Store the result of Ex-OR operation b/w contents of C & A in A.

11. Store content of A in 2602

4. Perform 16-bit addition b/w memory address (2520, 2521) & (2522, 2523) and store the result in (2620, 2621) and carry in 2622.

Address	Mnemonics	Opcode	Operand	Remarks
2700	LHLD 2520	2A	20, 25	$\langle L \rangle \leftarrow (2520)$ $\langle H \rangle \leftarrow (2521)$
2703	XCHG	EB	—	$\langle HL \rangle \leftrightarrow \langle DE \rangle$
2704	LHLD 2522	2A	22, 25	$\langle L \rangle \leftarrow (2522)$ $\langle H \rangle \leftarrow (2523)$
2707	MOV A, E	7B	—	$\langle A \rangle \leftarrow \langle E \rangle$
2708	ADD L	85	—	$\langle A \rangle \leftarrow \langle A \rangle + \langle L \rangle$
2709	STA 2620	32	20, 26	$\langle A \rangle \leftrightarrow (2620)$
270C	MOV A, D	7A	—	$\langle A \rangle \leftarrow \langle D \rangle$
270D	ADC H	8C	—	$\langle A \rangle \leftarrow \langle A \rangle + \langle H \rangle - cy$
270E	STA 2621	32	21, 26	$\langle A \rangle \rightarrow (2621)$
2711	MVI A, 00H	3E	00	$\langle A \rangle \leftarrow 00H$
2713	ADC A	8F	—	$\langle A \rangle \leftarrow \langle A \rangle + \langle A \rangle + cy$
2714	STA 2622	32	22, 26	$\langle A \rangle \rightarrow (2622)$
2717	RST 5	EF		

Algo:-

1. Load contents of memory address 2520 & 2521 in HL pair.

2. Exchange contents of HL & DE pairs

3. Load contents of 2522 & 2523 in HL pair.

4. Copy contents of A(E) & L and same in A

5. Copy contents E to A

6. Store result in 2620

7. Copy contents of D to A

8. Add contents of H, A & carry and store in A

9. Store result in 2621

10. Clear A.

11. get carry in A

12. store contents of A (carry) in 2622.

5. Perform 16-bit substraction b/w address (2520, 2521) & (2522, 2523) and store the result in (2620, 2621) and carry in 2622.

Address	Mnemonics	Opcode	Operand	Remarks
2700	LHLD 2520	2A	20, 25	$(L) \leftarrow (2520)$ $(H) \leftarrow (2521)$
2703	XCHG	EB	—	$(HL) \leftrightarrow (DE)$
2704	LHLD 2522	2A	22, 25	$(L) \leftarrow (2520)$ $(H) \leftarrow (2521)$
2707	MOV A, E	7B	—	$(A) \leftarrow (E)$
2708	SUB L	95	—	$(A) \leftarrow (A)(L)$
2709	STA 2620	32	20, 26	$(A) \rightarrow (2620)$
270C	MOV A, D	7A	—	$(A) \leftarrow (D)$
270D	SBB H	9C	—	$(A) \leftarrow (A) - (H) - cy$
270E	STA 2621	32	21, 26	$(A) \rightarrow (2621)$
2711	MVI A, 00H	3E	00	$(A) \leftarrow 00H$
2713	SBB A	9F	—	$(A) \leftarrow (A) - (A) - cy$
2714	STA 2622	32	22, 26	$(A) \rightarrow (2622)$
2717	RST 5	EF		

Algo:-

1. Load 2520 & 2521 in HL pair.

2. exchange HL & DE pair.

3. Load 2522 & 2523 in HL pair

4. copy E to A

5. subtract L from A & store in A.

6. Store Result in 2620

7. copy contents D to A

8. subtract H & carry from A

9. Store result in 2621

10. clear A

11. get carry (Borrow) in A

12. Store A (Borrow) in 2622.

6. Perform addition of n 8-bit No. stored from memory address 2001 & n is stored in 2000 store the result in 2300 & 2301.

Address	Mnemonics	Opcode	Operand	Remarks
3000	MVI A,00H	3E	00	(A) ← 00H
3002	LXI H,2000	21	00,20	(HL) ← (2000)
3005	MOV C,M	4E	—	(C) ← (M)
3006	INX H	23	—	(H) ← (H) +1
3007	ADD M	86	—	(A) ← (A) + (M)
3008	DCR C	0D	—	(C) ← (C) −1
3009	INX H	23	—	(H) ← (H) +1
300A	ADC M	8E	—	(A) ← (A) + (M) + CY
300B	DCR C	0D	—	(C) ← (C) −1
300C	JNZ 3009	C2	09, 30	Jmp to 3009 if (C) ≠ 0
300F	STA 2300	32	00, 23	(A) → (2300)
3012	MVI A,00H	3E	00	(A) ← 00H
3014	ADC A	8F	—	(A) ← (A) + (A) + CY
3015	STA 2301	32	01, 23	(A) → (2301)
3018	RST 5	EF		

Algorithm:-

1. clear A

2. copy address 2000 to HL pair.

3. copy M (content of address currently stored in HL) to C.

4. Increment H is point to next number / value / address.

5. copy M to A (can be done by addition)

6. Decrement C

7. Increment H

8. Add M & carry to A

9. Decrement C

10. keep repeating step 7,8,9, till C becomes 0

11. store the result (currently in A) to 2300

12. clear A

13. get carry in A

14. store carry in 2301.

Q7 Perform multiplication on two 8bit no.s:-

Address	Mnemonics	opcode	operand	Remarks
2000	LDA 3000	3A	00, 30	(A) ← (3000)
2003	MOV B,A	47	___	(B) ← (A)
2004	LDA 3500	3A	00, 35	(A) ← (3500)
2007	MOV C,A	4F	___	(C) ← (A)
2008	MVI A,00H	3E	0 0	(A) ← 00
200A	ADD B	81	___	(A) ← (A)+(B)
200B	DCR C	0D	___	(C) ← (C) -1
200C	JNZ 200C	88	___	(A) ← (A) +(B) +Cy
200E	JNZ 200C	0D	___	(C) ← (C) -1
2011	STA 3600	C2	0C, 20	Jump to 200c il C≠0
2014	MVI A,00H	3E	00,36	(A) → (3600)
2016	ADC A	8F	0 0	(A) ← 00
2017	STA 3601	32	___	(A) ← (A) +(A) +Cy
			01, 36	(A) → (3601)
201A	RST 5	EF	___	

Algorithm:-

1. Load register   with the number to multiply
2. Move B to A
3. Decrease C
4. Add A,B,& carry (if any)
5. Decrease C.
6. If C≠0, go to step 4.
7. Store the answer (A) in 3600
8. Store the carry in 3601

08 Divide and 8-bit no. by another.

Address	Mnemonics	Opcode	operand	Remarks
2000	LXI H, 2100	21	00, 21	$(HL) \leftarrow (2100)$
2003	MVI C, 00H	0E	00	$(C) \leftarrow 00H$
2005	MOV A, M	7E	—	$(A) \leftarrow (M)$
2006	INX H	23	—	$(H) \leftarrow (H) + 1$
2007	MOV B, M	46	—	$(B) \leftarrow (M)$
2008	CMP B	B8	—	compare to (A) & (B)
2009	JC 2013	DA	13, 20	Jump to (2013) if $C_y = 1$
200C	SUB B	90	—	$(A) \leftarrow (A) - (B)$
200D	INR C	0C	—	$(C) \leftarrow (C) + 1$
200E	JMP 2008	C3	08, 20	$(H) \leftarrow (H) + 1$
20011	INX H	E3	—	$(M) \leftarrow (A)$
2012	MOV M, A	77	—	$(H) \leftarrow (H) + 1$
2013	INX H	23	—	$(M) \leftarrow (C)$
2014	MOV M, C	71	—	
2015	RST 5	EF		

Algorithm:—

1. Using HL pair point to 2100 Memory location.
2. clean C
3. copy M C to which HL pair in currently pointing to) to A.
4. increment H.C point to next location)
5. copy M to B
6. compare As' B's contents. if $A < B$, $C_y = 1$ & $Z = 0$; if $A == B$, $C_y = 0$, $Z = 1$ and if $A > B$, $y = 0$, $Z = 0$.
7. if $C_y = 1$ (ie $A < B$), jump to memory location 2013 (go to step 11).
8. Subtract B from A & same in A
9. increment C
10. go to step 6
11. point to next of HL
12. store contents of A in M
13. point to next of HL
14. store contents of C in M