1. **Write an ALP to load register B with data 14H, register C with FFH, register D with 29H and register E with 67H.**

```
MVI B, 14H

MVI C, FFH

MVI D, 29H

MVI E, 67H

HLT
```

2. **Write an ALP to transfer data from register B to C.**

```
MVI B, 55H

MOV C, B

HLT
```

3. **Write an ALP to store data of register B into memory location 2050H.**

```
MVI B, 67H

MOV A, B

STA 2050H ; Store data of  Accumulator at memory location 2050H

HLT
```

4. **write an ALP which directly store data 56H into memory location 2050H.**

```
LXI H, 2050H

MVI M, 56H

HLT
```

5. **Write an 8085 assembly language program for exchanging two 8-bit numbers stored in memory locations 2050h and 2051h.**

```
LDA 2050H

MOV B, A

LDA 2051H

STA 2050H

MOV A, B

STA 2051H

HLT
```

6. **Write an ALP to interchange 16-bit data stored in register BC and DE.**

WITHOUT XCHG INSTRUCTION

```
MOV H, B
```

```
MOV L, C

MOV B, D

MOV C, E

MOV D, H

MOV E, L

HLT
```

WITH XCHG INSTRUCTION

```
MOV H, B

MOV L, C

XCHG    ; The contents of register H are exchanged with the contents of register D, and the

        ; contents of register L are exchanged with the contents of register E.

MOV B, H

MOV C, L

HLT
```

7. Write the set of 8085 assembly language instructions to store the contents of B and C registers on the stack.

```
MVI B, 50H

MVI C, 60H

PUSH B

PUSH C

HLT
```

8. Write an ALP to delete (Make 00H) the data byte stored at memory location from address stores in register DE.

```
MVI A, 00H

STAX D

HLT
```

9. Write an 8085 assembly language program to add two 8-bit numbers stored in memory locations 2050h and 2051h. Store result in location 2052h.

```
LXI H 2050H

MOV A M

INX H

ADD M
```

```
INX H

MOV M A

HLT
```

10. Subtract 8 bit data stored at memory location 2050H from data stored at memory location 2051H and store result at 2052H.

```
LXI H 2050H

MOV A M

INX H

SUB M ;  A = A - M

INX H

MOV M A

HLT
```

11. Write an 8085 assembly language program to add two 16-bit numbers stored in memory.

```
LHLD 2050H

XCHG        ; The contents of register H are exchanged with the contents of register D, and the

            ; contents of register L are exchanged with the contents of register E.

LHLD 2052H

MOV A E

ADD L

MOV L A

MOV A D

ADC H

MOV H A

SHLD 2054H ; Store Value of L Register at 2054 and value of H register at 2055.

HLT
```

12. Write an 8085 assembly language program to find the number of 1's binary representation of given 8-bit number.

```
MVI B 00H

MVI C 08H

MOV A D
```

```
BACK: RAR ; Rotate Accumulator Right through carry flag.
JNC SKIP
INR B
SKIP: DCR C ; Increment of B will skip.
JNZ BACK
HLT
```

13. Implement the Boolean equation D= (B+C) · E, where B, C, D and E represents data in various registers of 8085.

```
MOV A B
ORA C
ANA E
MOV D A
HLT
```

14. Write an 8085 assembly language program to add two decimal numbers using DAA instruction.

```
LXI H 2050H
MOV A M
INX H
MOV B M
MVI C 00H
ADD B
DAA ; Decimal adjustment of accumulator.
JNC SKIP
INR C
SKIP: INX H ; Increment of C will skip.
MOV M A
INX H
MOV M C
HLT
```

15. Write an 8085 assembly language program to find the minimum from two 8-bit numbers.

```
LDA 2050H
MOV B A
LDA 2051H
CMP B
JNC SMALL
STA 2052H
HLT
SMALL: MOV A B
STA 2052H
HLT
```

16. Write an 8085 program to copy block of five numbers starting from location 2001h to locations starting from 3001h.

```
LXI D 3100H
MVI C 05H
LXI H 2100
LOOP: MOV A M
STAX D
INX D
INX H
DCR C
JNZ LOOP
HLT
```

17. An array of ten data bytes is stored on memory locations 2100H onwards. Write an 8085 assembly language program to find the largest number and store it on memory location 2200H.

```
LXI H 2100H
MVI C 0AH
MOV A M
DCR C
LOOP: INX H
```

```
CMP M     ; Compare Data of accumulator with the data of memory location specified by HL pair and
          ; set flags accordingly.
JNC AHED
MOV A M
AHED: DCR C
JNZ LOOP
STA 2200H
HLT
```

18. Write an 8085 assembly language program to add block of 8-bit numbers.

```
LXI H 2000H
LXI B 3000H
LXI D 4000H
BACK: LDAX B
ADD M
STAX D
INX H
INX B
INX D
MOV A L
CPI 0A
JNZ BACK
HLT
```

19. Write an 8085 assembly language program to count the length of string ended with 0dh starting from location 2050h (Store length in register B).

```
LXI H 2050H
MVI B 00H
BACK: MOV A M
INR B
INX H
CPI 0DH
```

```
JNZ BACK

DCR B

HLT
```

20. An array of ten numbers is stored from memory location 2000H onwards. Write an 8085 assembly language program to separate out and store the EVEN and ODD numbers on new arrays from 2100H and 2200H, respectively.

```
LXI H 2000H

LXI D 2100H

LXI B 2200H

MVI A 0AH

COUNTER: STA 3000H

MOV A M

ANI 01H

JNZ CARRY

MOV A M

STAX B

INX B

JMP JUMP

CARRY: MOV A M ; This block will store Odd numbers.

STAX D

INX D

JUMP: LDA 3000H

DCR A

INX H

JNZ COUNTER

HLT
```

21. An array of ten data bytes is stored on memory locations 2100H onwards. Write an 8085 assembly language program to find the bytes having complemented nibbles (e.g. 2DH, 3CH, 78H etc.) and store them on a new array starting from memory locations 2200H onwards.

```
LXI H 2100H

LXI D 2200H
```

```
MVI C 0AH
LOOP: MOV A M
ANI 0FH
MOV B A
MOV A M
ANI F0H
RRC
RRC
RRC
RRC
CPM B
JNZ NEXT
MOV A M
STAX D
INX D
NEXT: INX H
DCR C
JNZ LOOP
HLT
```

22. Write an 8085 assembly language program to count the positive numbers, negative numbers, zeros, and to find the maximum number from an array of twenty bytes stored on memory locations 2000H onwards. Store these three counts and the maximum number on memory locations 3001H to 3004H, respectively.

```
LXI H 2000
MVI C 14
MVI D 00
MVI B 00
MVI E 00
LOOP: MOV A M
CMP B
```

```
JC NEG
JNZ POS
INX H
DCR C
JNZ LOOP
JMP STORE

NEG: INR D ; Count Negative number
INX H
DCR C
JNZ LOOP
JMP STORE

POS: INR E ; Count Positive number
INX H
DCR C
JNZ LOOP
JMP STORE

STORE: MOV A E
STA 3001

MOV A D
STA 3002

LXI H 2000
MVI C 14
MVI D 00
MVI B 00
```

```
MVI E 00

LOOP1: MOV A M ; Main Program for count Zero And Find Maximum.
CMP B
JZ ZERO
JNC MAX
INX H
DCR C
JNZ LOOP1
JMP STORE1

ZERO: INR D ; For count Zero
INX H
DCR C
JNZ LOOP1
JMP STORE1

MAX: CMP E ; Find Maximum.
JC SKIP
MOV E A
SKIP: INX H
DCR C
JNZ LOOP1
JMP STORE1

STORE1: MOV A D ; Store Number of zeros
STA 3003
MOV A E
STA 3004 ; Store maximum.
```

```
HLT
```

23. Write an 8085 assembly language program to separate out the numbers between 20_{10} and 40_{10} from an array of ten numbers stored on memory locations 2000H onwards. Store the separated numbers on a new array from 3000H onwards.

```
LXI H 2000

LXI D 3000

MVI C 0A

LOOP: MOV A M

CPI 14

JZ NEXT

JC NEXT

CPI 28

JNC NEXT

STAX D

INX D

NEXT: INX H ; Skip Storing of Number.

DCR C

JNZ LOOP

HLT
```

24. Write an 8085 assembly language program sort an array of twenty bytes stored on memory locations 2000H onwards in descending order.

```
MVI B 14

L2: LXI H 2000

MVI C 13

L1: MOV A M

INX H

CMP M

JC SWAP

bACK: DCR C

JNZ L1
```

```
DCR B
JNZ L2
HLT

SWAP: MOV D M; This block swap values.
MOV M A
DCX H
MOV M D
INX H
JMP BACK
```

25. An array of twenty data bytes is stored on memory locations 4100H onwards. Write an 8085 assembly language program to remove the duplicate entries from the array and store the compressed array on a new array starting from memory locations 4200H onwards.

```
MVI B 14H
MVI C 01H
LXI H 4101H
SHLD 3000H
LDA 4100H
STA 4200H
; This program fetch one by one value from original array and sore it on new array if it is not duplicate.
L1: LHLD 3000H
MOV A M
INX H
DCR B
JZ OVER
SHLD 3000H
LXI H 4200H
MOV D C
L2: CMP M
JZ L1
```

```
INX H
DCR D
JNZ L2
MOV M A
INR C
JMP L1
OVER: HLT
```

26. Write an ALP to Pack the two unpacked BCD numbers stored in memory locations 2200H and 2201H and store result in memory location 2300H. Assume the least significant digit is stored at 2200H.

```
LDA 2201
RLC ; Rotate accumulator left 4 times without carry.
RLC
RLC
RLC
ANI F0
MOV C A
LDA 2200
ADD C
STA 2300
HLT
```

27. Write a set of 8085 assembly language instructions to unpack the upper nibble of a BCD number.

```
MVI A 98
MOV B A
ANI F0
RRC ; Rotate accumulator left 4 times without carry.
RRC
RRC
RRC
STA 2000
```

```
HLT
```

28. Write Assembly language program to subtract 2 16-bit BCD numbers.

```
LXI H 3040

LXI D 1020

MOV A L

SUB E

DAA

STA 2000

MOV A H

SBB D

DAA

STA 2001

HLT
```

29. Write an 8085 assembly language program to continuously read an input port with address 50H. Also write an ISR to send the same data to output port with address A0H when 8085 receives an interrupt request on its RST 5.5 pin.

```
LOOP: IN 50

EI

CALL DELAY

JMP LOOP

HLT

DELAY: NOP

NOP

NOP

NOP

RET


; This code must be write at memory location 002C onwards.

OUT A0

JMP LOOP
```

30. Write an ALP to generate a square wave of 2.5 kHz frequency. Use D_0 bit of output port ACH to output the square wave.

```
MVI A 01H
REPEAT: OUT AC
MVI C Count
AGAIN: DCR C
JNZ AGAIN
CMA
JMP REPEAT
```

Calculation:

$$Time\ period\ of\ square\ wave = \frac{1}{2.5 * 10^3} = 0.4 * 10^{-3}s.$$

$$Time\ period\ of\ upper\ half\ and\ lower\ half\ of\ square\ wave = \frac{0.4 * 10^{-3}s}{2}. = 0.2 * 10^{-3}s.$$

$$let\ processor\ time\ period = 0.3 * 10^{-6}s.$$

$$Delay\ required\ beween\ transition\ of\ square\ wave = \frac{0.2 *\ 10^{-3}}{0.3 * 10^{-6}} \approx 666Tstates$$

Now

$$666 = 7 + (14 * Count) - 3 + 4$$

$$658 = 14 * Count$$

$$Count = 47$$

$$Count = 2FH$$

Final Program:

```
MVI A 01H
REPEAT: OUT AC
MVI C 2F
AGAIN: DCR C
JNZ AGAIN
CMA
JMP REPEAT
```