Total number of printed pages: **6**

Programme (U)/5th Semester/Paper Code: UIE501

2023

Microprocessor & Microcontroller

Full Marks: 100

Time: Three hours

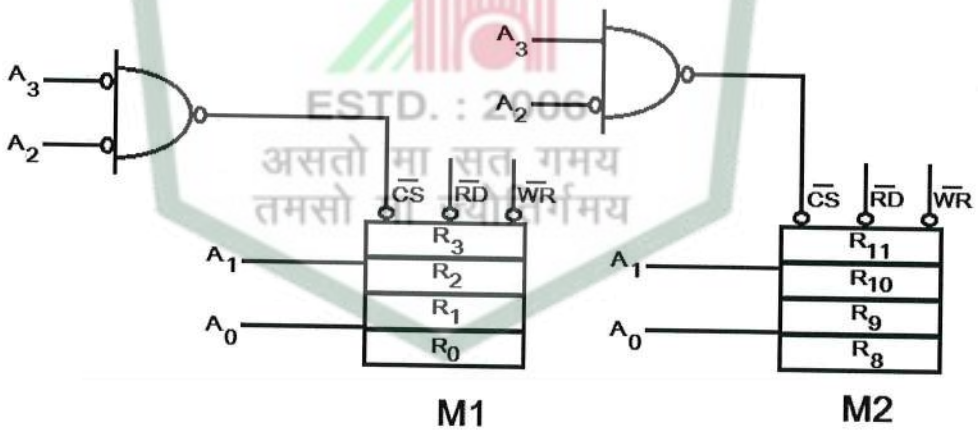
The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) Assemble the following program starting with ML: D123 H. 4

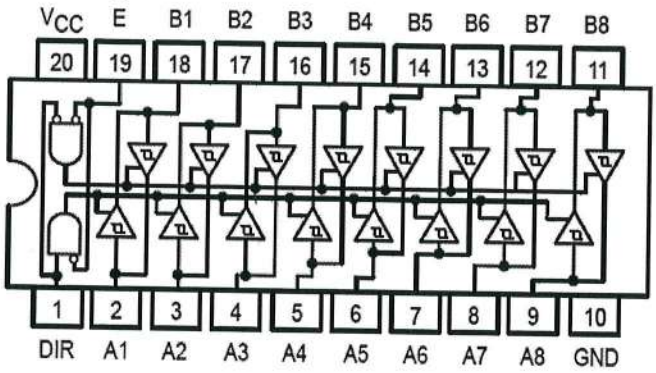
```
LXI SP, FFFE H
LXI H, BCDE H
MOV A, L
ORA H
CMA
NOP
JMP E789 H
```

b) 4



Identify the memory address range for the memory chips M1 and M2.

c) 4



For the bidirectional buffer shown above, complete the operations (data flow direction) in following functional table for the given inputs.

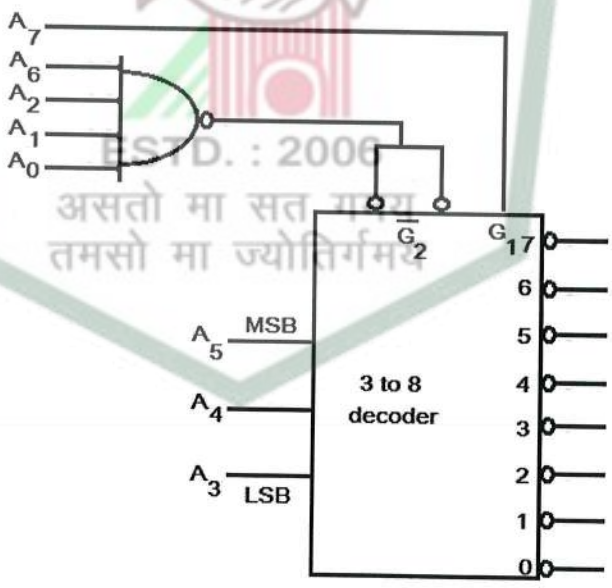
Enable Pin (19)	Direction Control Pin (1)	Operation
Low	Low	?
Low	High	?
High	Low	?
High	High	?

d) Specify the four control signals commonly used by 8085 microprocessor. 4

e) Why are the program counter and stack pointer are 16-bit registers? 2

f) What is the function of $\overline{WR}$ signal on memory chip? 2

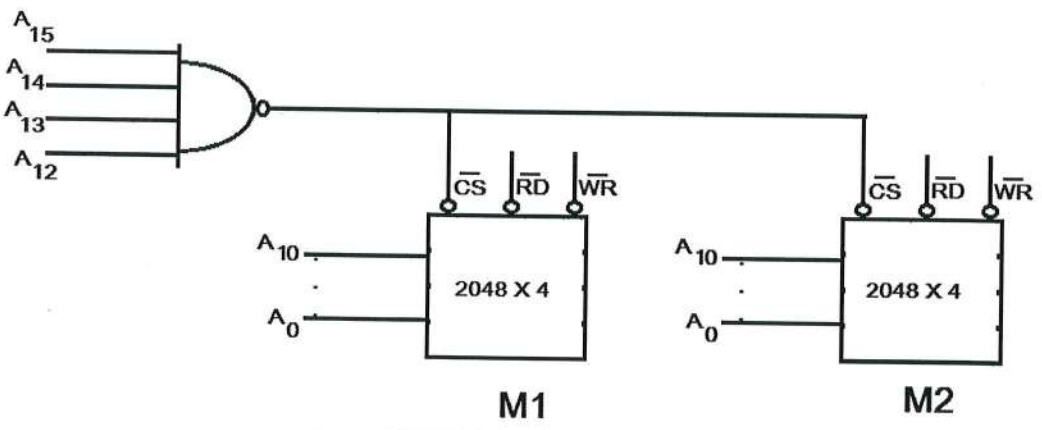
2. a) 4



Specify the o/p line that will go low if the input to the 3 to 8 decoder is as below:

A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0
1	1	1	1	0	1	1	1

b) 6



Identify the entire memory map (addresses) of the schematic shown above and explain the significance of the don't care address lines on the memory map.

c) Recognize the machine cycles in the following instructions: 5

- STA E000 H
- LDA D000 H
- JMP B000 H
- CALL A000 H
- MVI B, 22 H

d) What do you understand by Fold back or mirror memory? Explain with a suitable example. 5

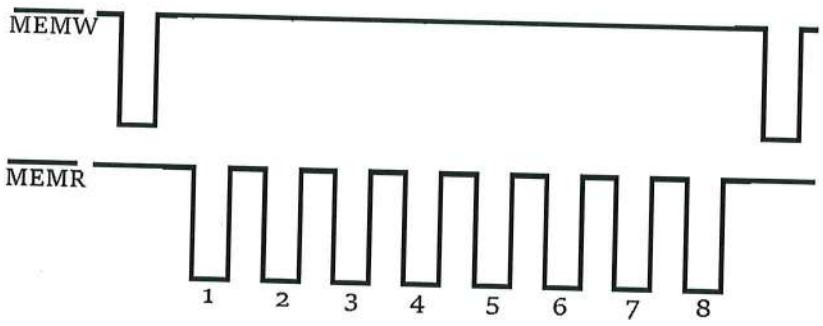
3. a) Specify the crystal frequency required to operate the 8085 microprocessor at 2 MHz 2

b) If the clock frequency is 5MHz, what is the time required executing an instruction of 18 T- states? 2

c) In an Opcode fetch m/cycle, what are the control and status signals asserted by the microprocessor to enable the memory buffer? 2

d) For the following program, identify the MEMR signal of the Opcode Fetch machine cycles in the given figure. 4

```
START: MVI C, 45H
       STA C000H
       JMP START
```



e) Calculate the 16-bit COUNT value to be loaded in register H-L to obtain a loop delay of 3-seconds. Assume the system clock period as 0.5μSec. 10

```
        MVI C, 26 H
Loop2:  LXI H, COUNT    (10T)
Loop1:  DCX H           (6T)
        MOV A,H         (4T)
        ORA L           (4T)
        JNZ Loop1       (10/7T)
        NOP             (4T)
        DCR C           (4T)
        JNZ Loop 2      (10/7T)
```

4. a) Write an assembly language program to exchange the content of reg B with content of reg C. Load EAH in register B and CDH in register C. 5

b) How 8085 instructions are classified as 1-byte, 2-byte and 3-byte instructions? Give examples of each. 5

c) If the 8085 adds F7H and D9H, specify the contents of the accumulator and the status of the S, Z, and CY flags. 3

d) What is meant by maskable interrupts? 2

e) What is the maximum number of input-output devices that can be connected in 8085 using I/O mapped I/O technique? 2

f) Explain how many times the following loop will be executed: 3

```
        LXI B, 0007H
LOOP:   DCX B
        JNZ LOOP
```

5. a) Draw an interfacing circuit for a 4Kbyte EPROM using a 3 to 8 decoder such that the memory address range will be F000H-FFFFH. 6

b) Make a comparison between Memory-Mapped I/O and Peripheral I/O technique. 5

c) Write an assembly language program for 8085 to convert Binary (say data stored in ML: CC20H) to ASCII data. 5

d) The following program reads one data byte at a time. Identify the data bytes from the following set that will transfer the program to location ACCEPT. 4

[Data Bytes: 19, 20, 64, 8F, D8, F2]

```
        IN PORT1
        MVI B, 30H
        CMP B
        JC REJECT
        JM REJECT
        STA 3099H
        JMP ACCEPT
REJECT: JMP INVALID
```

6. Write short notes on : (any Four) 5x4

a) Block diagram of 8259

b) Accumulator bit pattern for SIM Instruction

c) Nesting

d) Timing Diagram of CALL Instruction

e) Block diagram of 8155

7. a) Read the following program and answer the questions : 6

Line No	Mnemonics
1	LXI SP, 07FF H
2	LXI B, 2199 H
3	LXI H, 3288 H
4	LXI D, 4123 H
5	PUSH B
6	PUSH D
7	MOV A,L
...	...
...	...
20	POP H

I) What is saved in the stack pointer register after the execution of line 1?

II) What is the memory location of the stack where the first byte data will be stored?

III) What is stored in ML: 07FD H when line 5 (PUSH H) is executed?

b) Write an assembly language program for 8085 Microprocessor to multiply two 8- 5

bit Data.

c) Write an assembly language program for 8085 to find smallest number in an array of sixteen numbers of data which is store in memory location starting from DC00 H and store your result in CD00 H. 5

d) What do you mean by de-multiplexing of lower order address - data bus? How it is done? 4