

**Indian Institute of Engineering Science and Technology, Shibpur**  
**Dual Degree B.Tech.-M.Tech., 5<sup>th</sup> Semester (Information Technology) Examination, 2018**

Subject: Microprocessors (IT-501)

Time: 3 hours

Full Marks: 70

Answer 5 questions.

1. a) Write the function of SOD and SID Pin in 8085.  
b) Explain the different Flag bits of Flag register.  
c) Draw the 8085 Timing Diagram for Execution of Instruction MVI A, 47H.  
d) What is the clock cycle time of an 8085 microprocessor working with a crystal of 2MHz frequency?  
e) Write a CALL instruction at memory location 5001H to call a subroutine specified at 5050H. Assume that stack pointer is at location 5100H. 2+3+3+3+3

2. a) The status of the accumulator and carry flag is given as follows  
A = BAH and CY = 0. Find Accumulator contents after execution of  
a) RLC instruction  
b) RAL instruction  
c) RRC instruction  
d) RAR Instruction

b) The table shows how the content of each of the registers & the mem. locations varies after execution of each of the specified instructions. Compute the contents of the different registers and memory locations after instruction execution.

	A	B	C	D	E	H	L	1000	1001	1002	1003	1004
Initial	35	28	41	10	02	25	00	27	25	37	41	56
LDAX D												
XCHG												
MVI M, 56H												
MVI A, 25H												
MOV C, D												

- (c) Sixteen bytes of data are stored in memory locations at XX50 H to XX5F H. Write a suitable program to transfer the entire block of data bytes to new memory locations starting at XX70H 4+5+5

4. a) Draw the flow diagram for Operation of Hardware Interrupts  
b) What is Programmable Interrupt Controller 8259A?  
c) Write the SIM format for implementing Interrupts.  
d) The microprocessor is completing an RST 7.5 interrupt request and RST 6.5 is pending. Write down the necessary program to check whether it is pending and if it is pending, enable RST 6.5 without affecting any other interrupts, otherwise, and return to the main program. 3+2+4+5



5) a) A set of data bytes is stored in memory locations starting at 8050H. End of data string is indicated by data byte 00H. Write a program to add set of data bytes. Store answers in memory locations 8070 and 8071H.

b) How is loop Counter set up? Explain with the help of flowchart.

c) Calculate the delay for the following delay loop.

	LXI B, 1000H	10 T-States
LOOP	DCX B	6 T-States
	MOV A, C	4 T-States
	ORA B	4 T-States
	JNZ LOOP	10 T-States

5+4+5

6. a) Draw the memory map for microcomputer which has 2 K bytes of ROM and 256 bytes of RAM. The memory size of the system is 64K

b) Design a memory system of size 4K bytes using chips of size 2Kx 4 bits

c) Compare the advantages and disadvantages of fully decoded memory interface scheme with the partially decoded scheme.

(d) MPU system requires 4k bytes of ROM and 4k bytes of RAM and both the devices are available in 2kx8 organization. Design a (i) fully decoded memory interface assuming RAM contiguously on the higher order address space and ROM on the lower address space (ii) partially decoded memory interface. Write down the corresponding memory map.

3+4+ 3+ 4

7) a) Briefly explain the functions of BIU and EU of 8086-μp.

b) Discuss the differences of minimum and maximum mode 8086 system.

c) What are the functions of IP and SI registers in 8086?

d) Add the contents of the memory location 3000H: 0300H to contents of 4000H: 0400H and store the result in 5000H:0500H.

4+4+3+3

8) a) What do you mean by pipelined architecture? How is it implemented in 8086?

b) Explain the concept of segmented memory? What are its advantages?

c) Explain the physical address formation in 8086.

d) Assume that segment register contains 1004H and offset address is 5434. Calculate the physical address.

4+5+3+2

9) Write technical notes on (Any Four)

4 x 3.5=14

a) Stack operation and stack related instructions.

b) Function of DAA instruction in 8085

c) Physical address formation in 8086

d) Difference between Microprocessor and Microcontroller

e) Difference between the shift and rotate instructions in 8086

f) Function of DAA instruction in 8085

g) Status signal S<sub>0</sub> and S<sub>1</sub>



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**Answer Any 7 Questions**

1. a) How does ALE signal demultiplex the AD<sub>7</sub>-AD<sub>0</sub> bus? Explain with diagram.  
b) What is the utility of HOLD and HLDA pins of 8085 microprocessor?  
c) Explain why number of output ports in I/O mapped I/O technique is restricted to 256 ports.  
4+3+3
2. a) Write a program to implement the following expression.  
 $T = (X + Y) - Z$   
Where X is in Accumulator, Y is in memory location 8040H and Z is in memory location 8041H. Store result T at memory location 8042H. 5+5  
b) Write a program to find maximum of two numbers. One number is stored in Memory location 8101H and other number is in 8102H. The result will be saved in location 8103H.
3. a) Show how the contents of each of the registers & the memory locations vary after execution of each of the following instructions.  

	A	B	C	D	E	H	L	1000	1001	1002	1003	1004
Initial	35	28	41	10	02	25	00	27	25	37	41	56

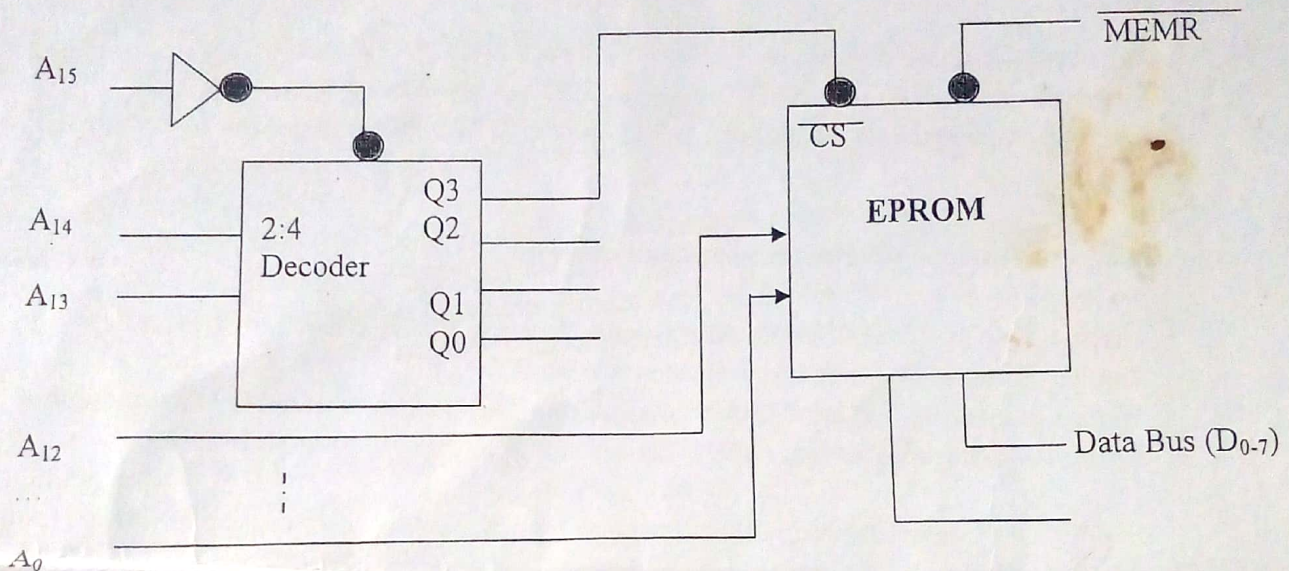
  
LDAX D  
XCHG  
MVI M, 56H  
MVI A, 25H  
MOV C, D  
b) Sixteen bytes of data are stored in memory locations at XX50 H to XX5F H. Write a suitable program to transfer the entire block of data bytes to new memory locations starting at XX70H.  
5+5
4. a) Explain the operation of loop counter using flow chart. Give an example. 3+3+4  
b) How do you implement the loop counter that counts more than 255? Give an example.  
c) Calculate the delay for the following delay loop.

	MVI B, 10H	7 T-States
LOOP2	MVI C, FFH	7 T-States
LOOP1	DCR C	4 T-States
	JNZ LOOP1	10 T-States
	DCR B	4 T-States
	JNZ LOOP2	10 T-States



5. a) Write down the operational steps for PUSH and POP.  
 b) Write a CALL instruction at memory location 8001H to call a subroutine specified at 8050H.  
 Assume that stack pointer is at location 8100H. 5+3+2  
 c) Write down the differences between 'CALL ADDRESS' and 'RST n'

6. a) Design a memory system of (16 x 4 bits) memory system using basic (4X4) memory chip and also draw the memory map.  
 b) Find the memory address range for the following diagram shown below.



- c) What are the advantages of fully address decoding technique? 4+3+2

7. a) What is the opcode format for RST n instruction?  
 b) Derive the vector address for RST n where,  $0 \leq n \leq 7$   
 c) How do you formulate the opcode for RST 5?  
 d) Draw a circuit diagram for generating opcode for RST 5 instruction? 2+2+2+4

8. a) Explain the concept of pipelined architecture? How is it implemented in 8086?  
 b) What are the functions of IP and SI registers in 8086?  
 c) Explain the concept of segmented memory? What are its advantages? 2+2+2+2+2

9. (a) Explain the physical address formation in 8086.  
 (b) Explain Indexed Addressing and Based Indexed Addressing modes in 8086 microprocessor.  
 (c) Add the contents of the memory location 3000H: 0300H to contents of 4000H: 0400H and store the result in 5000H:0500H. 2+4+4

10. a) Briefly explain the functions of BIU and EU of 8086- $\mu$ p. 5+5  
 b) How do you differentiate between the minimum and maximum mode operation in 8086?

11. a) Write the format for Control Word of the 8255.  
 b) Write a Bit Set/Reset control word subroutine to set bits PC5 and PC2 and reset them after 05 ms. Assume that the control register address is equal to 83H and a delay subroutine is available. 6+4

12. a) What are differences between a microprocessor and a microcontroller?  
 b) What are key features of 80851 microcontroller?  
 c) What are Interrupt sources in 8051? 4+3+3