



**MAULANA ABUL KALAM AZAD UNIVERSITY OF
TECHNOLOGY, WEST BENGAL**

Paper Code : EC-502

**MICROPROCESSOR AND
MICROCONTROLLER**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.
Candidates are required to give their answers in their own
words as far as practicable.*

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10
- i) A microprocessor is an
- | | |
|--|--|
| a) SSI device | b) MSI device |
| <input checked="" type="radio"/> c) LSI device | <input checked="" type="radio"/> d) VLSI device. |
- ii) In 8085, the Stack works on which of the following principles
- | | |
|--|----------|
| <input checked="" type="radio"/> a) FIFO | b) FILO |
| <input checked="" type="radio"/> c) LIFO | d) LILO. |
- iii) In 8085 Microprocessor, which of the following is non-maskable interrupt ?
- | | |
|------------|--|
| a) RST 7.5 | <input checked="" type="radio"/> b) TRAP |
| c) HOLD | d) INTR. |

- iv) CALL 8000H is an instruction of
- a) direct addressing mode
 - b) indirect addressing mode
 - c) registering addressing mode
 - d) immediate addressing mode.
- v) The mode 3 operation of 8253 timer is
- a) Square wave generator
 - b) Rate generator
 - c) Software triggered strobe
 - d) Hardware triggered strobe.
- vi) The call location of RST 7.5 interrupt is
- a) 003 CH
 - b) 002CH
 - c) 0034H
 - d) 0000H.
- vii) The on-chip RAM size of 8051 microcontroller is
- a) 1 KB
 - b) 512 bytes
 - c) 256 bytes
 - d) 128 bytes.
- viii) In 8085 CPU, the JUMP instruction address affects the
- a) accumulator
 - b) stack pointer
 - c) H-L pair
 - d) program counter.

ix) Which of the following instruction is not a logical instruction

- a) ANL A, #FF b) CPL A
 c) INC A d) SWAP A.

x) Segment memory capacity of 8086 is

- a) 1 MB b) 64 KB
 c) 2 MB d) 4 MB.

xi) To select Port B of 8255, A₀ and A₁ are

- a) 00 b) 01
 c) 10 d) none of these.

xii) The selection of the register bank of 8051 microcontroller is done by some bits of

- a) PSW b) Reg A
 c) Reg B d) Register Ro.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following 3 × 5 = 15

2. Draw the timing diagram of the instruction OUT 2Ah.
 3. Write down a small program in Assembly Level Language that introduces a delay routine in the main program using register pair.

opcode Fetch / mem Read / IDW

50003

3

[Turn over

```
LXI B, 1000
loop: DCX B
      MOV A, C
```

JNZ loop

4. a) Write an instruction to move the contents of D-E pair at the top of the stack. *PUSH D* 1
- b) Explain the different flags of the flag register of 8085 microprocessor. 2
- c) Write down the differences between instructions MVIA, 00h and XRA A. 2
5. a) Which register pair is the memory address register of 8085 Micro processor. 1
- b) Explain with examples why auxiliary carry flag is not user defined? 2
- c) Write a ALP program of 8085 processor to count ODD and EVEN numbers using Rotate Instruction. 2
6. a) What are the flags supported by 8051 controller? 2
- b) What is meant by Power-on-Reset in 8051 controller? 1
- c) What are the significance of SFRs in 8051 Microcontroller? 2

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) What is SIM ? What is the content for accumulator for SIM instruction to enable all the interrupts of Intel 8085 microprocessor. 4

- b) What is pending interrupt ? Write an 8085 Assembly Language Program to check if RST 6.5 is pending. If it is pending, enable it without affecting any other interrupts; otherwise return to the main program. 4
- c) Describe briefly the polling and daisy chain techniques for interrupt of I/O devices. 4
- d) Discuss the steps for data transfer process between a Floppy disk and R/W memory of 8085 system using DMA. 3 4 + 4 + 4 + 3

8. a) Write down the difference between memory mapped I/O and I/O mapped I/O. 4

(0-16 bit no) b) Write instructions to multiply by 4 to a hex number 0Ah using RAL instruction. 6

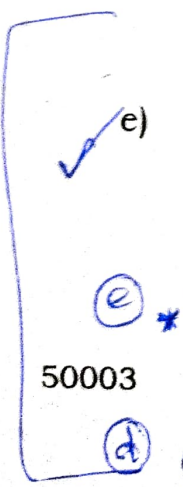
MOV AX, 16 bit no.

c) Write assembly language program to get 2's complement of 16 bit number. 2

STC
CMC
MVI A, CA
RAL
RAL
HLT

d) Draw the timing diagram of the instruction : INRM. 3

e) Write a program to save the value of the accumulator along with flags. Subtract 40h to the contents of C register. Restore the value of PSW. 2



```

LXI SP, XXXX H      SUB 40H      INR M → 34H.
PUSH PSW
MOV A, C             POP PSW
                    HLT
    
```

[Turn over

OP + MR + MW

- 1) fetching the opcode 34H from the memory. (4T)
- 2) Let the memory address(M) be 100H.
- 3) Read data (Let the content of that memory is 12H) 3
from C100H. (Memory Read cycle)
- 4) Increment the memory content from 12H to 13H and write the data into the same memory.

C23FH
- 4000H

823FH

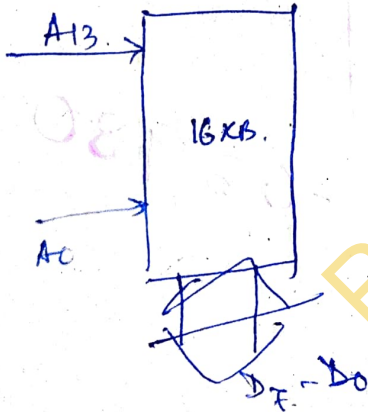
- f) The last address location of 16K Byte memory space is C23Fh. What will be the first address location. (2) $4 + 2 + 2 + 3 + 2 + 2$
9. a) What are the advantages of memory segmentation in 8086 μ p. 7
- b) What are the main functions of BIU and EU unit of 8086 μ p. 6
- c) What are the differences between the physical address and logical address in 8086 μ p ? How physical address will be generated from logical address ? 7
- d) Write down the bit pattern of Flag register of 8086 μ p ? 3 + 6 + 3 + 3
10. a) List the operating modes of the 8255 Programmable Peripheral Interface (PPI). 3
- b) Write the control word format of 8255 PPI for I/O mode. 3
- c) Write the BSR control word of 8255 to set PC7 and reset PC2. 3
- d) Draw the timing diagram of Mode 1 (Port A as input) operation. 3
- e) Describe the different modes of operation of 8253 timer. 4

11. Write short notes on any *three* of the following : 3 x 5

- a) Addressing modes in 8085
- b) Explain BI and EU of 8086
- c) Mode of operations of 8253
- d) Addressing Modes of 8051
- e) PIC microcontroller.

$16 \times 1 \text{KB}$
 $2^4 \times 2^{10}$

✓ 14 Address lines

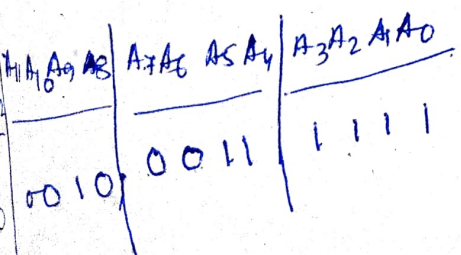


16×1024
 16×1024
 16×64
 16×4
 16×1

$3 \times 16 + 15 \times 16 + 15 \times 16^0 \rightarrow A$
 $0-2$
 $10 \rightarrow 16$

$03FF$
 $16 \text{KB} \rightarrow 4000 \text{H}$

0000
 $AB9$
 0547



| | | | |
|---------|---------|---------|---------|
| 1 1 1 1 | 1 0 1 0 | 1 0 1 1 | 1 0 0 1 |
| 0 0 0 0 | 0 1 0 1 | 0 1 0 0 | 0 1 1 0 |
| + 1 | | | |
| 0 0 0 0 | 0 1 0 1 | 0 1 0 0 | 0 1 1 1 |
| 0 | 5 | 4 | 7 |

NEG AX

| | | | |
|---------|---------|---------|---------|
| 0 0 0 0 | 0 0 0 0 | 0 0 0 0 | 0 0 0 0 |
| 1 1 1 1 | 1 0 1 0 | 1 0 1 1 | 1 0 0 0 |
| 011 | | | |

50003

8400
1100

7