

MICROPROCESSORS & MICROCONTROLLERS
(AEIE 3103)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group - A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) In 8085 microprocessor number of 16 bit register is-
(a) 2 (b) 3 (c) 6 (d) 8
- (ii) In memory read operation what is the status of IO/\overline{M} , \overline{RD} , \overline{WR} control signals.
(a) $IO/\overline{M} = 1, \overline{RD} = 1, \overline{WR} = 0$ (b) $IO/\overline{M} = 1, \overline{RD} = 0, \overline{WR} = 1$
(c) $IO/\overline{M} = 0, \overline{RD} = 1, \overline{WR} = 0$ (d) $IO/\overline{M} = 0, \overline{RD} = 0, \overline{WR} = 1$
- (iii) What is the content of D and E register after the execution of DCR D instruction?
Let the initial values are $D=23_H, E=32_H$.
(a) $D=23_H, E=31_H$ (b) $D=22_H, E=32_H$
(c) $D=22_H, E=31_H$ (d) None of these
- (iv) In IN F0H instruction content of A0- A7 and A8- A15 address lines are-
(a) A0- A7= F0H and A8- A15 =00H
(b) A0- A7= 00H and A8- A15 =F0H
(c) A0- A7= F0H and A8- A15 =F0H
(d) A0- A7= F0H and A8- A15 =High impedance state
- (v) In JNZ 4000H instruction program execution will be shifted to 4000H memory location when-
(a) Z=0 (b) Z=1 (c) CY=0 (d) CY=1
- (vi) If the operating frequency of 8085 is 2 MHz, then the time required to execute an instruction of 13T states is-
(a) 5 μ sec (b) 6.5 μ sec (c) 13 μ sec (d) 26 μ sec
- (vii) After reset operation content of SP register in 8051 μ C is-
(a) 00H (b) 07H (c) 0000H (d) FFH

- (viii) What is the value of control word register where Port A and Port B is configured as Output in Mode 0 and Port C is configured as Input?
 (a) 80_H (b) 91_H (c) $A2_H$ (d) None of these
- (ix) In 8051 μC if $RS1=0$ and $RS0=1$ then the selected register bank is-
 (a) Bank 0 (b) Bank 1 (c) Bank 2 (d) Bank 3
- (x) 8051 μC will read instruction from its internal program memory if-
 (a) RST pin is at logic 0 (b) RST pin is at logic 1
 (c) \overline{EA} pin is at logic 0 (d) \overline{EA} pin is at logic 1

Group- B

2. (a) Draw and discuss the flag register of 8085 microprocessor.
 [(C01) (Remember/LOCQ)]
- (b) With one suitable circuit diagram explain the process of de-multiplexing of lower order address bus and data bus in 8085 microprocessor.
 [(C01) (Understand/LOCQ)]
- (c) Read the program and answer the following questions:
 MVI A, 17_H
 Loop: ORA A
 RAL
 JNC Loop
 STA 5000_H
 HLT
- i) What is the function of ORA A instruction?
 ii) What is the function of JNC Loop instruction?
 iii) How many times the Loop will be executed?
 iv) What is the content of memory location 5000_H ?
 [(C02) (Analyze/IOCQ)]
 $(1 + 3) + (1 + 2) + (1 + 1 + 2 + 1) = 12$
3. (a) Discuss the programmable and non-programmable registers of 8085 microprocessor. [(C01) (Remember/LOCQ)]
- (b) Calculate the amount of delay generated in the following subroutine.
 MVI A, $F0_H$
 Loop: DCR A
 JNZ Loop
 RET. [(C05) (Analyse/IOCQ)]
- (c) Write an ALP for 8085 microprocessor to store the last two digits of your autonomy roll and registration numbers in memory location 4000_H and 4001_H . Increment the content of location 4000_H by 2. Perform XOR operation between the contents of location 4000_H and 4001_H and store the result in memory location 4002_H . [(C02) (Solve/IOCQ)]
 $5 + 2 + 5 = 12$

Group - C

4. (a) What is the difference between absolute and partial address decoding?
[[CO3] (Remember/LOCQ)]
- (b) Design a circuit to interface one 8KB ROM and one 8KB RAM memory chips to 8085 microprocessor. The first address in the ROM memory chip is 0000_H and the last address in RAM memory chip is FFFF_H. [[CO3] (Design/HOCQ)]
2 + 10 = 12
5. (a) What is difference between vectored and non-vectored interrupts of 8085 microprocessor. Give an example of maskable and non-maskable interrupts of 8085 microprocessor. [[CO4] (Understand/LOCQ)]
- (b) Design a circuit to interface one 7 segment display to 8085 microprocessor using Latch as interfacing device. Consider the last two digits of your autonomy roll number as the IO port address. [[CO3] (Design/HOCQ)]
- (c) Write a program for above circuit to display the last digit of your registration number on the 7 segment display. [[CO3] (Solve/IOCQ)]
(2 + 2) + 4 + 4 = 12

Group - D

6. (a) Draw and discuss the control word register (CWR) format of 8255 PPI in BSR mode. [[CO6] (Remember/LOCQ)]
- (b) Design a circuit to interface TWO 7 segment displays to 8085 microprocessor using 8255 PPI. Let the Port A address of 8255 PPI is X0_H (Where, X is the last digit of your autonomy roll number). [[CO6] (Design/HOCQ)]
- (c) Write a program for the above circuit to display the last two digits of your autonomy roll number on the 7 segment displays. Also mention the CW value and 7 segment codes. [[CO6] (Solve/IOCQ)]
(1 + 2) + 4 + (4 + 1) = 12
7. (a) Draw and discuss the internal architecture of 8251 USART.
[[CO6] (Remember/LOCQ)]
- (b) Design a circuit to interface one A/D converter to 8085 microprocessor using 8255 PPI. Let the Port A address of 8255 PPI is X0_H (Where, X is the last digit of your autonomy roll number). [[CO6] (Design/HOCQ)]
- (c) Write a program to blink one LED connected at PC₀ line of 8255 PPI.
[[CO6] (Solve/IOCQ)]
(2 + 4) + 4 + 2 = 12

Group - E

8. (a) What are the differences between microprocessor and microcontroller?
[[CO1] (Remember/LOCQ)]

- (b) With suitable example discuss the function of RS1 and RS0 bits in 8051 microcontroller? [(C01) (Understand/LOCQ)]
- (c) Write an ALP for 8051 microcontroller to store 10 random numbers in RAM memory location starting from 20_H. Count the number of even and odd numbers presents in the block and store the result in RAM memory. [(C02)(Solve/IOCQ)]
3 + 3 + 6 = 12
9. (a) What is the function of TxD pin in 8051 microcontroller?
[(C01) (Remember/LOCQ)]
- (b) Design a circuit to interface one 7 segment display unit and one switch to 8051 microcontroller. [(C06) (Design/HOCQ)]
- (c) Write a program for the above circuit to display the last digit of your autonomy roll number on the 7 segment displays if the switch is open and display the last digit of your registration number if the switch is closed. [(C06)(Solve/IOCQ)]
2 + 4 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	36.45%	36.45%	27.10%

Course Outcome (CO):

After the completion of the course students will be able to:

1. Learn the architecture of 8 bit microprocessor (8085), 8051 and PIC (PIC16F877) microcontrollers
2. Develop the skill in program writing for 8085 microprocessor, 8051 and PIC microcontroller
3. Realize the interfacing of memory, input/output devices with 8085 microprocessor
4. Understand the interrupts of 8085 microprocessor, 8051 and PIC microcontroller
5. Learn the use of timer/counter and serial data communication process in 8085 microprocessor and 8051 microcontroller
6. Apply the knowledge to interface different type of I/O devices with 8085 microprocessor, 8051 and PIC microcontroller

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question

Department & Section	Submission Link
AEIE	https://classroom.google.com/c/NDA2MDE5NDU4ODQ2/a/NDYzODgwODY3NzM5/details