MICROPROCESSOR & MICROCONTROLLER
(AEI2105)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) During a memory read operation the CPU fetches.
(a) Opcode (b) Another address
(c) Data itself (d) all of the above

(ii) Instruction cycle of DCX is composed with
(a) 4T (b) 7T (c) 6T (d) 10 T

(iii) PSW indicates
(a) Flag Register (b) W-Z register
(c) A-F Register (d) None of These.

(iv) RST1 is actually
(a) RESET signal (b) 3byte Restart instruction
(c) Ending program execution (d) S/w Interrupt.

(v) BSR mode is used to Set and Reset
(a) Port A (b) Port B (c) Port C (d) Any Port

(vi) During DMA operation Microprocessor 8085 is receiving HOLD request signal coming from DMAC
(a) HOLD pin (b) HRQ pin (c) HLDA Pin (d) CS pin

(vii) If CWR address of 8255 connected to 8085 processor is FBH, then the address of PORT A will be
(a) F7H (b) F8H (c) F9H (d) FAH

(viii) Microcontroller 8051 is using
(a) RISC and Vo-Neumann Architectures
(b) RISC and Harvard Architectures
(c) CISC and Princeton Architecture
(d) CISC and Von-Neumann Architecture

(ix) In Microcontroller 8051-MOVC A, @R1
(a) Copy data from register R1 to Register A
(b) Copy data from memory pointed by register R1 to Register A
(c) Cut and paste data from register R1 to Register A
(d) Invalid Instruction.

(x) In Microcontroller 8051 -'MOV R1, 70H' is used to
(a) Copy the immediate data byte 70H to Register R1.
(b) Copy data byte from memory address 70H to Register R1.
(c) Be an example of Indexed Addressing
(d) Invalid Instruction.

Fill in the blanks with the correct word

(xi) 2 KB ROM initial address if is 1000H the last address would be_____.

(xii) Full form of USART is _____.

(xiii) Control word 5EH in PPI8255A indicates _____.

(xiv) "MOV TMOD, #12H" is initialising T2 in Timer mode ____ in Microcontroller 8051.

(xv) DPTR in Microcontroller 8051 is a _____.

Group - B

2. (a) Write down the function of the following pin signals of Microprocessor 8085 (Any two):
INTR, HOLD, $\overline{RESET\ IN}$, and X1-X2. *[(CO1)(Understand/LOCQ)]*

(b) Write the complete mnemonic with and explain the function of the following instructions of Microprocessor 8085 (Any two):
LDA, DAD, RRC, CPI *[(CO2)(Understand/LOCQ)]*

(c) What will be the content of Register A and F after execution of the following instructions? Calculate total execution time if f_0 = 3MHz of Microprocessor 8085.
MVI A, 0C
MVI B, AC
ADD B
XRA A *[(CO3)(Apply/IOCQ)]*

(2 + 2) + (2 + 2) + (2 + 2) = 12

3. (a) Write down the function of the following pin signals of Microprocessor 8085. (Any two)
AD0-AD7, HOLD, $\overline{INTA}$, and IO/$\overline{M}$ *[(CO1)(Understand/LOCQ)]*

(b) Write difference between the pair of following instructions of Microprocessor 8085 (Any One):
(i) RRC and RAR (ii) STA and STAX *[(CO2)(Understand/LOCQ)]*

(c) Explain the following with example:
(i) Direct Addressing Mode
(ii) Register Indirect Addressing Mode *[(CO2) (Apply/IOCQ)]*

4 + (2 + 2) + (2 + 2) = 12

Group - C

4. (a) Compare Memory-Mapped I/O and I/O mapped I/O. *[(CO5)(Analyse/HOCQ)]*
   (b) Interface a 16KB EPROM IC with the 8085 using a NAND gate address decoder such that the Starting address assigned to the chip is 8000H. *[(CO5)(Design/HOCQ)]*
   (c) Explain the significance of Opcode: RIM. *[(CO4)(Remember/LOCQ)]*

3 + 6 + 3 = 12

5. In case of memory interfacing with 8085 processor, where A15 address line is connected to E0 terminal of the decoder; A14, A13, A12 are connected to input terminals of the decoder (A11, A10 are not used in this case) with output of the decoder is taken from O5 and other address lines are connected to memory device.
   (i) Draw the interfacing circuit diagram
   (ii) Find the initial and the final address
   (iii) What will be the size of the memory device
   (iv) Write down four different types of instructions for this application. *[(CO5)(Design/HOCQ)]*

(4 + 4 + 2 + 2) = 12

Group - D

6. (a) Describe the function of control word as a MODE 0 operation of 8255 PPI. *[(CO6)(Remember/LOCQ)]*
   (b) Draw the complete interfacing diagram with 8255 PPI for the following condition. Given address of PORTA =80H, multiple input NAND gate at Chip Selection Input of 8255A, PORT A & PORT C (upper) function as a INPUT and other PORTs are as output. *[(CO6)(Analyse/HOCQ)]*
   (c) With the above setting write down an ALP to send the complemented information to output terminals from the input using 8085 instructions. *[(CO6)(Apply/IOCQ)]*

4 + 4 + 4 = 12

7. Draw an Interfacing diagram of a Seven Segment Display with 8085 via 8255a and 8-Bit Latch 74LS373. Port A of 8255A is used for sending data and PB.0 is used to enable Latch. Write an ALP to blink the last digit of your Autonomy Roll number on the Seven Segment Display. If required write delay subroutine with your main program using 8085 instructions. *[(CO6)(Analyse/HOCQ)]*

(3 + 9) = 12

Group - E

8. (a) Explain with example the Addressing Mode of Microcontroller 8051. *[(CO2)(Remember/LOCQ)]*
   (b) Explain PSW of Microcontroller 8051. *[(CO1)(Remember/LOCQ)]*
   (c) Write down the instructions of Microcontroller 8051 for the following operation.
      (i) Add A0H to the content of Accumulator,
      (ii) Increment the content of internal memory location by $R_{0,}$
      (iii) Subtract immediately 45 from accumulator register with borrow,

(iv) Transfer the Above subtraction result in two successive memory locations.
[(CO3)(Apply/IOCQ)]

4 + 4 + 4 = 12

9. (a) Draw a circuit to interface 8 LEDs with Microcontroller 8051. Write an ALP to blink the alternate LEDs. *[(CO3)(Solve/HOCQ)]*

(b) Calculate the total delay generated by Microcontroller 8051, when the Timer0 (T0) register count value in F0H in Mode1. *[(CO1)(Solve/HOCQ)]*

(3 + 6) + 3 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	32.29	29.16	38.54