M.Sc.(Instrumentation) First year second semester-2019

Subject: Embedded Systems   Time: 4 hrs   Full Marks: 100

Use separate answer scripts for each part

Part-I (50 marks)

Answer question No. 1 and any four from the rest questions   10X5

1. (i) Give example of 8 16, and 32 bit microprocessor.   1X10
   (ii) Why is data bus bi-directional
   (iii) Name the type of flags in 8086
   (iv) Name the various segment registers in 8086.
   (v) What does EU do in 8086?
   (vi) What is the position of the stack pointer after POP instruction in 8085?
   (vii) What is tri-state logic?
   (viii) The language that the computer can understand and execute is called ....
         (a) Machine language   (b) Application software   (c) System program   (d) None of them
   (ix) The access method used for magnetic tape is ....
         (a) Direct   (b) Random   (c) Sequential   (d) none of them
   (x) Dynamic memory cell uses ....
         (a) TTL gate   (b) Charged capacitor   (c) Register   (d) None

2. (a) What are the two different techniques used for interfacing I/O devices using microprocessor 8085? Differentiate between them and also write the instructions used to execute them.

(b) Draw the block diagram of 8255 and explain its working mechanism. What is Control Word? Determine the control word for the following configuration of 8255, for I/O Mode, in Mode-0
Port A – Output
Port B –Input,
Port C lower (pins PC0 – PC3) – input
Port C upper (pins PC4 – PC7) – output   4+6=10

3. Sketch and explain the interface of 2K EPROM and 4 K R/WM using a decoder with 8085. Write the address range of EPROM & R/WM. Write also remaining locations for future expansions.   5+5=10

4. (a) Explain in detail the following instructions:-
       (i) ADC (ii) LHLD (iii) RLC (iv) DAD H
   (b) Differentiate between (1) POP and PUSH (2) CALL and Return   6+4=10

5. (a) Following set of instructions are executed in microprocessor 8085 to set up a delay using register.

	T-States
MVI C, CF H	7
LOOP DCR C	4
JNZ LOOP	10/7

Calculate total delay of all instructions using 2 MHz clock frequency of the system.
(b) Assume the accumulator contents are 71H and CY=1. Illustrate the accumulator contents after the execution of the instruction RRC and RAR.   5+5=10

[Turn over

6. Explain the functions of the following routines:

a) LXI SP, 209FH
   MVI C, 00H
   PUSH B
   POP PSW
   RET

b) LXI SP, STACK
   PUSH B
   PUSH D
   POP B
   POP D

(c) Write the instruction to load the number 2050H in the register pair HL. Increment the number using the instruction INX H and illustrate whether INR H instruction is equivalent to the instruction INR L.   4+4+2=10

7. (a)The memory location C050H holds the data byte F8H. Write the instructions to transfer the data byte to the accumulator using three different op-codes: MOV, LDAX and LDA.

(b) Write a program to add two hex numbers FA and 46 and to store the sum at memory location XX98H and the flag status at location XX97H.

(c) Write a program to clear accumulator   3+5+2=10

8. Answer any two:

(a) Draw and explain timing diagram for execution of the instruction STA 8255.

(b) Architecture of 8086 microprocessor.

(c) A code word is stored at data memory location E050. Write a program for testing whether the code word belongs to the 3 out of 6 code. Set location E055 to FF if yes and 00 if No. The code word is valid if the first two MSB are zero and the number of 1's in the remaining 6 bits is 3 (= 3 out of 6 code)

                                                                        5+5=10

PART-II (50 marks)

Answer any five questions, each question carries 10 Marks

1. Distinguish between RISC AND CISC. What Is The Feature Of 8051 Microcontroller? Write the steps required for programming 8051 to transfer data serially.

2. What is the difference between timer and counter? Explain the function of each bit in TMOD Register. Write an Assembly Language Program to generate square wave of 3KHZ frequency with 50% duty cycle on Pin P2.1 using timer 1 mode 1 operation, Assume XTAL=12MHZ and show the delay calculation

3. What is the advantage and disadvantages of MODE 2 operation of 8051 when compared to Mode 1 Operation. Explain the importance of TI and RI flagWrite a program for the 8051 to receive bytes of data serially, and put them in P1, set the baud rate at 4800, 8-bit data, and 1 stop bit

4. Mention the difference between interrupt and polling method.
   Write a program in which the 8051 reads data from P1 and writes it toP2 continuously while giving a copy of it to the serial COM port to be transferred serially. Assume that XTAL=11.0592. Set the baud rate at9600.

5. List out and explain different assembler directives used in an ALP. Explain the following instructions with an example
   i)   SWAP A ii) RRC A iii) DIV AB iv) XCHD A,@Riv) DA A

6. Sketch the interface of a 16ch x 1line LCD to the 8051 microcontroller. Write an 8051 assembly program segment to display any Logo

7. Explain briefly about synchronous and asynchronous communication. Write an 8051 assembly program segment to input the code of keys.

8. i) Assume that the on-chip ROM has a message. Write a program to copy it from code space into the upper memory space starting at address 80H. Also, as you place a byte in upper RAM, give a copy to P0.

ii) Assume that RAM locations 40 – 44H have the following values.Write a program to find the sum of the values. At the end of theprogram, register A should contain the low byte and R7 the high byte.
40 = (7D); 41 = (EB) ;42 = (C5); 43 = (5B) ; 44 = (30)