DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, NOVEMBER - 2023

MICROCONTROLLERS

[Maximum marks: 100]   [Time: 3 Hours]

PART – A
Maximum marks: 10

I (Answer *all* the questions in one or two sentences. Each question carries **2** marks)

1. Write instructions to load value 0x95 into the SPL I/O Register.

2. Give two ways for hex data representation in the AVR assembler.

3. What is the difference between PORTC=0x00 and DDRC=0x00?

4. Mention the function of TCCR0 register.

5. Which pins of the ATmega32 are set aside for serial communication, and what are their functions?   (5 x 2 = 10)

PART – B
Maximum marks: 30

II (Answer any *five* of the following questions. Each question carries **6** marks)

1. Explain all data format representations in AVR with example for each.

2. Explain any four features of RISC as implemented in AVR microcontroller.

3. List the I/O bit manipulation instructions in AVR. Explain each with suitable example.

4. Write an AVR C program to toggle all the bits of PORT B continuously with a 100 ms delay. Assume that the system is ATmega 32 with XTAL = 8 MHz.

5. Write the steps for finding initial values to be loaded into the TCNT0 register.

6. Describe the main registers used by serial communication of the AVR.

7. List the features of ATMega 32 ADC.   (5 x 6= 30)

PART – C
Maximum marks: 60
(Answer *one full* question from each unit. Each full question carries **15** marks)

UNIT –I

III. (a) Write short notes on

   (i)   Program Counter in AVR   (ii) Status Register in AVR

   (iii) Instruction Cycle Time of AVR   (iv) Stack Pointer in AVR   (8)

(b) Write an assembly language program to toggle all the bits of PORT B by sending \$55 and \$AA continuously. Put a time delay between each issuing of data to PORT B. (7)

OR

IV. (a) Explain any four conditional branch instructions in AVR with example. (8)

(b) Write assembly language program to

  (i) load the PORTB register with the value 0x55
  (ii) Complement PORT B 700 times. (7)

UNIT-II

V. (a) List any four data types for AVR C. Explain each of them. (8)

(b) Write an AVR C program to get a byte of data from PORT C. If it is less than 100, send it to PORT B; otherwise, send it to PORT D. (7)

OR

VI. (a) Find the port value after each of the following is executed:

  (i) PORTB=0x65>>2   (ii) PORTC=0x39<<2
  (iii) PORTB=0xD4>>3   (iv) PORTD=0xA7<<2 (8)

(b) Write an AVR C program to monitor bit 7 of PORT B. If it is 1, make bit 4 of PORT B input; else, change pin 4 of PORT B to output (7)

UNIT-III

VII. (a) Explain about Timer 1 in ATMega 32 with a block diagram. (8)

(b) List and Explain External Hardware Interrupts in ATmega 32. (7)

OR

VIII. (a) Describe about TIMSK (Timer Interrupt Mask) Register by specifying the function of each bit in the register. (8)

(b) Write about prescaler and generating large time delay using timers in AVR. (7)

UNIT-IV

IX. (a)   (i) List the reasons for widespread use of LCD.

    (ii) Write LCD pin descriptions. (8)

(b) Explain about interfacing keyboard to AVR with diagram. (7)

OR

X. (a) Describe about sending commands and data to LCD. (8)

(b) Write steps of programming the AVR to receive data serially using USART. (7)