

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, APRIL - 2024**

MICROCONTROLLERS

(Maximum Marks:100)

(Time: 3 Hours)

PART - A

(Maximum Mark : 10)

Marks

- I. Answer **all** the questions in one or two sentences. Each question carries 2 marks.
1. Name the two types of memory architectures used in microcontrollers.
 2. Write the number of general purpose registers and their names in AVR family of microcontrollers.
 3. Write the instruction in assembly language to make PORTA as output port.
 4. State the difference between timer and counter operations.
 5. Name the two registers provided in LCD module. (5 x 2 = 10)

PART - B

(Maximum Mark: 30)

- II Answer **any five** questions from the following. Each question carries 6 marks.
1. Briefly explain Data memory organization in AVR microcontroller.
 2. Differentiate stack and stack pointer in AVR. Write the steps in assembly language to initialize stack.
 3. Write a program for AVR to toggle all the pins of PORTA with a delay.
 4. Draw the bit status of TCCR0 register and indicate the function of each bits.
 5. List the various sources of internal interrupts in AVR. Write the difference between RET and RETI instructions.
 6. Write the steps for AVR serial port programming for transmitting data.
 7. Specify the functions of E, RS, R/W pins of LCD module. (5 x 6 = 30)

PART - C

(Maximum Mark: 60)

(Answer **one full** question from each unit. Each full question carries 15 marks.)

UNIT - I

- III. a) Explain the architecture of AVR microcontroller with a block diagram. (8)
- b) List the features of RISC processor architecture. (7)

OR

- IV. a) Describe the different data transfer instructions of AVR with one example each. (8)
- b) Explain the difference between conditional branch and unconditional branch instructions. Give two examples for each. (7)

UNIT – II

- V. a) Comment the following AVR assembly language instructions
- | | |
|-------------------|---------------------|
| (i) SBI DDRA,5 | (ii) CBI DDRB,PORTB |
| (iii) SBIS PINA,0 | (iv) SBIC PINA,7 |
- (8)
- b) A switch is connected at the PB0 pin of atmega 32. Write an embedded C program to send the data 0xA5 to PORTA if the switch is pressed, otherwise send 0x5A to PORTA. (7)

OR

- VI a) Describe the importance of declaring the data type in embedded C. List the data types and their ranges used in AVR embedded C. (8)
- b) Write the assembly language instructions to perform the following tasks
- (i) Read the byte of data from PORTA pins to CPU.
- (ii) Send the data 0xB2 to PORTB. (7)

UNIT – III

- VII a) Write the name of registers associated with timer0 and mention their functions. (8)
- b) Describe the term interrupt and its importance. Write the sequence of operations taking place on getting an interrupt. (7)

OR

- VIII a) With the instructions write the steps to program timer0 in normal mode to generate time delay using polling method. (8)
- b) Write short notes on AVR external hardware interrupts. (7)

UNIT – IV

- IX a) With diagram explain 4 x 4 matrix keyboard interface with AVR. (8)
- b) List various registers in ADC module of AVR and mention their functions. (7)

OR

- X a) With diagram explain DAC interface with AVR microcontroller. (8)
- b) Write the programming steps for temperature sensor interface with diagram. (7)

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