U.S.N | | | | | | | | | | |

# P.E.S. College of Engineering, Mandya - 571 401

*(An Autonomous Institution affiliated to VTU, Belagavi)*

**Fourth Semester, B.E. - Information Science and Engineering**

**Semester End Examination; August - 2023**

**AVR Microcontroller**

*Time: 3 hrs* *Max. Marks: 100*

***Course Outcomes***

*The Students will be able to:*
*CO1 – Compare and contrast Microprocessor and Microcontroller.*
*CO2 - Code simple AVR assembly language instructions.*
*CO3 - Code assembly language to use the ports for input or output.*
*CO4 - Code c program for time delay, logical and arithmetic operations and fro data serialization.*
*CO5 - Interfacing the keypad to the AVR using assembly and C.*

***Note: I) PART - A** is compulsory. **Two** marks for each question.*
***II) PART - B**: Answer any **Two** sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.*

| Q. No. | Questions | Marks | BLs | COs | POs |
|---|---|---|---|---|---|
| | **I : PART - A** | **10** | | | |
| 1 a. | List any four applications used by microcontroller. | 2 | L1 | CO1 | PO1 |
| b. | What you meant by RCALL and ICALL? | 2 | L1 | CO2 | PO1 |
| c. | Define Data Serialization. | 2 | L1 | CO4 | PO1 |
| d. | Define indirect addressing mode. | 2 | L1 | CO3 | PO1 |
| e. | List out the logical operations in AVR programming C. | 2 | L1 | CO5 | PO1 |
| | **II : PART - B** | **90** | | | |
| | **UNIT - I** | **18** | | | |
| 2 a. | Explain the simplified view of an AVR microcontroller. | 9 | L2 | CO1 | PO1 |
| b. | Write the program to multiply two numbers in a given address 0x6A and 0x5C. After that store it in an address of SRAM address 0x7A. | 9 | L3 | CO1,2 | PO1 |
| c. | Define Microcontroller. Compare microcontroller versus Microprocessor. | 9 | L2 | CO1 | PO1 |
| | **UNIT - II** | **18** | | | |
| 3 a. | With an example, explain how to calling many subroutines from the main program? | 9 | L2 | CO2 | PO1 |
| b. | Write a program and flowchart for the following steps given below:<br>Step 1: Clear R20,<br>Step 2: Add 6 to R20,11 times,<br>Step 3: Send the sum to PORT C.<br>Use BRNE instruction. | 9 | L3 | CO3 | PO1 |
| c. | Explain the other conditional branch instructions with example. | 9 | L2 | CO2 | PO1 |

Contd… 2

| | | | | | |
|---|---|---|---|---|---|
| | **UNIT - III** | **18** | | | |
| 4 a. | Explain Arithmetic instructions for unsigned numbers with an example. | 9 | L2 | CO3 | PO1 |
| b. | Assume that R16 has the number 72. Show how we can use ROR to divide R16 by 9. | 9 | L3 | CO2,3 | PO1 |
| c. | Explain logic and compare instructions with an example. | 9 | L2 | CO2,4 | PO1 |
| | **UNIT - IV** | **18** | | | |
| 5 a. | Define addressing mode. List and Explain types of addressing modes in AVR microcontroller. | 9 | L2 | CO3 | PO1 |
| b. | Write assembly code to send $55 to PORT B, which includes the register name, I/O address and data memory address. | 9 | L3 | CO4 | PO1 |
| c. | Define macro along with an example. Explain how macro is used? | 9 | L2 | CO2,4 | PO1 |
| | **UNIT - V** | **18** | | | |
| 6 a. | Explain the three ways to create time delay in AVR C with an example. | 9 | L2 | CO4,5 | PO1 |
| b. | Explain binary (hex) to Decimal and ASCII conversion in AVR C. | 9 | L2 | CO5 | PO1 |
| c. | i) Write a AVR C program to toggle all bits of PORTB 50000 times.<br>ii) Write a 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. | 9 | L3 | CO4,5 | PO1 |

* * * *