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Question Paper Code	12325
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023**

Fifth Semester

**Mechanical and Automation Engineering**

**20ESEI501 - PLC AND MICROCONTROLLER**

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

- |  | <i>Marks,<br/>K-Level, CO</i> |
|--|-------------------------------|
| 1. Compare PLC and computer.   | <i>2,K2,CO1</i>               |
| 2. What is a PLC? What are the main advantages and disadvantages of PLC?             | <i>2,K1,CO1</i>               |
| 3. Write the 3 types of counter instructions.  | <i>2,K1,CO2</i>               |
| 4. List any four Master control Reset Instruction.                                   | <i>2,K1,CO2</i>               |
| 5. What are the alternate functions of port 2.0 to 2.3 pins in 8051 microcontroller? | <i>2,K1,CO3</i>               |
| 6. What is the function of Stack pointer in 8051MC?                                  | <i>2,K1,CO3</i>               |
| 7. Explain the register IP format of 8051.   | <i>2,K2,CO4</i>               |
| 8. List the interrupts of 8051 microcontroller.                                      | <i>2,K1,CO4</i>               |
| 9. Write the advantages and limitations of I2C communication.                        | <i>2,K1,CO5</i>               |
| 10. Describe keyboard debouncing.  | <i>2,K2,CO5</i>               |

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

- |   |                  |
|---|------------------|
| 11. a) Discuss in detail the input and output devices available in PLC.                                     | <i>13,K2,CO1</i> |
| <b>OR</b>   |                  |
| b) Draw the equivalent ladder logic diagram for basic gates and universal gates.                            | <i>13,K2,CO1</i> |
| <b>OR</b>   |                  |
| 12. a) Write a ladder logic program for automatic lubrication of supplier conveyor belt.                    | <i>13,K2,CO2</i> |
| <b>OR</b>   |                  |
| b) Explain automatic bottle filling system using ladder logic diagram.                                      | <i>13,K2,CO2</i> |
| <b>OR</b>   |                  |
| 13. a) What is an Interrupt? Discuss the importance of interrupt and its structure in 8051 Microcontroller. | <i>13,K2,CO3</i> |
| <b>OR</b>   |                  |
| b) Explain the Logical Instruction set of 8051 microcontroller.   | <i>13,K2,CO3</i> |

14. a) (i) Write a delay program with a single register loaded with its maximum value and calculate its time delay machine cycle. 8,K2,CO4  
(ii) Calculate the time delay for the given subroutine 5,K2,CO4  
Delay : Mov R2 #05H  
Loop : DJNZ R2, Loop  
NOP  
NOP  
RET

**OR**

- b) Write a program to retrieve the contents of these locations one by one, and output it to port p1 which is connected to a seven segment display which display the numerals repeatedly with a delay of 100ms between displays. The common cathode seven segment codes for the numerals 0 to 9 are given in the below table. Store this look up table in ROM locations 400H onwards. 13,K2,CO4

Decimal Digit	Seven segment code
0	3F
1	06
2	5B
3	4F
4	66
5	6D
6	7D
7	07
8	7F
9	6F

15. a) Demonstrate the signal using a transfer of byte when using the I2C bus and also the format of bits at the I2C bus with diagram. 13,K2,CO5

**OR**

- b) Draw a circuit diagram for keyboard interface with 8051 microcontroller and write a program for reading any key. 13,K2,CO5

**PART - C (1 × 15 = 15 Marks)**

16. a) (i) Write a program to copy a block of 10 bytes from RAM location starting at 37h to RAM location starting at 59h. 8, K2,CO4  
(ii) Explain the serial communication using CAN. 7, K2,CO5

**OR**

- b) (i) Write a program for 8051 Microcontroller to convert Hexadecimal value in to decimal value. 8, K2,CO5  
(ii) Explain in detail the interrupt structure of 8051 Microcontroller. 7, K2,CO4