Reg. No. | | | | | | | | | | | | |

# B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023

Fourth Semester

## EC18405–MICROPROCESSOR AND MICROCONTROLLER BASED SYSTEM DESIGN

(*Electronics and Communication Engineering*)

**(Regulation 2018A)**

**TIME: 3 HOURS** **MAX. MARKS: 100**

| COURSE OUTCOMES | STATEMENT | RBT LEVEL |
|---|---|---|
| CO 1 | Develop programs in 8086 microprocessors by understanding its architecture, instruction set and interrupt process. | 4 |
| CO 2 | Sketch the system bus structure of 8086 and multiprocessor configurations. | 3 |
| CO 3 | Design I/O and Memory interfacing units. | 4 |
| CO 4 | Develop programs in 8051 microcontrollers by understanding its architecture and instruction set. | 4 |
| CO 5 | Design various interfacing units with 8051 microcontroller-based systems. | 4 |

**PART- A (10 x 2 = 20 Marks)**

(Answer all Questions)

| | | CO | RBT LEVEL |
|---|---|---|---|
| 1. | What is the word size of the 8086 microprocessor, and how many bytes can it process at a time? | 1 | 3 |
| 2. | Mention the purpose of the following assembler directives (i)DB (ii)ENDP | 1 | 3 |
| 3. | What is the significance of HOLD and RESET Pins in 8086 microprocessor? | 2 | 2 |
| 4. | Draw the schematic diagram of clock generator 8254. | 2 | 2 |
| 5. | Configure the control word of 8255, In mode 0 operation, Ports A and B are input ports and C is an output port. Assume port address for Control word register to be 0FFE6, write suitable 8086 instructions to configure 8255. | 3 | 3 |
| 6. | List the significance of Interfacing an Analog to Digital Converter in a microprocessor system. | 3 | 2 |
| 7. | Find the addressing modes of the following instructions and explain them.<br>a) CJNE @R0, #43, NEXT b) MOVX @DPTR, A | 4 | 4 |
| 8. | Find the status of the carry, auxiliary carry and parity flag affected after the execution of the following three instructions.<br>MOV A,#9CH;<br>ADD A,#64H;<br>ANL A,#32H | 4 | 3 |





| | | | CO | RBT LEVEL |
|---|---|---|---|---|
| 9. | Define step angle with respect to stepper motor. Find the number of steps per revolution of a stepper motor having 5° step angle. | 5 | 4 | |
| 10. | Justify the importance of $I^2C$ protocol in multimaster bus communication. | 5 | 3 | |

**PART- B (5 x 14 = 70 Marks)**

| | | | Marks | CO | RBT LEVEL |
|---|---|---|---|---|---|
| 11. (a) | (i) | Write an ALP using 8086 instructions to check whether the given string is a palindrome. Add suitable comments to your Program. | (6) | 1 | 3 |
| | (ii) | Write an ALP using 8086 instructions to move a block of data from one memory block to another block of memory Location. Add suitable comments to your Program. | (7) | 1 | 3 |
| | | **(OR)** | | | |
| (b) | (i) | Describe the following 8086 instructions with suitable examples:<br>a) MUL b) DIV c) XLAT | (6) | 1 | 3 |
| | (ii) | Explain the various string manipulation instructions with suitable examples. | (7) | 1 | 3 |
| 12. (a) | | Tabulate the Minimum mode signals. Explain the functions of all the signals and how the signals are generated with the help of various functional units | (14) | 2 | 3 |
| | | **(OR)** | | | |
| (b) | (i) | Compare closely coupled and loosely coupled multiprocessor configurations. | (7) | 2 | 3 |
| | (ii) | What is the need for memory segmentation in an 8086 Microprocessor? List the advantages of memory segmentation. | (6) | 2 | 3 |
| 13. (a) | | Point out the features and explain the operation of 8255 Parallel Communication Interface and explain the various modes of operation. | (14) | 3 | 4 |
| | | **(OR)** | | | |
| (b) | | Justify how the interrupt handling capability of the 8086 Microprocessor can be enhanced with 8259 programmable Interrupt controller. | (14) | 3 | 4 |

Q. Code:189619

| | | | Marks | CO | RBT LEVEL |
|---|---|---|---|---|---|
| **14. (a)** | | Illustrate the architectural features of 8051 microcontroller with necessary diagram. | **(14)** | **4** | **2** |
| | | **(OR)** | | | |
| **(b)** | **(i)** | Explain the functions of the SFR's present in the 8051 microcontroller. | **(6)** | **4** | **2** |
| | **(ii)** | Explain the Memory organization of 8051's RAM. | **(7)** | **4** | **2** |
| **15. (a)** | | Construct with neat diagram, a 7x5 dot matrix LED to display "E" by interfacing it with 8051 microcontroller. Write suitable Assembly language code and comment on it. | **(14)** | **5** | **4** |
| | | **(OR)** | | | |
| **(b)** | | Examine how an EEPROM can be interfaced with 8051 microcontroller using $I^2C$ standard. Write a suitable program to perform read/write operation. | **(14)** | **5** | **4** |

**PART- C (1 x 10 = 10 Marks)**

(Q.No.16 is compulsory)

| | | Marks | CO | RBT LEVEL |
|---|---|---|---|---|
| **16.** | Explain in detail how a stepper motor can be interfaced with 8051 and write a suitable assembly language program for the following condition. Assume a switch is connected at pin P1.5, rotate the stepper motor in counterclockwise direction when the switch is closed and in clockwise direction when the switch is open | **(10)** | **5** | **5** |

**********