Institute:	Institute of Technology
Name of Programme:	B.Tech. Electronics & Communication Engineering
Course Code:	2EC701
Course Title:	Microcontroller and Interfacing
Course Type:	(■ Core/ ☐ Value Added Course/☐ Departmental Elective/ ☐ Institute Elective/ ☐ University Elective/ (☐ Open Elective Any other)
Year of Introduction:	2023-24

Credit Scheme

L	T	Practical component				C
		LPW	PW	W	S	
2	-	2	-	-	-	3

Course Outcomes (CO):

At the end of the course, students will be able to –

1. comprehend the architecture and instruction set of 8051microcontroller — BL 2
2. demonstrate 8051 microcontroller programming proficiency — BL 3
3. develop interface logic for interconnection of peripheral devices and memory with microcontroller — BL 5
4. design microcontroller-based system for given applications — BL 6

Unit No.	Syllabus	Teaching hours
I	**Architecture of 8051 Microcontroller:** Introduction of Microprocessors and Microcontrollers, Architecture of 8051 microcontroller. 8051 pin signals, I/O ports interrupts, timer, serial communication.	08
II	**Assembly Language of 8051:** Instruction set of 8051. Addressing modes, Assembly directives, simple programming and programming of I/O ports, timer, interrupts, serial communication.	08
III	**Interfacing with 8051:** Interfacing of 8051 microcontroller with LEDs, keyboard, 7 segment, LCDs, ADCs, DACs, Sensors, External memory	06
IV	**Interfacing Standards:** Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART, Serial data transfer schemes, RS-232, RS-422, RS-485, USART Architecture and Interfacing	04
V	**8051 microcontroller Applications:** Design microcontroller-based system for monitoring and controlling of temperature, level, pressure, speed, humidity etc.	04

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:
Laboratory work will be based on above syllabus with minimum 10 experiments including assembly and C-language programming of 8051 microcontroller from the suggested list of experiments.

List of Experiments:

Sr. No.	Title of the experiment	Hours
1.	Write and execute assembly language program for understanding of addressing modes of 8051.	04
2.	Write and execute assembly and language programs based on arithmetic operations – Addition, subtraction, multiplication and division – 3 programming exercises	04
3.	Write and execute assembly language programs based on jump, loop and call instruction – 3 programming exercises	02
4.	Write and execute programs based on Logical, Rotate and Call instructions – 3 programming exercises	02
5.	Write and execute programs for IO port programming – 2 to 3 programming exercises	02
6.	Write and execute programs based on timer programming and applications – 3 programming exercises	02
7.	Write and execute assembly language programs for interrupt programming and application – 3 programming exercises	02
8.	Write and execute assembly language programs for serial communication programming and application – 3 programming exercises	02
9.	Interfacing and assembly language program for hex kay pad and push button	02
10.	Interfacing and assembly language program for 7-segment display	02
11.	Interfacing and Assembly language program for LCD	02
12.	Interfacing and assembly language program 8-bit ADC	02
13.	Interfacing and assembly language program for 8-bit DAC	02
14.	Interfacing and assembly language program for DC motor	02
15.	Interfacing and C language program for different Interfacing Standards	04

Note 1- Item 1 to 7 will be done on Keil IDE.
Note 2 – All Interfacing experiments (from 9 – 15) will be done using Keil and hardware boards.
Note 3 – Some of the programs will be done based on C language in addition to assembly language.

Suggested Readings:
1. Kenneth Ayala, The 8051 Microcontroller, Cengage
2. M. A. Mazidi, J. C. Mazidi and R.D.Mckinlay, The 8051 Microcontroller and Embedded System, Pearson
3. K Uma Rao and Andhe Pallavi, 8051 and MSP430 Microcontrollers: Architecture, Programming and Applications, Wiley