

## NIRMA UNIVERSITY

<b>Institute:</b>	<b>Institute of Technology</b>
<b>Name of Programme:</b>	<b>B. Tech. in Electrical Engineering</b>
<b>Semester:</b>	<b>IV</b>
<b>Course Code:</b>	<b>2EE503</b>
<b>Course Title:</b>	<b>Microprocessor and Microcontrollers</b>
<b>Course Type:</b>	<b>Core</b>
<b>Year of Introduction:</b>	<b>2023 – 24</b>

<b>L</b>	<b>T</b>	<b>Practical component</b>				<b>C</b>
		<b>LPW</b>	<b>PW</b>	<b>W</b>	<b>S</b>	
<b>2</b>	<b>0</b>	<b>2</b>	-	-	-	<b>3</b>

### Course Learning Outcomes (CLOs):

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

1. interpret the architecture of 8085 microprocessor and 8051 microcontroller. (BL2)
2. develop algorithm/program of the microprocessor and microcontrollers for an application. (BL6)
3. apply the knowledge of peripheral devices for real-world applications. (BL3)
4. infer the architecture of advanced microcontrollers. (BL2)

### Syllabus:

**Teaching Hours: 30**

<b>Unit-1</b>	<b>Microprocessor, architecture and programming</b>	<b>06</b>
	Introduction and history of microprocessor, 8085 microprocessor architecture and pin diagram, instructions and addressing mode, programming techniques.	
<b>Unit-2</b>	<b>MCS51 microcontroller architecture and programming</b>	<b>13</b>
	Introduction, 8051 microcontroller internal architecture, I/O pins, ports, counters, timers, interrupts, serial data input/output, special function registers, internal memory organization, Programming of 8051 in assembly and C language, timing diagrams, data types and time delay in 8051, I/O programming, serial port programming, timer programming, interrupts programming.	
<b>Unit-3</b>	<b>Applications of 8051</b>	<b>06</b>
	ADC, DAC, sensor interfacing, microprocessor-based relay applications, LCD interfacing, keyboard interfacing, dc motor interfacing, 8051 interfacing to external memory, embedded C programming for different applications.	
<b>Unit-4</b>	<b>Advanced Microcontrollers</b>	<b>05</b>
	CISC Vs RISC design philosophy, Von-Neumann vs Harvard architecture, Concept of pipelining, Introduction to ARM processors and its architecture	

### 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:

This shall consist of at least 10 practical / simulations based on the above syllabus.

**Suggested Reading:**

1. R. S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085, Penram International Publications
2. K. J. Ayala, The 8051 Microcontroller Architecture, Programming and Applications, Penram International Publications.
3. Mazidi and Mazidi, 8051 Microcontroller and Embedded system, Pearson Publications.
4. B. Ram, Fundamentals of Microprocessors and Microcontrollers, Dhanpat Rai Publishing Co.
5. R. S. Kaler, A Textbook of Microprocessors and Microcontrollers, I. K. International Publishing house.
6. Steve Furber, ARM System-on-Chip Architecture, Pearson Education Limited
7. Andrew N Sloss, Dominic Symes, Chris Wright, ARM System Developer's Guide: Designing and Optimizing System Software, Morgan Kaufmann Publishers
8. Hall D V, Microprocessors & Interfacing, McGraw Hill

**Suggested List of Experiments (not restricted to the following):  
(Only for Information)**

	<b>Title of Experiment</b>	<b>Hrs.</b>
1.	To apply the data transfer instructions of 8085 microprocessor.	2
2.	To apply the arithmetic and logical instructions of 8085 microprocessor.	2
3.	To apply branching instructions of 8085 microprocessor.	2
4.	Assembly language programming using subroutine technique.	2
5.	Introduction to Keil software for assembly and C programming of 8051 microcontroller.	2
6.	To apply data transfer instructions of 8051 microcontroller.	2
7.	To apply arithmetic and logical instructions of 8051 microcontroller.	2
8.	To apply branching instructions of 8051 microcontroller through assembly language programming.	2
9.	To apply branching instructions of 8051 microcontroller through C programming.	2
10.	Timer programming of 8051 microcontroller using Keil.	2
11.	Interfacing of LED and LCD display control using 8051 microcontroller with the help of assembly and C programming.	2
12.	Interfacing of ADC and DAC with 8051 microcontroller.	2

L = Lecture, T = Tutorial, P = Practical, C = Credit

w.e.f. academic year 2023 - 24 and onwards