

## **Short Syllabus**

**BECE204L**

**Microprocessors and Microcontrollers (3-0-0-3)**

Overview of Microprocessors - Introduction to 8-bit/16-bit Microprocessor; Microprocessor Architecture and Interfacing: Intel x86 - 8086 Architecture and Addressing modes; Microcontroller Architecture: Intel 8051 – RAM ROM Organization, Assembly programming; Microcontroller 8051 Peripherals – Timers, Counters; I/O interfacing with Microcontroller 8051 - LCD, Sensor with Signal Conditioning Interface; ARM Processor Architecture - Overview of ARM architecture; ARM Instruction Set - Assembly Programming.

<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>BECE204L</b>	<b>Microprocessors and Microcontrollers</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Pre-requisite</b>	<b>BECE102L</b>	<b>Syllabus version</b>			<b>1.0</b>

**Course Objectives:**

1. To acquaint students with architectures of Intel microprocessors, microcontroller and ARM processors.
2. To familiarize the students with assembly language programming in 8051 microcontroller and ARM processor.
3. To interface peripherals and I/O devices with the 8051 microcontroller.

**Course Outcome:**

At the end of the course, the student should be able to

1. Comprehend the various microprocessors including Intel Pentium Processors
2. Infer the architecture and Programming of Intel 8086 Microprocessor.
3. Comprehend the architectures and programming of 8051 microcontroller.
4. Deploy the implementation of various peripherals such as general purpose input/output, timers, serial communication, LCD, keypad and ADC with 8051 microcontroller
5. Infer the architecture of ARM Processor
6. Develop the simple application using ARM processor.

<b>Module:1 Overview of Microprocessors</b>	<b>3 hours</b>
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Introduction to Microprocessors, 8-bit/16-bit Microprocessor, Overview of Intel Pentium, I (i3, i5, i7) Series Processor.

<b>Module:2 Microprocessor Architecture and Interfacing: Intel x86</b>	<b>8 hours</b>
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16-bit Microprocessor: 8086 - Architecture and Addressing modes, Memory Segmentation, Instruction Set, Assembly Language Processing, Programming with DOS and BIOS function calls, minimum and maximum mode configuration, Programmable Peripheral Interface (8255), Programmable Timer Controller (8254), Memory Interface to 8086.

<b>Module:3 Microcontroller Architecture: Intel 8051</b>	<b>7 hours</b>
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Microcontroller 8051 - Organization and Architecture, RAM-ROM Organization, Machine Cycle, Instruction set: Addressing modes, Data Processing - Stack, Arithmetic, Logical; Branching – Unconditional and Conditional, Assembly programming.

<b>Module:4 Microcontroller 8051 Peripherals</b>	<b>5 hours</b>
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I/O Ports, Timers-Counters, Serial Communication and Interrupts.

<b>Module:5 I/O interfacing with Microcontroller 8051</b>	<b>7 hours</b>
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LCD, LED, Keypad, Analog-to-Digital Convertors, Digital-to-Analog Convertors, Sensor with Signal Conditioning Interface.

<b>Module:6 ARM Processor Architecture</b>	<b>5 hours</b>
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ARM Design Philosophy; Overview of ARM architecture; States [ARM, Thumb, Jazelle]; Registers, Modes; Conditional Execution; Pipelining; Vector Tables; Exception handling.

<b>Module:7 ARM Instruction Set</b>	<b>8 hours</b>
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ARM Instruction- data processing instructions, branch instructions, load store instructions, SWI Instruction, Loading instructions, conditional Execution, Assembly Programming.

<b>Module:8 Contemporary issues</b>	<b>2 hours</b>
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	<b>Total Lecture hours:</b>	<b>45 hours</b>
<b>Text Book(s)</b>		
1.	A.K. Ray, K.M. Bhurchandi, Advanced Microprocessor and Peripherals, 2012, 2 <sup>nd</sup> Edition, Tata McGraw-Hill, India.	
2.	Mohammad Ali Mazidi, Janice G. Mazidi, Rolin D. McKinlay, The 8051 Microcontroller and Embedded Systems, 2014, 2 <sup>nd</sup> Edition, Pearson, India.	
<b>Reference Books</b>		
1.	Muhammad Ali Mazidi, ARM Assembly Language Programming & Architecture: 1, 2016, 2nd Edition, Microdigitaled.com	
2.	A. Nagoor Kani, 8086 Microprocessors and its Applications, 2017, Second Edition, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, India.	
3.	Joseph Yiu, The Definitive Guide to ARM® Cortex®-M0 and Cortex-M0+ Processors, 2015, 2 <sup>nd</sup> Edition, Elsevier Science & Technology, UK	
Mode of Evaluation: Continuous Assessment Test, Digital Assignment, Quiz and Final Assessment Test		
Recommended by Board of Studies	14-05-2022	
Approved by Academic Council	No. 66	Date 16-06-2022