

## DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Date: 16-02-2026

### CO-PO Mapping and CIE portions Coverage Details.

Batch: 2024-28	Academic Year & Semester: 2025-26 & IV
Course Name: Microcontroller Laboratory	
Course Title & Code: BECL456A	
Course Coordinators: Mrs. Swetha K T	

### 1. Course Outcomes (COs)

#### (a) VTU Defined & Redefined COs

CO	VTU Defined CO Statement	Redefined CO (if applicable)
CO1	Write a Assembly language / C programs in 8051 for solving simple problems that manipulate input data using different instructions.	
CO2	Develop testing and experimental procedures on 8051 Microcontroller, analyse their operations under different cases.	
CO3	Develop programs for 8051 Microcontroller to implement real world problems.	
CO4	Develop microcontroller applications using external hardware interface.	

### 2. CO-PO-PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	3	-	-	2	-	-	1	2	2
CO2	3	3	2	3	3	-	-	2	-	-	1	2	2
CO3	3	3	3	2	3	-	-	2	-	-	2	3	2
CO4	3	2	3	2	3	-	-	2	-	-	2	3	2

Note: 1: Low, 2: Medium, 3: High contribution

### 3. CIE Portion & Coverage (IA-1, IA-2, IA-3)

IA No.	Module(s)/ Topic Covered	COs Mapped	RBT Levels (L1-L6)	Remarks
IA-1	1. Assembly Language Programming 2. Arithmetic & Logical Operation Programs	CO1	L3	
IA-2	1. Counter Operation Programs: 2. C Programming 3. Hardware Interfacing Programs	CO4	L3	

Course Coordinators Sign

Vertical Head Sign

HoD

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Justification of CO-PO Mapping		
Course Name: <b>Microcontroller Lab (BECL456A)</b>		Year of Study: <b>2025-26</b>
Coordinator: <b>Swetha K T</b>		Semester: <b>4<sup>th</sup></b>
Course Outcomes		
<b>CO1:</b>	Write a Assembly language / C programs in 8051 for solving simple problems that manipulate input data using different instructions.	
<b>CO2:</b>	Develop testing and experimental procedures on 8051 Microcontroller, analyse their operations under different cases.	
<b>CO3:</b>	Develop programs for 8051 Microcontroller to implement real world problems.	
<b>CO4:</b>	Develop microcontroller applications using external hardware interface.	
CO	Mapped POs	Justification
<b>CO1</b>	<b>PO1</b>	Students apply core engineering knowledge of microcontroller architecture, instruction sets, memory organization, and programming concepts to develop Assembly and C programs
	<b>PO2</b>	Basic problem analysis is involved in understanding logic, instruction flow, and data manipulation, but problems are well-defined and structured.
	<b>PO3</b>	Programs are simple and predefined, involving minimal design decisions, hence low contribution to solution design.
	<b>PO5</b>	Students use modern embedded tools such as assemblers, compilers, and simulators for program development and execution.
	<b>PO8</b>	Students perform experiments individually while discussing program logic, debugging steps, and execution flow with peers during lab sessions. This encourages collaborative learning and peer interaction, resulting in an average contribution to PO8
	<b>PSO1</b>	<ul style="list-style-type: none"> <li>Students write Assembly and C programs for the 8051 microcontrollers.</li> <li>This builds fundamental embedded programming skills and introduces usage of microcontroller development tools.</li> <li>However, applications are basic and introductory, hence a moderate contribution</li> </ul>
	<b>PSO2</b>	<ul style="list-style-type: none"> <li>Programming tasks are largely individual and guided.</li> <li>Limited scope for teamwork, leadership, or requirement analysis.</li> <li>Therefore, contribution to professional and collaborative skills is low.</li> </ul>
<b>CO2</b>	<b>PO1</b>	Engineering fundamentals are applied to understand microcontroller operation under different conditions.
	<b>PO2</b>	Students analyze program behavior, debug errors, and evaluate outputs for different test cases, demonstrating strong analytical skills.
	<b>PO3</b>	Development of experimental procedures.
	<b>PO4</b>	Involves conducting experiments, observing results, validating outputs, and drawing conclusions, fulfilling investigative learning.
	<b>PO5</b>	Embedded development tools and debugging utilities are used for testing and validation.
	<b>PO8</b>	focuses on developing and testing experimental procedures and analyzing results. Students often work in small groups to observe outputs, validate results, and troubleshoot errors, promoting teamwork and shared responsibility in achieving experimental objectives.
	<b>PSO1</b>	<ul style="list-style-type: none"> <li>Students test, debug, and analyze microcontroller programs under different operating conditions.</li> <li>Enhances understanding of embedded system behavior and tool-based analysis.</li> <li>Since activities are lab-oriented and predefined, contribution is moderate.</li> </ul>

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	PSO2	<ul style="list-style-type: none"> <li>Experiments require procedural planning, observation, and interpretation of results.</li> <li>Students interact with peers and instructors during lab execution and viva.</li> <li>This supports team interaction and problem understanding, giving a moderate contribution</li> </ul>
CO3	PO1	Application of core engineering concepts. Students apply embedded system concepts to practical applications rather than theoretical analysis.
	PO2	Real-world problems require identification of constraints, logical breakdown, and efficient solution development
	PO3	Students design and implement embedded solutions addressing real-time and application-oriented problems.
	PO4	Verification of program functionality through testing and performance observation is involved.
	PO5	Effective use of microcontroller programming environments, interfacing techniques, and development tools.
	PO8	emphasize solving real-world problems using microcontroller programming. Students collaborate to interpret problem statements, divide tasks such as coding, testing, and result analysis, and jointly arrive at feasible solutions, thereby supporting team-based execution.
	PSO1	<ul style="list-style-type: none"> <li>Students develop programs to address real-world embedded problems.</li> <li>Strongly aligns with design, analysis, and application of embedded systems.</li> <li>Demonstrates direct achievement of PSO1 → strong contribution.</li> </ul>
	PSO2	<ul style="list-style-type: none"> <li>Requires understanding of problem requirements and developing feasible solutions.</li> <li>Mostly executed individually with some peer interaction.</li> <li>Hence, moderate contribution to professional engineering practice.</li> </ul>
CO4	PO1	Strong application of electronics, microcontrollers, peripherals, and interfacing concepts.
	PO2	Students analyze hardware–software interactions and resolve interfacing issues.
	PO3	Design and implementation of complete embedded systems involving external hardware.
	PO4	Includes testing, observation, and validation of interfaced hardware behavior.
	PO5	Extensive use of modern tools, development boards, peripherals, and embedded platforms.
	PO8	These experiments require coordinated efforts in circuit setup, programming, and observation, fostering effective collaboration and role-based teamwork in the laboratory environment.
	PSO1	<ul style="list-style-type: none"> <li>➤ Hardware interfacing (stepper motor, DAC, waveform generation) demands: <ul style="list-style-type: none"> <li>Integration of software and hardware.</li> <li>Use of modern embedded tools and peripherals.</li> </ul> </li> <li>➤ Direct and strong alignment with embedded system design and applications.</li> </ul>
	PSO2	<ul style="list-style-type: none"> <li>➤ Interfacing tasks involve: <ul style="list-style-type: none"> <li>Team-based lab work</li> <li>Troubleshooting real hardware issues</li> <li>Applying engineering judgment</li> </ul> </li> </ul>