

**3EC03: MICROCONTROLLER AND APPLICATIONS LAB**  
**CREDITS – 1 (LTP:0,0,2)**

**Course Objective:**

Main objective of this subject is to introduce RISC Architecture in AVR Atmega32 Microcontroller and its features. To enable students design microcontroller based embedded systems for applications.

**Teaching and Assessment Scheme :**

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
L	T	P		C	Theory Marks		Practical Marks	
			ESE		CE	ESE	CE	100
0	0	2	1	0	0	40	60	

**List of Experiments :**

Sr. No.	Practical List
1.	Demonstrate use of instructions and effect on Status Register. a. Data Transfer instruction
2.	Demonstrate use of Branching, arithmetic and logical instructions. Check effect on Status registers
3.	Conversion: BCD-ASCII, ASCII-BCD, HEX-BCD, BCD-HEX
4.	Basic Digital IO Programming : a. LED interfacing and programming b. Switch interfacing and programming. (with and without interrupt)
5.	Display interfacing and programming : a. LCD interfacing and programming b. 7-segment interfacing and programming
6.	Keypad interfacing and programming
7.	PIR sensor based motion detection
8.	Ultrasonic sensor based distance measurement.
9.	Temperature monitoring and control using LM35.
10.	Light intensity monitoring using LDR.
11.	DC motor direction control using L293D
12.	Stepper motor interfacing and programming.
13.	Serial communication programming.
14.	I2C – nRF24L01+ interfacing and programming.
15.	SPI – DS1307 interfacing and programming.

**List of References :**

1. Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi, *“The AVR Microcontroller and Embedded Systems: Using Assembly and C”*, 1st Edition, Pearson Education, 2012.
2. Dhananjay Gadre. *“Programming and Customizing the AVR Microcontroller”*, 1st Edition, TMH, 2001
3. AVR ATmega32 data sheet.

**Course Outcomes (COs) :**

1. Relate concepts of Digital circuits and microprocessor with microcontroller and outline AVR features.

2. Understand AVR architecture and assembly programming.
3. Interface and program IO devices to use it for user interface.
4. Make use of sensors for monitoring different quantities in application.
5. Design and use driving circuit to interface actuators in applications
6. Integrate Communication protocols for intra and inter system communication.