Department Elective with Laboratory

Nirma University
School of Technology, Institute of Technology
B. Tech (Electronics and Instrumentation Engineering)

L	T	P	C
2	0	2	3

Course Code	**2EIDE51**
Course Title	**Embedded Controller based design**

Course Outcomes (CO):
At the end of the course, students will be able to –

- illustrate the architecture of AVR microcontrollers
- program AVR controllers in C and assembly language
- design and develop embedded systems based on AVR microcontrollers

Syllabus	**Teaching Hours**
UNIT 1: Introduction to AVR microcontrollers	
Overview of the AVR family, ATmegaxxx series pin configuration, RISC architecture, General purpose registers, data memory, status register, data format and directives.	**02**
UNIT 2: Overview of Assembly Language Programming	
Introduction to instruction set, branch and looping, advanced assembly instructions.	**05**
UNIT 3: Introduction C language programming	
Data types and time delay, I/O programming, logic operations, data conversions, memory allocations , serial communication, interrupt programming, I^2C and SPI Communication.	**08**

UNIT 4: Timer and Counter **04**

Programming timers 0, 1 and 2, counter programming, timer programming in c Interrupt: AVR Interrupts, programming timer interrupts, external hardware interrupts, interrupt priority, interrupt programming in C.

UNIT 5: ADC and DAC Interfacing and Programming **03**

ADC characteristics, ADC interfacing, ADC programming, sensor interfacing and signal conditioning, DAC interfacing, DAC programming

UNIT 6: Applications of AVR Controller

Interfacing and programming for LED's, push buttons, switches, buzzer, LCD, keyboard, DC motor, stepper motor, servo motor, relay, opto-isolator, temperature sensor, IR sensor, ultrasonic sensor, designing of embedded systems using AVR microcontroller. **08**

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 consist of minimum 10 experiments based on the above syllabus.

References:

1. Muhhamad Ali Mazidi, The AVR Microcontroller and Embedded System Using Assembly and C, Pearson Publication
2. Michael Margolis, Arduino Cookbook, O'reilly Publication
3. Dhananjay V Gadre, Programming and Customizing The AVR Microcontroller, McGraw-Hill Publication.
4. User manual of Atmega 128/328 series controller.