Progressive Education Society's

Modern College of Arts, Science and Commerce,

Shivajinagar, Pune – 5

(Autonomous College)

Third Year of B.Sc. (Computer Science) Major Elective: Electronics

Under NEP_2020 (NEP 2023)

SEMESTER V

Course Code: 23CsEleU5203 **Course Name: Intel 8051 and AVR microntroller**

Teaching Scheme: TH: 2 hrs / Week **Credit : 02**

Examination Scheme: CIA: 20 Marks **End-Sem: 30 Marks**

Prerequisites: Basic knowledge of Digital Electronics and C programming

Course Outcomes:

- Understand the architecture and operation of the 8051
- Understand the architecture and operation of the AVR microcontrollers.
- Develop assembly programming skills for these microcontrollers.
- Capable to write embedded C programming for these microcontrollers.
- Develop interfacing skills for peripherals such as LCD, Keypad, ADC, DAC, motors, and sensors.
- Implement 8bit embedded system applications using 8051 and AVR.

Course Contents

Chapter 1	**Introduction to Microcontrollers**	8 Hrs
	Microprocessors vs. Microcontrollers, Classification and applications of microcontrollers, Comparison of different microcontroller families (8051, AVR, PIC, ARM) **Architecture & Features** Intel 8051 architecture, Internal memory organization (RAM, ROM), Special function registers (SFRs), I/O ports and pin configuration, Timers and Counters, Interrupts.	
Chapter 2	**Instruction Set, Interfacing and Programming**	10 Hrs
	Assembly language programming:- Addressing modes, Instruction set, assembler directives(ORG,DB, END),Delay generation using loops and timers **Peripheral Interfacing**:- LED, Seven-Segment Display, LCD and Keypad, Serial Communication (UART),Timer-based delay generation.	

Chapter 3	**AVR Microcontroller Architecture & Features**	4 Hrs
	AVR family overview (ATmega series), Harvard architecture and RISC features, Memory organization (Flash, EEPROM, SRAM), GPIO structure and pin configurations	
Chapter 3	**Programming & Development**	8 Hrs
	Introduction to AVR Studio & Atmel Studio, **Embedded C programming for AVR:-** I/O operations and delays, Timers and interrupts **Peripheral Interfacing**: ADC and DAC, PWM generation, Serial communication (USART, SPI, I2C),DC motor and stepper motor interfacing, Real-time clock (RTC) interfacing.	

Text/ Reference Books:

1. 1. **"The 8051 Microcontroller and Embedded Systems"** – Muhammad Ali Mazidi, Janice Gillispie Mazidi, and Rolin McKinlay
2. **"AVR Microcontroller and Embedded Systems"** – Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi
3. **"Microcontroller Theory and Applications with the PIC18F"** – M. Rafiquzzaman
4. **Datasheets and Application Notes from Intel (8051) and Atmel (AVR)**

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Third Year of B.Sc. (Computer Science) Major Elective: Electronics

Under NEP_2020 (NEP 2023)

SEMESTER V

Course Code: 23CsEleU5203 Course Name: Lab on Intel 8051 and AVR microntroller

Teaching Scheme: PR: 4 hrs / Week **Credit : 02**

Examination Scheme: CIA: 20 Marks **End-Sem: 30 Marks**

Prerequisites: Basic knowledge of Digital Electronics and C programming

Course Outcomes:

- Understand the architecture and operation of the 8051 and AVR microcontrollers.
- Learn assembly and embedded C programming for these microcontrollers.
- Develop interfacing skills for peripherals such as LCD, Keypad, ADC, DAC, motors, and sensors.
- Implement embedded system applications using 8051 and AVR.

List of Practical

1. Basics of assembly program: basic arithmetic and logical instruction handling Code conversion, Equal length array addition, Array sorting.
2. Study of LED interfacing to 8051 and programme for LED blinking using 8051
3. Study of SSD interfacing and programming using 8051 as rolling display.
4. Study of Interfacing thumb wheel switch and SSD and programming of 8051
5. Study of LCD interfacing and its programming using 8051
6. Create a simple serial communication program to send characters between the 8051 and PC.
7. Study of waveform generations using DAC 8051.
8. Basics of AVR programming (I/O, Arithmetic and Logic).
9. Program to convert Packed BCD number into ASCII and ASCII to BCD using instruction Set of AVR.
10. Study for PWM Generation for speed control of DC motor using AVR.
11. Study of ADC interfacing and sensor reading using AVR.
12. Study the I2C EEPROM interfacing with AVR.
13. Study of SPI based RTC interfacing to AVR.
14. Study to interface of IR modules as object detector using AVR.
15. Building a mini project (e.g., temperature monitoring system) 8051/AVR

(weightage of 3 practical).