Microprocessor and Embedded Systems

1.1 Course Number: ECE321

1.2 Contact Hours: 3-0-0   Credits: 9

1.3 Semester-offered: 4th Year-Odd Semester

1.4 Prerequisite: Basic knowledge of digital electronics and computer architecture is required.

1.5 Syllabus Committee Member: Dr. Umakant Dhar Dwivedi, Dr. Abhishek Kumar Singh, Dr. Sajal Agarwal, Dr. Vijay Kumar Singh, Dr. Ankur Pandey.

2. **Objective:**
    - Apply the fundamentals of assembly level programming of 8085 microprocessor and 8051 microcontroller.
    - Work with standard microprocessor real time interfaces
    - Develop skill for writing C programs for 8051 microcontroller.
    - Design microprocessors/microcontrollers-based systems.

3. **Course Content:**

    Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	**Introduction to Microprocessor**	Internal architecture of 8085 microprocessor –Instruction set - Addressing modes – Classification of instructions. Assembly language programming –standard programs in assembly, Stack and Subroutines – CALL and RETURN instructions – Delay subroutines. Timing and control – Machine cycles, instruction cycle and T states – fetch and execute cycles – Timing diagram for instructions.	14
2	**Interfacing of Microprocessor with I/O Devices**	IO and memory interfacing – Address decoding– interrupt structure of 8085. I/O ports- Programmable peripheral interface PPI 8255 - Modes of operation. Interfacing of LEDs, ADC and DAC with 8085.	8

3	**Introduction to Microcontroller**	Introduction to Embedded Systems-Application domain of embedded systems, features and characteristics, System model, 8051- Microcontrollers Hardware: Microcontroller Architecture: IO Port structure, register organization, general purpose RAM, Introduction to microcontrollers, overview of architecture of a typical microcontroller such as AVR microcontroller, addressing, assembly language programming.	10
4	**Application and Interfacing with Microcontroller**	Interfacing with LEDs, Seven Segment, Sensors, Basic concepts of LCD, ADC, DAC, Relays etc. and their interfacing to microcontroller.	8
		Total	**40**

4. **Readings**

4.1 **Textbook:**

1. Mohamed Ali Mazidi,Janice Gillispie Mazidi," The 8051 microcontroller and embedded systems using Assembly and C",second edition, Pearson education /Prentice hall of India.
2. Ramesh Gaonkar, Microprocessor, Architecture, Programming and Applications, Penram International Publishing; Sixth edition, 2014.
3. Mathur A., Introduction to Microprocessors, Tata McGraw Hill, New Delhi, 1992.
Douglas V. Hall, Microprocessors and Interfacing, Tata McGraw Hill, Education, New Delhi, Third Edition.

4.2 **Reference Books**

1. Scott MacKenzie, Raphael C W Phan, "The 8051 Microcontroller", Fourth Edition, Pearson education.

Outcome of the Course: At the end of the course the student should be able to: recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system. Identify a detailed s/w & h/w structure of the Microprocessor. Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor. Distinguish and analyze the properties of Microprocessors. Analyze the data transfer information through serial & parallel ports.