Course Type	Course Code	Name of Course	L	T	P	Credit
DC	ECC209	Microprocessors & Microcontrollers	3	0	0	9

Course Objective

To provide adequate knowledge to students for designing various types of microprocessor and microcontroller based low cost and efficient embedded designs.

Learning Outcomes

Upon successful completion of this course, students can able to:

- Gain information about the programming techniques using assembly and machine language with processor.
- Know the various conditions, limitations and handshaking process of peripherals with microprocessors.
- Develop their project-oriented work in the field of modern and advanced embedded systems.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Intel 8085 CPU Architecture and Pin Outs, Timing Diagram, Stacks and Subroutines, Addressing Modes, Instruction sets, Programming, Interrupt Structure and Serial I/O, Memory and I/O Interface.	7	Gain a basic understanding of various instructions, codes and execution techniques of assembly language
2.	Interfacing Different Peripherals: Programmable Interval Timer (8254), Programmable Peripheral Interface (8255) and Programmable Interrupt Controller (8259). Introduction to Programmable DMA Controller (8237) and Programmable Communication Interface (8251). Interfacing of A/D and D/A converters	7	Develop procedures to connect interfacing devices to microprocessor units and know their optimization ways.
3.	Applications of Microprocessor for Measurement of Physical Quantities (Temperature, Strain, Deflection, Level and Speed of Motor), Traffic Control, Generation of Square wave / Pulse. Measurement of Electrical Quantities (Frequency, Phase Angle and Power Factor, Impedance).	6	Ability to use microprocessors for monitoring and controlling different purposeful devices.
4.	Intel 8086 CPU Architecture and Pin Outs, Minimum and Maximum Mode, Memory Segmentation, Addressing Modes, Memory Interface.	7	Acquire knowledge about the applications of higher bit and efficient processors.
5.	Microcontrollers 8051 systems; Memory Organization Input/Output Ports, Interrupts, Timers/Counter, Serial Communication, Power Control. 8051 µC instructions and its assembly language programming Concepts of 8051 µC. Interfacing of some other devices/peripherals with 8051 µC, e.g., LCD, ADC, DAC , Motor Control: DC and Stepper motors. Comparison of CISC and RISC processors.	8	Ability to successfully develop novel projects in embedded systems by using some advanced microcontrollers.
6.	ARM microcontrollers; ARM instruction set: programming model, assembly language, ARM interrupts vectors, priorities and latency; Embedded system design approaches, embedded controller design, RTOS, Tasks and Task States, Semaphores.	7	Acquire knowledge for using ARM microcontrollers and techniques of their implementation.

Textbook:

1. R.S. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, Penram International Publishing, 2017.
2. M. A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", Prentice-Hall of India PVT LTD, 2014.

Reference Books:

1. J.H. Hennessy, and D.A. Patterson, Computer Architecture: A Quantitative Approch, Morgan Kaufmann Publishers, 2006.

2. Kenneth J. Ayala, The 8051 Microcontroller, Architecture, Programming and Applications, Penram International Publishing, 2016.
3. K Ayala, “The 8051 Microcontroller & Embedded Systems Using Assembly and C”, Ceneage Learning India PVT LTD, 2017.
4. The 8051 Microcontroller Based Embedded Systems, Manish K Patel, McGraw Hill Education (India), 2018.