Microprocessor Systems

Code	Credit Hours
EE-222	3-1

COURSE DESCRIPTION:

The course covers the architectural aspects and assembly language programming of general-purpose processors based on RISC architecture. The course also includes the study of one of the microcontroller architectures and developing real-time applications with them. The skills acquired can be used in the areas of electronics, communications, embedded system and industrial automation design.

TEXT BOOKS:

1. 8086 IBM PC and compatible computers, Muhammad Ali Mazidi`
2. PIC Microcontroller and Embedded Systems, Muhammad Ali Mazidi
3. The AVR Microcontroller and Embedded Systems: Using Assembly and C,Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi

REFERENCE BOOK:

1. Computer Organization and Design The Hardware/Software Interface (RISC-V Edition) by Hennessy and Patterson, Morgan Kaufmann
2. Some Assembly Required; Assembly language programming with the AVR microcontroller by Margush, CRC
3. Definitive Guide to the ARM Cortex-M3 and M4 Microcontrollers, Third Edition by Joseph Yiu.

SUGGESTED OUTLINE:

WEEK NO	TOPICS	LEARNING OUTCOMES
1	Introduction	Course outline, objectives, teaching plan, assessment method, introduction to computing systems
2	Microprocessor (Basics)	Introduction to CPU, ALU, program counter, buses, memories and peripherals
3-4	Memories	Memories types and interfacing with microprocessor
5-8	Microcontrollers (Basics)	Introduction to AVR/PIC Microcontrollers, architecture, assembly language (arithmetic operation, flags, jumps and branches, procedure calls and stack, bit operations)
MID TERM EXAM		
9-11	Microcontrollers (Advance)	Microcontrollers internal memories manipulation, Microcontrollers programming in C
12-17	Microcontroller Peripherals	Timers, interrupts, serial port, ADC sensor interfacing, pulse width modulation, relays and dc motor control

	(Advance)	
END SEMESTER EXAMS		

Experiments:

S.No.	List of Experiments
1	Read-only-memory (ROM) initialization and data reading
2	Random-access-memory (RAM) data write and read
3	Simulation of Arithmetic Logic Unit circuit with file register
4	Address decoding circuit for memories interface
5	Branching, call and I/O instructions in assembly language
6	Arithmetic and logic instructions in assembly language
7	Compare, rotate and indirect addressing mode instructions in assembly language
8	PIC Programming in C language
9	AVR Programming in C language
10	Generating square wave using timer
11	Introduction to hardware
12	LCD/7-Segment Display Interfacing (Open ended)
13	Serial communication and interrupts
14	Data Acquisition using ADC