Course Title : AVR Microcontroller			
Course Code : P18CS45	**Semester : 4**	**L :T:P:H : 4:0:0:4**	**Credits: 3**
Contact Period: Lecture: 52 Hr, Exam: 3 Hr		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit 1

Microcontrollers and embedded processors: microcontroller versus microprocessors, criteria for choosing microcontroller. Overview of the AVR family, general purpose registers in AVR, the AVR data memory, instructions with data memory, AVR status register, AVR data format and directive, AVR assembly instruction format, the program counter and program ROM space in AVR.

Self-study components: Introduction to computing- numbering and coding system.

11 Hours

Unit 2

Branch instruction and looping in AVR: looping in AVR, other conditional jumps, unconditional branch instruction. Call instructions and Stack: CALL, RCALL, and ICALL. I/O port programming in AVR, I/O Bit-manipulation programming.

Self-study components: AVR time delay: time delay calculation for AVR.

10 Hours

Unit 3

Arithmetic instructions: Addition, subtraction, multiplication and division of unsigned numbers, signed number concepts and arithmetic operations. Logical and compare instructions. Rotate and Shift instructions.

Self-study components: Data serialization.

11 Hours

Unit 4

BCD and ASCII conversion, introducing to some more assembler directives, Register and Direct addressing mode, register and indirect addressing mode. Macros, Timer 0 programming

Self-study components: look-up table and table processing.

10 Hours

Unit 5

AVR programming in C: Data types and time delays in C, I/O programming in C, Logic operations in C, Data conversion programs in C,Memory allocations in C. Keypad interfacing: Interfacing the keypad to AVR.

Self-study components: Data serialization in C.

10 Hours

Text book:

1. The AVR microcontroller and embedded system using assembly and C by Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi.

Reference book:

1. Programming and interfacing ATMEL's AVRs by Thomas grace.

Course outcomes:

1. Compare and contrast Microprocessor and Microcontroller
2. Code simple AVR assembly language instructions.
3. Code assembly language to use the ports for input or output
4. Code c program for time delay, logical and arithmetic operations and fro data serialization.
5. Interfacing the keypad to the AVR using assembly and C

CO-PO Mapping

Course code : P18CS45		Title : AVR Microcontroller													
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO 1	**Compare and contrast** Microprocessor and Microcontroller	3	3	3	1					2		2	2		3
CO 2	**Code** simple AVR assembly language instructions.	3	2	3	1					2		2	2		3
CO 3	**Code** assembly language to use the ports for input or output	3	3	3		2				2		2			3
CO 4	**Code** c program for time delay, logical and arithmetic operations and fro data serialization.	2	2	2						2		2			2
CO 5	**Interfacing** the keypad to the AVR using assembly and C	2	1	1											2
		2.6	**2.2**	**2.4**	**1**	**2**				**2**			**2**	**2**	**2.6**