MICROCONTROLLERS

Course Code : 19EC4DCMIC
L : P : T : S : 3 : 0 : 0 : 0
Exam Hours : 03
Total Hours : 40

CREDITS : 03
CIE Marks : 50
SEE Marks : 50
CIE + SEE Marks : 100

COURSE OBJECTIVES:

1. To give comprehensive coverage of theoretical and programming concepts.
2. To discuss about the fundamentals of 8051 and ARM with architecture and memory organization.
3. To impart knowledge on different instruction sets and addressing modes, that deals with methods of accessing memory using instructions.
4. To provide exposure to assembly language and insight about timers and its operation along with programming concepts using both C and assembly language.
5. To disseminate knowledge on serial communication, interrupts and its programming.
6. To enhance overall programming skills to develop interfaces Programs of 8051.

COURSE OUTCOMES:

At the end of the course, student will be able to

CO1	**Use** the knowledge of memory architecture, instruction set to categorize the controllers**.**
CO2	**Analyze** the fundamental concepts of 8051 and ARM.
CO3	**Apply** the knowledge of instruction set and addressing modes to write assembly level coding.
CO4	**Use** the programming skills for coding software delay programs of 8051.
CO5	**Analyze** and code for serial communication, timers and interrupts of 8051.
CO6	**Develop 8051** on-chip peripheral programs for interfacing applications.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-
CO6	3	2	1	1	-	-	-	-	-	-	-	-

Module	Course Content	Hours	COs
1	**Introduction:** Overview of microcomputer systems and their building blocks, Difference between Microprocessors and Microcontrollers, RISC & CISC Architectures, Harvard & Von-Neumann memory organizations. **8051 microcontroller:** Pin diagram, Architecture, memory organization including stack mechanism. **Text Book-1,2**	08	CO1 CO2
2	**8051 instruction Set:** Addressing modes -Immediate, direct, Indirect, Register, Indexed .Data transfer instructions, arithmetic and logical instructions, Bit manipulation, Jump and call instructions. Assembler directives. **Text Book-1**	08	CO3
3	**8051 Programming:** Assembly language programs, Software delay calculations, Software delay programming. **8051 Interrupts:** Introduction, programming external interrupts in assembly. **Text Book-1**	08	CO4 CO5
4	**8051 Timers and serial port:** Timer introduction, Different modes of timer operations, Assembly and C programming on Timers (Mode1 and Mode 2) . Basics of 8051 Serial Communication, RS 232 connections, C programming on serial communication **Text Book-1**	08	CO5
5	**8051 Interfacing applications :** Interfacing 8051 to Keyboard (4X4), LCD. **Text Book -1** **Fundamentals of ARM :** ARM core data flow model, Registers, Current Program Status Register, Pipeline, Core Extensions, Architecture Revisions. **Text Book-3**	08	CO2 CO6

NOTE:

1. Questions for CIE and SEE not to be set from self-study component.
2. Open book assignment.

SELF-STUDY COMPONENT:

UNIT 1 : Evolution of Microcontrollers, external memory interfacing.
UNIT 2 : Addressing Modes related to CALL, JUMP and Bit Addressable Instructions.

UNIT 3 : Introduction to Embedded C.
UNIT 4 : 8051 counters & its programming.
UNIT 5 : Arm -exceptions, Interrupts and vector table, comparision between ARM and 8051.

TEXT BOOKS:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay, "The 8051 Microcontroller and Embedded Systems – using assembly and C ", *PHI*, 2006
2. Kenneth J. Ayala, "The 8051 Microcontroller", *Penram International Publishing*, 1996.
3. Andrew N Sloss, Dominic Symes, Chris Wright, "ARM systems Developer's Guide " Elsever Publication, 2004

REFERENCE BOOKS:

1. Narendra Kumar & HemanthKumar C.S., "Microcontrollers 8051 and MSP 430", *Excellent Engineer Publications*.
2. D.A. Patterson and J.H. Hennessy, "Computer Organization and Design-The hardware and software interface", *Morgan Kaufman Publishers*.
3. V. Udayshankara and M.S. Mallikarjuna Swamy, "8051 Microcontroller".

Scheme of Evaluation of the CIE & Assessment Pattern :

Assignment : Only one assignment (open book test normally) will be of 10 marks & conducted in the class during the course of the semester (normally midway thro' the semester or in between 2nd & 3rd test). Generally, 2- 4 questions can be given which has to be solved in 1 hour duration, the assignment question has to be from the self-study component or it can be a coding demo done in the laptop & shown on the spot to the teacher in the class, the questions has to be set according to easy, medium, tough & severe and evaluation to be done as per the assignment evaluation rubrics.

Quiz : There will be 1 quiz of 10 marks consisting of 10 questions of multiple choice of 1 marks each, which may be conducted along with the 2nd CIE test and written in the answer booklet at the end.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set module/unit-wise.

CIE – Continuous Internal Evaluation Theory (50 Marks)

Bloom's Category	Tests - 3 CIEs	Assignments - 1 No.	AAT - 1 No.
Marks (out of 50)	**30**	**10**	**10**
Remember	10		02
Understand	05		02
Apply	05	05	02
Analyze	10	05	02
Evaluate			02
Create			

SEE –Semester End Examination Theory (50 Marks)

Bloom's Category	Marks Theory (50)
Remember	10
Understand	10
Apply	10
Analyze	20
Evaluate	
Create	