

Course Code	Course Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	TW/ Practical	Tutorial	Total
ETC501	Microcontroller & Applications	04	--	--	04	--	--	04

Course Code	Course Name	Examination Scheme								
		Theory Marks					Term Work	Practical	Oral	Total
		Internal assessment			End Sem. Exam					
		Test 1	Test 2	Ave. Of Test 1 and Test 2						
ETC501	Microcontroller & Applications	20	20	20	80	-	-	-	100	

Course Pre –requisite:

- ETC303: Digital electronics
- ETC403: Microprocessor and Peripherals

Course Objectives:

- To develop background knowledge and core expertise of microcontroller.
- To know the importance of different peripheral devices and their interfacing to microcontrollers.
- To know the design aspects of microcontrollers.
- To write assembly language programs of microcontrollers for various applications.

Course Outcomes: At the end of course, a student will be able to

- Draw and describe architecture of 8051 and ARM7 microcontroller.
- Interface various peripheral devices to the microcontrollers.
- Write assembly language program for microcontrollers.
- Design microcontroller based system for various applications.

Module No.	Topics	Hrs.
1.	8051 Microcontroller	12
	1.1 Comparison between Microprocessor and Microcontroller	
	1.2 Features, architecture and pin configurations	
	1.3 CPU timing and machine cycle	
	1.4 Input / Output ports	
	1.5 Memory organization	
	1.6 Counters and timers	
	1.7 Interrupts	
2.	8051 Assembly Language Programming.	08
	2.1 Instruction set	
	2.2 Addressing mode	
	2.3 Assembler directives	
	2.4 Programs related to: arithmetic, logical, delay, input, output port, serial communication, and interrupts	
3	8051 Interfacing and Applications	12
	3.1 Interfacing of display: LED, LCD, and seven segment display	
	3.2 Keyboard Interfacing	
	3.3 Interfacing of ADC and DAC (0808/09)	
	3.4 Stepper motor and relay	
	3.5 Connection to RS 232 for serial communication	
	3.6 Manual and auto reset	
	3.7 IR based wireless communication system design	
4	ARM7: A 32-bit Microcontroller	08
	4.1 The RISC design philosophy	
	4.2 Concept of Cortex-A, the Cortex-R, and the Cortex-M	
	4.3 Features of ARM Microcontroller	
	4.4 Operating modes	
	4.5 Architecture (ARM core dataflow model)	
	4.6 Registers	
	4.7 Current program status register	
	4.8 Pipeline	
	4.9 Exceptions, interrupt and vector table	
	4.10 Memory management	
4.11 ARM7 processor families		
5	ARM7 Programming	08
	5.1 Instruction set for data processing, branching, load-store, software interrupt, and program status register	
	5.2 Addressing modes	
	5.3 Programming for ARM7	
6	Introduction to Embedded Systems	04
	6.1 Concepts of embedded systems	
	6.2 Optimizing design matrices and common design matrices	
	6.3 Study of embedded systems 1) Digital camera 2) Stepper motor controller	
Total		52

Recommended Books:

1. M. A. Mazidi, J. G. Mazidi and R. D. Mckinlay, “*The 8051 Microcontroller & Embedded systems*”, Pearson Publications, Second Edition 2006.
2. C. Kenneth J. Ayala and D. V. Gadre, “*The 8051 Microcontroller & Embedded system using assembly & ‘C’*”, Cengage Learning, Edition 2010.
3. Satish Shah, “*The 8051 Microcontrollers*”, Oxford publication first edition 2010.
4. Andrew Sloss, Dominic Symes, and Chris Wright, “*ARM System Developer’s Guide*” Morgan Kaufmann Publishers, First Edition 2004.
5. James A. Langbridge, “*Professional Embedded Arm Development*”, Wrox, John Wiley Brand& Sons Inc., Edition 2014
6. Frank Vahid& tony Gavages “*Embedded system design – A unified hardware / software introduction*”, Wiley publication, Third edition 2002.

Internal Assessment (IA):

Two tests must be conducted which should cover at least 80% of syllabus. The average marks of two tests should be considered as final IA marks

End Semester Examination:

1. Question paper will comprise of 6 questions, each of 20 marks.
2. Total 4 questions need to be solved.
3. Question No.1 will be compulsory and based on entire syllabus wherein sub questions for 2 to 5 marks will be asked.
4. Remaining questions will be selected from all the modules.