



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
EXC501	Microcontrollers and Applications	4	--	--	4	--	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	EXC303: Digital Circuits and Design EXC402: Discrete Electronic Circuits EXC403: Microprocessor and Peripherals
After successful completion of the course, student will be able to	
Course Outcomes	CO1 Discuss architecture and pin configuration of ARM7TDMI and Intel 8051.
	CO2 Apply the knowledge of instruction set of 8051 microcontroller and ARM7TDMI to implement Assembly Language Programs
	CO3 Design various applications using 8051 microcontroller and ARM7TDMI.
	CO4 Develop C program applications in LPC2148

Module No.	Unit No.	Topics	Ref.	Hrs.
1		8051 Microcontroller Architecture		06
	1.1	8051 architectural features and its purpose, advantages	1,2	
2		8051 Microcontroller Assembly Language Programming		12
	2.1	Bit, byte, word processing, format conversion between HEX, BCD, ASCII	1,2	
	2.2	Data movement / copy operations, Block transfer of data, data swap / exchange	1,2	
	2.3	Arithmetic, logical, and stack operation, loops, condition evaluation, decision making based on flags	1,2	
	2.4	Call, return, jumps, serial and parallel port handling, timer / counter handling, interrupts and its handling	1,2	
3		8051 Microcontroller Hardware and Software Applications Objectives: Interpreting logical, electrical, timing specification, requirement of following interfaces and interfacing and accessing/controlling using assembly programs		10
	3.1	External memory interfacing and memory access cycles, polled I/O, Interrupt I/O	1,2	
	3.2	Serial communication using RS232: Pulse width modulation and DC motor interfacing, electromagnetic relay, stepper motor interfacing, switch interfacing, SCR firing circuit (with electrical isolation)	1,2	
	3.3	Parallel input/output interfacing: 7-segment LED display interfacing, 8-bit parallel DAC interfacing, 8-bit parallel ADC interfacing, 4x4 matrix keyboard interfacing, temperature (resistive, diode based) sensor, optical (photodiode/ phototransistor, LDR)	1,2	



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		sensors interfacing, 16x2 generic alphanumeric LCD interfacing		
4		ARM7TDMI(ARMv4T) Architectural		10
	4.1	Features, purpose, and advantages	4,5	
	4.2	Processor operating states, memory formats, data types, operating modes, registers	4,5	
	4.3	The program status registers, exceptions, interrupt latencies, and pipelined architecture advantage	4,5	
5		ARM7TDMI(ARMv4T) Assembly Language Programming		10
	5.1	8,16,32 bit and floating point numbers processing, format conversion between Hex, BCD, ASCII, data movement/copy operations, block transfer of data, data swap/exchange	4,5	
	5.2	Arithmetic, logical, and stack operation, loops, condition evaluation and decision making based on flags, control transfers (Call, Return, Jumps), processor state changing (ARM \leftrightarrow THUMB)	4,5	
	5.3	Exceptions, interrupts and its handling	4,5	
6		LPC2148 based C Program Applications	6	4
	6.1	Applications for On-chip ADC, DAC, parallel port, and serial port accessing		
			Total	52

References:

- [1] Kenneth J. Ayala, "The 8051 Microcontroller architecture, Programming and Applications" Penram international, Cengage Learning India Pvt. Ltd, Second Edition.
- [2] M. A. Mazadi and J. C. Mazadi, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second Edition.
- [3] V. Udayashankara, "8051 Microcontroller Hardware, Software and Application", McGraw-Hill.
- [4] David Seal, "ARM Architecture", Reference Manual (Second Edition)
- [5] William Hohl, "ARM Assembly Language: Fundamentals and Techniques", Second Edition.