



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

COURSE PLAN

Department	:	Instrumentation and Control Engineering			
Course Name & code	:	Microcontrollers & ICE 3152			
Semester & branch	:	V & E&I			
Name of the faculty	:	Dr. Dayananda Nayak & Mr. Ganesh Nayak			
No of contact hours/week:		L	T	P	C
		4	0	0	4

Course Outcomes (COs)

<i>At the end of this course, the student should be able to:</i>		No. of Contact Hours	Marks
C01:	Understand the difference between various computer architectures, Architecture and pin details of 8051 microcontrollers, and Interfacing of 8051 to external memory.	6	Marks
C02:	Understand the addressing modes and write ALPs using 8051 instruction set.	8	Marks
C03:	Explain the operation of Timers/Counters, Serial port, and Interrupt system of 8051 with programming.	16	Marks
C04:	Understand the architecture of ARM and GPIO, Timer programming of LPC 2148 with its architecture.	12	Marks
C05:	Interface simple switches, LEDs, ADC, DAC, LCD, keyboard, stepper motor, and DC motor to 8051/LPC 2148 using I/O ports.	6	Marks
Total			

Assessment Plan

Components	Assignments	Sessional Tests	End Semester/ Make-up Examination
Duration	20 to 30 minutes	60 minutes	180 minutes
Weightage	20 % (4 X 5 marks)	30 % (2 X 15 Marks)	50 % (1 X 50 Marks)
Typology of Questions	Understanding; Applying; Analyzing; Evaluating; Creating	Remembering; Understanding; Applying	Understanding; Applying; Analyzing; Evaluating; Creating
Pattern	Answer one randomly selected question from the problem sheet (Students can refer their class notes)	MCQ (10 marks): 10 questions of 0.5 marks each Short Answers (10 marks): questions of 2 or 3 marks	Answer all 5 full questions of 10 marks each. Each question may have 2 to 3 parts of 3/4/5/6/7 marks
Schedule	As notified by Associate Director (Academics) at the start of each semester	Calendared activity	Calendared activity
Topics Covered	Assignment 1 (L _{x1-x2} & T _{y1-y2}) (CO x)	Test 1 (L _{a1-a2} & T _{b1-b2}) (CO x)	Comprehensive examination covering full syllabus. Students are expected to answer all questions (CO1-5)
	Assignment 2 (L _{x3-x4} & T _{y3-y4}) (CO x)		
	Assignment 3 (L _{x5-x6} & T _{y5-y6}) (CO x)	Test 2 (L _{a3-a4} & T _{b3-b4}) (CO x)	
	Assignment 4 (L _{x7-x8} & T _{y7-y8}) (CO x)		

Lesson Plan

L. No.	Topics	Course Outcome Addressed
L0	Basics of computers, microcontroller vs microprocessors, ALP vs. High Level Languages	CO1
L1	Von Neumann vs. Harvard Architecture, 8051 Block diagram	CO1
L2	Features of 8051 with RAM organization	CO1
L3	8051 Pin Diagram, 8051 Registers, Program Counter, ROM	CO1
L4	8051 PSW, Register Banks, Stack operation	CO1
L5	Interfacing 8051 to external memory	CO1
L6	Introduction to addressing modes and instructions of 8051	CO2

L7	Various addressing modes with examples	CO2
L8	Data transfer instructions with examples	CO2
L9	Arithmetic operation instructions with examples	CO2
L10	Logical operation instructions with examples	CO2
L11	Other instructions of 8051 with examples	CO2
L12	Analyzing 8051 ALP using various examples	CO2
L13	Introduction to Jump and Call opcodes	CO2
L14	Programming 8051 timers	CO3
L15	Programming 8051 timers : Mode 1 with examples	CO3
L16	Mode 1 : Finding values to be loaded in timers, generating large time delays	CO3
L17	Programming 8051 timers : Mode 2 with examples	CO3
L18	8051 counter programming	CO3
L19	Basics of serial communication, RS232, UART Protocol	CO3
L20	8051 connection to RS232, MAX233, Serial Port programming	CO3
L21	Programming 8051 to transfer data serially with examples	CO3
L22	Programming 8051 to receive data serially with examples	CO3
L23	Importance of TI flag, RI flag, doubling baud rates	CO3
L24	Basics of interrupts, polling, 8051 interrupts	CO3
L25	Programming 8051 timer interrupts	CO3
L26	Programming 8051 external hardware interrupts	CO3
L27	Programming serial communication interrupts	CO3
L28	8051 Interrupt examples with solutions	CO3
L29	Interrupt priority in 8051	CO3
L30	Introduction to ARM	CO4
L31	ARM features, architecture, programmer's model	CO4
L32	Assembler directives and Instructions	CO4
L33	Assembler directives and Instructions	CO4
L34	Instructions and Programming	CO4
L35	Instructions and Programming	CO4

L36	Introduction to LPC 214xx Family	CO4
L37	Internal Bus architecture, memory mapping and accelerator module	CO4
L38	GPIO programming	CO4
L38	GPIO programming	CO4
L40	Timer and PWM unit	CO4
L41	Timer programming	CO4
L42	Stepper and DC motor inter interfacing and programming	CO5
L43	Key pad interfacing and programming	CO5
L44	ADC and DAC interfacing and programming	CO5
L45	Programming assembly and C	CO5
L46	Programming assembly and C	CO5
L47	Programming assembly and C	CO5
L/T	Click or tap here to enter text.	CO
L/T	Click or tap here to enter text.	

References:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, The 8051 Microcontroller and Embedded Systems Using Assembly and C, Pearson Education, (2e), 2007.
2. Kenneth J. Ayala, The 8051 Microcontroller, Cengage Learning, (3e), 2004.
3. Steve Furber, ARM System - on – Chip Architecture, Pearson, (2e), 2015.
4. William Hohl, Hinds Christopher, ARM Assembly Language, CRC Press, (2e), 2014.
5. LPC21XX User Manual, 2007.
6. Click or tap here to enter text.
7. Click or tap here to enter text.

Submitted by: Mr. Ganesh Nayak

(Signature of the faculty)

Date: 17-08-2021

Approved by: Dr. Shreesha C

(Signature of HOD)

Date: 17-08-2021

FACULTY MEMBERS TEACHING THE COURSE (IF MULTIPLE SECTIONS EXIST):

FACULTY	SECTION	FACULTY	SECTION
Dr. Dayananda Nayak	A	Mr. Ganesh Nayak	B
