Lok Jagruti Kendra University
University with a Difference

Diploma
in
Electrical Engineering

LJ Polytechnic

Course Code:025070401
Microprocessor & Microcontroller Interfacing

Programme / Branch Name			Diploma in Electrical Engineering			
Course Name	Microprocessor & Microcontroller Interfacing				**Course Code**	025070401
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1) Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				Evaluation Scheme			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**Total Marks**
3	0	2	4	50	50	50	150

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2) Prerequisite

- ✓ Number system and their conversions.
- ✓ Boolean algebra, logic gates, flip-flop and registers.
- ✓ Concepts in combinational and sequential logic.

3) Rationale

The objective of the course is to expose to the students to the architecture and instruction set of typical 8-bit microprocessor. It also deals with Assembly Language Programming. Input-output techniques and important programmable support chips used in microprocessor-based systems are discussed in detail and to understand basic of interfacing microprocessor with real world.

4) Objectives

- ✓ Explain microprocessor and controller as central device connected to memory and I/O devices.
- ✓ Describe basics of microprocessor and microcontroller architecture and programming.
- ✓ Explain & perform experiments based on interfacing microprocessor with memory and various I/O (Input/Output) devices.
- ✓ Analyze, design, and simulate various programming based on microprocessor and its peripheral.

5) Contents

Unit No.	Topics	Sub-Topics	Learning Outcomes	% Weightage	Hours
1	**Introduction to Microprocessor and Architecture of 8085**	1.1. Introduction to Microprocessor Schematic capture 1.2. Microprocessor based Systems 1.3. PIN Diagram of 8085 Microprocessor 1.4. Microprocessor Architecture 1.5. Microprocessor operations	• Evolutions of Microprocessor • 8085 BUS organization • PIN Diagram of 8085 Microprocessor and Pin Functions • De-multiplexing the Bus AD7 to AD0 • Generating Control Signals • Architecture of 8085: Address Bus & Multiplexed Address / Data Bus, Registers, ALU, Control and status signals, Power-supply and clock frequency, externally initiated signals including Interrupts, Serial I/O Ports • Microprocessor operations: Microprocessor initiated Operations, Internal data operations, Externally Initiated operations.	30%	10
2	**8085 Addressing modes and Instruction Set**	2.1. Addressing modes 2.2.Instruction Formats 2.3.Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set	• Various addressing modes • 8085 machine cycle and bus timings to fetch, decode and execute instruction from memory • Instruction Formats: Single Byte, Two Bytes & Three Bytes Instructions • Types of Instructions	10%	7

3	**Introduction of Microcontrollers**	3.1 Describe functions of each block. diagram of generic digital computer 3.2 Differentiate between microprocessor and microcontroller 3.3 Explain various architectures of microcontroller 3.4 Explain functions of each block of 8051microcontroller 3.5 Explain Pin Diagram of 8051 3.6 Explain Memory organization of 8051 3.7 Differentiate Stack, Stack Pointer and stack operation 3.8 Differentiate Stack, Stack Pointer and stack operation Justify need of Interrupt Mechanism	• Block diagram of microcontroller: CPU, input device, output device, memory and buses • Differentiate between microprocessor and microcontroller • Architectures of microcontroller Harvard, Von Neumann RISC and CISC • Justify need of Interrupt Mechanism • Functions of each pin of 8051 • Memory organization of 8051 • Stack, Stack Pointer and Stack operation • Interrupt structure, vector address, priority and operation • Special Function Registers	30%	12
4	**8051 Addressing modes and Instruction Set**	4.1 Addressing modes 4.2 Instruction Formats Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set	• Various addressing modes • Types of Instructions	10%	6
5	**Basic Programming and Interfacing**	5.1 Arithmetic operation 5.2 Looping, Counting and Indexing 5.3 Data transfer 5.4 Read and write data on register and address 5.5 LED Interfacing 5.6 LCD Interfacing	• Addition, subtraction, multiplication, division • Looping, counting and indexing operation • Memory operation • Interfacing with devices	20%	7

			Total Hours		42

6) List of Practical / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No	Practicals / Exercises	Key Competency	Hours
1	Introduction of simulator		2
2	Addition of two 8 – bit numbers and Subtraction of two 8 bit numbers	Simulator	2
3	Addition of two 16 – bit numbers and Subtraction of two 16 bit numbers.	Simulator	2
4	Multiply two 8 bit numbers using successive addition method	Simulator	2
5	Write a program to multiply two 8 bit numbers using shift and add method.	Simulator	2
6	Divide 16 bit number by an 8 bit number	Simulator	2
7	Transfer a block of n bytes from source to destination	Simulator	2
8	Find maximum number in the array	Simulator	2
9	Find minimum / smallest number in array	Simulator	2
10	Convert two BCD numbers a. BCD to hex b. Hex to BCD conversion	Simulator	2
11	Write a subroutine for to generate a delay of 10ms	Simulator	2
12	Sort the numbers in ascending order and descending order.	Simulator	2
		Total Hours	24

7) Suggested Specification Table with Hours

Unit No.	Chapter Name	Teaching Hours	Distribution of Topics According to Bloom's Taxonomy					
			R %	U %	App %	C %	E %	An %

1	Introduction to Microprocessor and Architecture of 8085	10	40	20	20	0	10	10
2	8085 Addressing modes and Timing Diagram	4	20	20	15	20	20	5
3	Introduction of Microcontrollers	10	20	20	20	15	10	15
4	8051 Addressing modes and Instruction Set	12	20	10	20	40	5	5
5	Basic Programming and Interfacing	6	30	20	20	10	10	10

Legends: R-Remembering C- Creating
U- Understanding E- Evaluating
App- Applying An- Analyzing

8) Textbook

1) Microprocessor Architecture, Programming and Applications with 8085/8080A – Ramesh S. Gaonkar, Wiley Eastern Limited.
2) The 8051 Microcontroller by Kenneth Ayala

9) Reference Books

1) Hall D.V., "Microprocessor and Interfacing-Programming and Hardware", 2nd Ed., Tata McGraw-Hill Publishing Company Limited.
2) Sunil Mathur, "Microprocessor 8085 and Its Interfacing", PHI Learning Pvt. Ltd.
3) The 8051 Microcontroller and Embedded Systems using Assembly and C -by Muhammad Ali Mazidi

10) Open Sources (Website, Video, Movie)

1) https://www.youtube.com/watch?v=4pTiujyY4IM
2) https://www.youtube.com/watch?v=I78iyzXQrP4
3) https://www.youtube.com/watch?v=fIHWZmDWTFU