



Lok Jagruti Kendra University
University with a Difference

**Diploma
in
Electronics & Communication
Engineering**



Course Code:025030401
**Microprocessor &
Microcontroller Interfacing**

Programme / Branch Name			Diploma in Electronics and Communication			
Course Name	Microprocessor & Microcontroller Interfacing			Course Code	025030401	
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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<p>3.1 Describe functions of each block. diagram of generic digital computer</p> <p>3.2 Differentiate between microprocessor and microcontroller</p> <p>3.3 Explain various architectures of microcontroller</p> <p>3.4 Explain functions of each block of 8051 microcontroller</p> <p>3.5 Explain Pin Diagram of 8051</p> <p>3.6 Explain Memory organization of 8051</p> <p>3.7 Differentiate Stack, Stack Pointer and stack operation</p> <p>3.8 Differentiate Stack, Stack Pointer and stack operation Justify need of Interrupt Mechanism</p>	<ul style="list-style-type: none"> • 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	<p>4.1 Addressing modes</p> <p>4.2 Instruction Formats Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set</p>	<ul style="list-style-type: none"> • Various addressing modes • Types of Instructions 	10%	6
5	Basic Programming and Interfacing	<p>5.1 Arithmetic operation</p> <p>5.2 Looping, Counting and Indexing</p> <p>5.3 Data transfer</p> <p>5.4 Read and write data on register and address</p> <p>5.5 LED Interfacing</p> <p>5.6 LCD Interfacing</p>	<ul style="list-style-type: none"> • Addition, subtraction, multiplication, division • Looping, counting and indexing operation • Memory operation • Interfacing with devices 	20%	7

			Total Hours		42
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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=4pTiujuY4IM>
- 2) <https://www.youtube.com/watch?v=I78iyzXQrP4>
- 3) <https://www.youtube.com/watch?v=fIHwZmDwTFU>