

# **Techno India NJR Institute of Technology**



## **Course File**

### **Microprocessor (5EE4-04)**

### **Session (2022-23)**

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**(Associate Professor)**  
**Department of ECE**



**RAJASTHAN TECHNICAL UNIVERSITY, KOTA**  
**SYLLABUS**

**3<sup>rd</sup> Year - V Semester: B.Tech. (Electrical Engineering)**

**SEE4-04: MICROPROCESSOR**

**Credit: 3**

**Max. Marks: 150(IA:30, ETE:150)**

**3L+0T+0P**

**End Term Exam: 3 Hours**

<b>SN</b>	<b>CONTENTS</b>	<b>HOURS</b>
<b>1</b>	<b>Introduction:</b> Objective, scope and outcome of the course.	<b>01</b>
<b>2</b>	<b>Fundamentals of Microprocessors</b> Fundamentals of Microprocessor Architecture, 8-bit Microprocessor and Microcontroller architecture, Comparison of 8-bit microcontrollers, 16-bit and 32-bit microcontrollers. Definition of embedded system and its characteristics, Role of microcontrollers in embedded Systems. Overview of the 8051 family.	<b>07</b>
<b>3</b>	<b>The 8051 Architecture:</b> Internal Block Diagram, CPU, ALU, address, data and control bus, Working registers, SFRs, Clock and RESET circuits, Stack and Stack Pointer, Program Counter, I/O ports, Memory Structures, Data and Program Memory, Timing diagrams and Execution Cycles.	<b>08</b>
<b>4</b>	<b>Instruction Set and Programming</b> Addressing modes: Introduction, Instruction syntax, Data types, Sub-routines Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Relative addressing, Indexed addressing, Bit inherent addressing, bit direct addressing. 8051 Instruction set, Instruction timings. Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction. Assembly language programs, C language programs. Assemblers and compilers. Programming and debugging tools.	<b>08</b>
<b>5</b>	<b>Memory and I/O Interfacing</b> Memory and I/O expansion buses, control signals, memory wait states. Interfacing of peripheral devices such as General Purpose I/O, ADC, DAC, timers, counters, memory devices.	<b>06</b>
<b>6</b>	<b>External Communication Interface</b> Synchronous and Asynchronous Communication. RS232, SPI, I2C. Introduction and interfacing to protocols like Blue-tooth and Zig-bee.	<b>06</b>
<b>7</b>	<b>Applications</b> LED, LCD and keyboard interfacing. Stepper motor interfacing, DC Motor interfacing, sensor interfacing	<b>05</b>
	<b>TOTAL</b>	<b>41</b>

Office of Dean Academic Affairs  
Rajasthan Technical University, Kota

### Course Overview:

General introduction to microprocessor systems; Operation and Control of 8-bit microprocessor; Instruction set; Assembly Language Programming; , I/O Techniques, Interfacing of I/O Devices; Interrupts; Peripheral Devices, Programmable Peripheral Interface (Intel 8255A), Programmable Interval timer (Intel 8253), Programmable Interrupt Controller (Intel 8259A), Programmable Keyboard/Display Interface (Intel 8279).

### Course Outcomes:

CO.NO.	Cognitive Level	Course Outcome
1	<b>Comprehension</b>	Able to Classify different types of microcontrollers.
2	<b>Application</b>	Able to Sketch interfacing circuit for peripherals like, I/O, A/D, D/A, timer etc.
3	<b>Analysis</b>	Able to Analyze response time of different microcontrollers.
4	<b>Synthesis</b>	Able to Select processors, microcontroller for different application.
5	<b>Evaluate</b>	Compare microprocessor architecture with Microcontroller architecture based systems.

### Prerequisites:

1. Fundamentals knowledge of digital electronics.
2. Fundamentals knowledge of diode, transistor.

### Course Outcome Mapping with Program Outcome:

Course Outcome	Program Outcomes (PO's)											
	Domain Specific					Domain Independent						
CO. NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	1	0	0	0	0	0	0	1
CO2	2	1	2	1	3	0	1	0	0	0	0	1
CO3	2	2	1	2	2	0	0	0	0	0	1	0
CO4	2	2	2	1	2	0	0	0	1	0	0	0
CO5	2	1	2	2	2	1	1	0	0	0	0	0

1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)

**Course Coverage Module Wise:**

<b>Lecture No.</b>	<b>Unit</b>	<b>Topic</b>
1	1	<b>INTRODUCTION:</b> Objective, scope and outcome of the course.
2	2	<b>FUNDAMENTALS OF MICROPROCESSORS</b>
3	2	Fundamentals of Microprocessor Architecture 8-bit Microprocessor.
4	2	Architecture. 8-bit Microcontroller
5	2	Comparison of 8-bit microcontrollers, 16-bit and 32-bit microcontrollers.
6	2	Definition of embedded system and its characteristics.
7	2	Role of microcontrollers in embedded Systems.
8	2	Overview of the 8051 family.
9	3	<b>THE 8051 ARCHITECTURE</b>
10	3	Internal Block Diagram
11	3	CPU, ALU, address, data and control bus
12	3	Working registers, SFRs.
13	3	Clock and RESET circuits, Stack and Stack Pointer.
14	3	Program Counter, I/O ports, Memory Structures.
15	3	Data and Program Memory.
16	3	Timing diagrams and Execution Cycles.
17	4	<b>INSTRUCTION SET AND PROGRAMMING</b>
18	4	Addressing modes: Introduction, Instruction syntax, Data types, Subroutines
19	4	Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Relative addressing,
20	4	Indexed addressing, Bit inherent addressing, bit direct addressing.
21	4	8051 Instruction set & Instruction timings.
22	4	Data transfer instructions, Arithmetic instructions,

		Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction..
23	4	Assembly language programs, C language programs.
24	4	Assemblers and compilers. Programming and debugging tools.
25	<b>5</b>	<b>MEMORY AND I/O INTERFACING</b>
26	5	Memory and I/O expansion buses Control signals, memory wait states.
27	5	Interfacing of peripheral devices such as General Purpose I/O
28	5	ADC, DAC
29	5	Timers, counters
30	5	Memory devices.
31	<b>6</b>	<b>EXTERNAL COMMUNICATION INTERFACE</b>
32	6	Synchronous and Asynchronous
33	6	RS232
34	6	SPI & I2C
35	6	Introduction and interfacing to protocols Bluetooth
36	6	Introduction and interfacing to protocols Zigbee
37	<b>7</b>	<b>APPLICATIONS</b>
38	7	LED, LCD Interfacing
39	7	keyboard interfacing
40	7	Stepper motor interfacing & DC Motor interfacing
41	7	Sensor interfacing

## TEXT/REFERENCE BOOKS

1. Microprocessor Architecture: Programming and Applications with the 8085/8080A, R. S. Gaonkar, Penram International Publishing, 1996.
2. Embedded System Design, A Unified Hardware/Software Introduction, Frank Vahid/Tony Givaris, Jhon, Wiley Student Edition, 2006.
3. The 8051 Microcontroller & Embedded System, Muhammad Ali Mazidi, Pearsons.
4. The 8051 Microcontroller, Kenneth J. Ayala, Penram International Publishing, 1996.

## **QUIZ Link**

<https://www.sanfoundry.com/microcontroller-mcqs-introduction/>

<https://www.indiabix.com/digital-electronics/the-8051-microcontroller/>

## **NPTEL COURSES LINK**

<https://archive.nptel.ac.in/courses/108/105/108105102/>

## **Faculty Notes Link**

<https://drive.google.com/drive/folders/1iQxrGEcg2U9Z9Sg5YJAmT2KR5KQDfQkh?usp=sharing>

## **Assessment Methodology:**

1. Practical exam using MATLAB software.
2. Two Midterm exams where student have to showcase subjective learning.
3. Final Exam (subjective paper) at the end of the semester.