

COURSE HANDOUT

MICROCONTROLLER AND APPLICATIONS (ECE-401)

ECE-4TH SEMESTER

ACADEMIC YEAR (2023-24)

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Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
ECE-401	Microcontroller and Applications	PCC	4	3	1	0	50	100	150

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Understand the general architecture of Microprocessors and Microcontrollers.
CO2	Apply knowledge and demonstrate the program proficiency using the various addressing modes logics and commands.
CO3	Articulate the interrupts and serial communication of 8051 microcontroller.
CO4	Develop interfacing circuits for different peripheral devices.
CO5	Use microcontroller development board to solve the various engineering problems.

Unit-I

Introduction Microprocessor and Microcontroller: Block Diagram, Architecture of 8085 Microprocessor and 8051 Microcontroller, Comparison of Microprocessor and Microcontroller, Directives, Addressing Modes and Instructions Set of 8051 Microcontroller, 8051 Assembly Language Programming.

(10 Hours)

Unit-II

8051 Programming In Embedded C: Data Types, Time Delay, Loop, Logic Operations, I/O programming and Data Conversion, Accessing Code Space, Data Serialization and Counter/Timer Programming in Embedded C.

(8 Hours)

Unit-III

Serial port and Interrupts: Basics of serial communication, 8051 connections to RS232, serial port operations and programming, basics of 8051 interrupts, timer interrupts, external hardware interrupts, serial port interrupts, Interrupt priority in 8051, Interrupt programming using embedded C.

(6 Hours)

Unit-IV

Interfacing: LCD and Keyboard Interfacing, De-bouncing effect, ADC 0804 interfacing, DAC interfacing, Sensor and actuator interfacing, speed and direction control of DC and Stepper Motors.

(10 Hours)

Unit-V

Microcontroller Development Board: Introduction to Arduino, Programming Tools and Programming language for development board. Interfacing with analog and digital sensors, display devices and actuator, serial communication, wireless communication using RF module.

(11 Hours)

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Microprocessor Architecture, Programming, and Applications with the 8085	R.S. Ganorkar	Penram International	5 th (2011)
2.	The Microcontroller and Embedded Systems Using Assembly and C	Muhammad Ali Mazidi	Pearson Education India	2 nd (2007)

Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	The 8051 Microcontroller, Architecture, Programming and Applications	Kenneth J. Ayala	Penram International	3 rd (1996)
2	Programming Arduino: Getting Started with Sketches	Simon Monk	McGraw-Hill Education	2 nd (2016)

COURSE PLAN

Unit-I Introduction Microprocessor and Microcontroller		
S.No	Topics	Recommended Books
1	Block Diagram of 8085 Microprocessor	Book 1, Ch.2s
2	Architecture of 8085 Microprocessor	Book 1, Ch.3
3	Block Diagram of 8051 Microcontroller	Book 2, Ch.1
4	Architecture of 8051 Microcontroller	Book 2, Ch.1
5	Comparison of Microprocessor and Microcontroller	Book 2, Ch.1
6	Directives	Book 2, Ch.2
7	Addressing Modes	Book 2, Ch.5
8	Instructions Set of 8051 Microcontroller	Book 2, Ch.2
9	8051 Assembly Language Programming	Book 2, Ch.2
Unit-II 8051 Programming in Embedded C		
10	Data Types	Book 2, Ch.7
11	Time Delay.	Book 2, Ch.9
12	Loop, Logic Operations	Book 2, Ch.3
13	I/O programming and Data Conversion	Book 2, Ch.4
14	Accessing Code Space	Book 2, Ch.5
15	Data Serialization	Book 2, Ch.7
16	Counter/Timer Programming in Embedded C	Book 2, Ch.9
Unit-III Serial port and Interrupts		
17	Basics of serial communication	Book 2, Ch.10
18	8051 connections to RS232	Book 2, Ch.20
19	Serial port operations and programming	Book 2, Ch.10
20	Basics of 8051 interrupts	Book 2, Ch.11
21	Timer interrupts using embedded C	Book 2, Ch.11
22	External hardware interrupts, serial port interrupts	Book 2, Ch.11
23	Interrupt priority in 8051	Book 2, Ch.11
24	Interrupt programming	Book 2, Ch.11
Unit-IV Interfacing		
25	LCD and Keyboard Interfacing	Book 2, Ch.12
26	De-bouncing effect	Book 2, Ch.12

27	ADC 0804 interfacing	Book 2, Ch.13
28	DAC interfacing	Book 2, Ch.13
29	Sensor and actuator interfacing	Book 2, Ch.13
30	Speed and direction control of DC	Book 2, Ch.17
31	Speed and direction control of Stepper Motors	Book 2, Ch.17
Unit-V Microcontroller Development Board		
32	Introduction to Arduino	Book 2, Ch.8
33	Programming Tools and Programming language for development board	Book 2, Ch.8
34	Interfacing with analog and digital sensors	Book 2, Ch.8
35	Display devices and actuator	Book 2, Ch.8
36	Serial communication	Book 2, Ch.8
37	Wireless communication using RF module.	Book 2, Ch.8

ADDITIONAL WEB RESOURCES

1	NPTEL: Course on Microprocessor and Microcontroller by Prof. Santanu Chattopadhyay of IIT Kharagpur https://onlinecourses.nptel.ac.in/noc20_ee42/preview
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GRADING AND ASSESSMENT

- **Sessional Test:** 20 marks
- **Assignment:** 20 marks
- **Attendance:** 10 marks
- **Final Examination:** 100 marks

COURSE POLICIES

- **Attendance:** Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity:** MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions:** Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**
 Monday (12:05 PM - 12:55 PM)
 Friday (12:05 PM - 12:55 PM)
- **Contact Information**
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