

Minor Courses offered by the Department of Computer Science

Year / Sem	Type of Course	Course Code	Title of the Course	Credits	Teaching Hours
1st Year (Semester-I & II)	MID-1	CS1MI01	Microprocessor and ALP	4	5
	MID-2	CS2MI02	Microcontrollers Programming	4	5
2nd Year (Semester-III & IV)	MID-3	CS3MI03	System Software	4	5
	MID-4	CS4MI04	Embedded Application Development	4	5
3rd Year (Semester-V & VI)	MID-5	CS5MI05	Theory of Computation	4	5
	MID-6	CS6MI06	UNIX System Programming / Network Programming	4	5
4th Year (Semester-VII)	MID-7		AI / Compiler Design	4	5
	MID-8		Cyber Security / Internet of Things	4	5

Year	I	Course Code: CS1MI01	Credits	4
Sem.	I	Course Title: Microprocessor & ALP	Hours	75
Course Prerequisites, if any	Number Systems (binary, octal, hexadecimal) and their conversions. Boolean Algebra, logic gates, flip-flops and registers. Concepts in Combinational and Sequential logic.			
Internal Assessment Marks: 25	End Semester Marks: 75	Duration of ESA (Theory) : 03 hrs. Duration of ESA (Practical) : 03 hrs.		
Course Outcomes	<ul style="list-style-type: none"> • Learn the architecture & organization of 8085 Microprocessor. • Understand and classify the instruction set of the 8085 Microprocessor. • Apply the memory & I/O Interfacing with 8085 Microprocessor. • Analyse the architecture and operation of Programmable Interface. • Create applications to interface various peripheral IC's with Intel 8085 microprocessor. 			
Unit No.	Course Content			Hours
Theory Component				
Unit I	Introduction to Microprocessors & 8085 Assembly Language Programming Microprocessors, Instruction set and computer languages, 8085 programming model, Instruction classification, Instruction, Data format and storage, Execute a simple program , 8085 instruction set			9
Unit II	8085 Microprocessor architecture Microprocessor Architecture and its operations, Memory, I/O Devices, 8085 MPU, 8085 based microcomputer, memory interfacing, 8155 memory segment Interfacing, Interfacing I/O devices: Basics, Interfacing input and output devices, memory mapped I/O			9
Unit III	Programming 8085 Instruction Set of 8085, Data Transfer, arithmetic, Logic, Branch, Writing ALP and Debugging programs, Looping, Counting and Indexing, 16 bit Arithmetic instructions, Logic operations, Counters and Time Delay			9
Unit IV	Interfacing I/O Devices Stack and subroutines, Restart, Conditional call and Return instruction, Advanced subroutine concepts, Code conversion, BCD Arithmetic and 16 bit operations, BCD- Binary conversion, Binary to BCD conversion, BCD to seven segment LED code conversion, Binary to ASCII and ASCII to binary conversion, BCD addition and subtraction.			9
Unit V	Interfacing Peripheral (I/O) and Applications Interrupts: 8085 Interrupt, RST instructions, Software and Hardware interrupt, multiple Interrupts and Priorities, 8085 Vectored Interrupts, Restart as Software Instructions, 8155 – Multipurpose programmable Device, 8279 – Programmable Keyboard/Display Interface, 8255 – Programmable peripheral Interface			9
Practical Component				
Exercises	<ol style="list-style-type: none"> 1. Assembly Language Programming for Arithmetic Operations like Addition, Subtraction, Multiplication and Division on 8, 16-bit data. 2. Assembly Language Programming for different logical operations. 3. Assembly Language Programming for code conversions. 4. Assembly Language Programming for sorting 5. Assembly Language Programming for Searching. 6. Assembly Language Programming for memory block transfer. 			30

	<p>7. Assembly Language Programming using subroutines.</p> <p>8. Assembly Language Programming using counters and time delay.</p> <p>(Many more programs can be included related to the programming techniques of Microprocessor 8085)</p>	
Recommended Learning Resources		
Print Resources	<ol style="list-style-type: none"> 1. Ramesh S. Gaonkar, Microprocessor – Architecture, Programming and Applications with the 8085, Penram International Publisher, 6th Edition 2013. 2. Douglas V. Hall, Microprocessors and Interfacing, Tata McGraw Hill publications, 2nd Edition, 2012. 3. Intel Corp: The 8085 / 8085A. Microprocessor Book – Intel marketing communications, Wiley Inter Science publications, 1980, (Digitized:17 Nov 2007) ISBN:0471035688, 9780471035688. 4. Nilesh B. Bahadure, Microprocessors - The 8086/8088, 80186/80286, 80386/80486 and the Pentium Family. 2010, PHI Learning, ISBN-978-81-203-3943-2. 5. Barry B. Brey, The INTEL Microprocessors – 8086 / 8088, 80186 / 80188, 80286, 80386, 80486 Pentium and Pentium pro processor, Pentium II, Pentium III and Pentium IV - Architecture, Programming and interfacing, PHI, 8th Edition, ISBN 0-13-502645-8. 	

Year	I	Course Code: CS2MI02	Credits	4
Sem.	I	Course Title: Microcontroller Programming	Hours	75
Course Prerequisites, if any	Digital Logic Fundamentals, Microprocessor and ALP			
Internal Assessment Marks: 25	End Semester Marks: 75	Duration of ESA (Theory) : 03 hrs. Duration of ESA (Practical) : 03 hrs.		
Course Outcomes	<ul style="list-style-type: none"> • Learn the fundamentals of Microcontrollers. • Understand the internal design of 8051 microcontroller along with the features and their programming. • Analyse the on-chip peripherals of microcontrollers. • Design different interfacing applications using microcontrollers and peripherals. • Build systems using microcontrollers for real time applications. 			
Unit No.	Course Content			Hours
Theory Component				
Unit I	Microprocessors and Microcontrollers Microprocessors vs Microcontrollers - 8051 Architecture - Input/Output Pins – Ports - External Memory - Counter and Timers - Serial Data Input/Output - Interrupts.			9
Unit II	Programming 8051 Addressing Modes, External Data Moves, Code Memory Read-Only Data Moves, PUSH and POP Opcodes, Data Exchanges - Logical Operations - Arithmetic Operations - Jump and Call Opcodes.			9
Unit III	8051 Microcontroller Design Microcontroller Specification – Design - Testing - Timing Subroutines - Lookup Tables for 8051 - Serial Data Transmission.			9
Unit IV	Applications Keyboards – Displays - Pulse Measurement - D/A and A/D Conversions - Multiple Interrupts.			9
Unit V	Serial Data Communication Network Configurations - 8051 Data Communication Modes.			9
Practical Component				
Exercises	<ol style="list-style-type: none"> 1. Blinking LED 2. Reading Analog Input 3. Digital Counter with Seven-Segment Display 4. Analog-to-Digital Conversion (ADC) 			30

	<ol style="list-style-type: none"> 5. UART Communication 6. PWM (Pulse Width Modulation) Control 7. Timer Interrupt - Using a timer interrupt to perform a task at regular intervals 8. I2C Communication 9. External Interrupt 10. Temperature Sensor (DS18B20) Interface 11. Matrix Keypad Interface 12. LCD Display Interface 13. Traffic Light Controller <p>(Many more programs can be included related to the programming 8051 microcontroller)</p>	
Recommended Learning Resources		
Print Resources	<ol style="list-style-type: none"> 1. Kenneth J. Ayala, The 8051 Microcontroller Architecture, Programming, and Applications, West Publishing Company, USA, 1991. 2. Martin Bates, PIC Microcontrollers - An Introduction to Microelectronics, Third Edition, Elsevier, 2011, ISBN: 978-0-08-0969 1 1-4 3. Hubert Henry Ward, C Programming for the PIC Microcontroller-Demystify Coding with Embedded Programming, Apress, UK, 2020. ISBN-13 (pbk): 978-1-4842-5524-7; ISBN-13 (electronic): 978-1-4842-5525-4 https://doi.org/10.1007/978-1-4842-5525-4 	