

Branch Name:	Information and Communication Technology
Program Code:	ET107
Semester/Year:	Semester V/ Third Year
Course Title:	Microprocessor and Microcontroller
Course ode:	2ET1070501T
Pre-requisite:	Digital Design

Course Objectives:

1. The knowledge of Microprocessor and Microcontroller is very essential for a B.Tech. student of Information and Communication Technology as the world is migrating towards automation rapidly in each and every fields.
2. The students studying the subject are supposed to learn the architecture and programming of typical Microprocessor and Microcontroller.
3. Students will be taught the basic use of an assembly as well as embedded C programming environment to control peripheral devices.
4. Students will also understand the interfacing of various peripheral elements with Microprocessor and Microcontroller to design an automated system.
5. The course will cover introduction to basic 8085 microprocessor as well as AVR, 8-bit Microcontroller in detail with sufficient exposure to design an embedded system.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No.	Topic	Total Hours	Weightage (%)
1	Fundamentals of Microprocessors: History of microprocessor and microcontrollers, Difference between microprocessors and microcontrollers and Applications of microcontrollers, Internal 8086 microprocessor architecture and pin diagram, Real mode memory addressing, Addressing modes.	10	20
2	Programming The Microprocessor: Data movement instructions, Arithmetic and logic instructions, Program control instructions, string instruction, assembly language programming, assembler directives, program development tools.	9	20

3	Architecture and instruction set of 8-bit AVR Microcontroller: AVR Microcontroller architecture: Registers, AVR status register, Memory Space, ATmega32 pin-configuration & function of each pin, Addressing mode and instruction set of AVR microcontroller, Data transfer, Arithmetic, Logic and Compare, Rotate and Shift, Branch and Call instructions, Bit manipulation instructions	8	15
4	AVR Assembly and C Programming: AVR data types and assembler directives, AVR assembly language programs, AVR I/O Port Programming, Time delay loop, BCD, ASCII conversion Program, Look-up table, Bit addressability, MACROs, Pros and cons of C and assembly language programming, Data types, Intex Hex file format, Simple C programs for general purpose I/O and bit addressability.	10	25
5	AVR on-chip peripherals and its programming: General purpose I/O Ports, Timers, Interrupts, serial port, Serial port Interfacing protocols, SPI, I2C, UART. Assembly and C Language programming for peripherals.	8	20

List of Reference Books:

1. MuhammadAliMazidi,SarmadNaimiandSepehrNaimi,"*TheAVRMicrocontroller and Embedded Systems*", *Using Assembly and C*, Pearson Education, 1st Edition, 2012.
2. DhananjayGadre,"*ProgrammingandCustomizingtheAVRMicrocontroller*",TMH,1st Edition, 2001.
3. R.S.Gaonkar,"*MicroprocessorArchitecture:ProgrammingandApplicationswith the 8085*", Penram International Publishing, 1996

e-Resources (If any):

1. NPTELVideolectureon AVR microcontroller: <https://nptel.ac.in/courses/108105102/52>
2. Arduino software

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Explain the architecture of 8086 microprocessor and AVR 8-bit Microcontroller	1 Remembering 2 Understanding
CLO2	Differentiate microprocessor and microcontroller and Describe the importance and function of each pin of AVR ATmega 32 Microcontroller	2 Understanding 4 Analysis
CLO3	Learn and analyze assembly language programs for AVR Microcontroller	3 Applying 4 Analysis
CLO4	Develop embedded C language programs for AVR Microcontroller	5 Evaluate 6 Create
CLO5	Interface I/ O peripheral devices with AVR microcontroller to develop embedded system	6 Create

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	H	M	M	L	M	L	M		H				M	M		
CLO2	H	M	M	L	L	M		L				L	M	M		
CLO3	M	M	M	L	L				M		M		M	M		
CLO4	M	M	L	M	L	L	H							M		
CLO5	M	M	M	L	L			L		H		H		H		

H: High, M: Medium, L: Low