



Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur-441 108

NAAC Accredited (A+ Grade) & NBA Accredited

An Autonomous Institute affiliated to RTMNU Nagpur



Second Year (Semester-III) B.Tech. Electronics & Communication Engineering

BEC42311: MICROCONTROLLERS AND APPLICATIONS(Minor)

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	CT-1	15
Tutorial	- Hrs/week	CT-2	15
Total Credit	3	TA	10
		ESE	60
		Total	100
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Course Outcomes (CO) :After the completion of this course, Students will be able to-

CO1: **To understand** the architecture, assembly language of microcontrollers.

CO2: **To learn** how to interface external devices and study programming techniques and interfacing concepts.

CO3: **Develop** applications using timers, counters, interrupts and communication peripherals.

CO4: **Interface** sensors, displays, motors and other external devices.

CO5: **Develop** basic embedded-system applications using a microcontroller

Course Contents

Unit I	Introduction to 8051 micro controllers, Pin diagram, architecture, features & operation, Ports, memory organization, SFR's, Flags, Counters/Timers, Serial ports. Interfacing of external RAM & ROM with 8051, Interrupt structure, Instruction set of 8051; data transfer, logical, arithmetic & branching instructions, Addressing modes.
Unit II	Interfacing of Switches, Assembly language programming, Instruction set and addressing modes, keyboard, LED & LCD display, ADC & DAC Interface, Stepper motor Interface, DMA
Unit III	Timer and counter concepts, Timer modes and operation, Delay generation using timers, Interrupt concept and classification, Hardware and software interrupts, Interrupt priority, External and internal interrupts, Timer and interrupt-based applications
Unit IV	Seven-segment display interfacing, LCD interfacing, Keypad interfacing, ADC and DAC interfacing, Sensor interfacing, DC motor and stepper motor interfacing, Serial communication, I ² C, Basics of CAN communication
Unit V	Embedded-system development using microcontrollers, Temperature and humidity monitoring, Automatic street-light system, Digital clock, Traffic-light controller, Motor-speed control, Home automation, Security and alarm systems, IoT-enabled microcontroller applications.

Text Books

1	Microcontrollers: Principles and Applications by Ajit Pal
2	Microcontrollers and Applications by Prof. Santanu Chattopadhyay
3	Embedded Systems: Introduction to ARM Cortex-M Microcontrollers by Jonathan W. Valvano

Reference Books

1	The 8051 Microcontroller and Embedded Systems by Muhammad Ali Mazidi, Janice Gillispie Mazidi, and Rolin D. McKinlay
2	Microcontrollers and Application by Ajay V. Deshmukh.

Useful Links	
1	https://link.springer.com/book/10.1007/978-3-031-79737-8
2	https://www.edaboard.com/threads/books-and-websites-for-learning-microcontroller-from-scratch.213909/