GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering Syllabus

Subject Code : 3154503

Subject Name : Micro-Controllers and Interfacing Techniques

WEF Academic Year :	: 2023-24
Semester :	5
Course Name & Code	

Prerequisite:

In depth knowledge of Digital Logic Design, Microprocessor architecture as well as logical ability and programming skills to develop the code

Rationale:

- The students studying the subject are supposed to learn the architecture and programming of a typical microcontroller.
- Students will be taught the basic use of an assembly as well as embedded C programming environment to control peripheral devices.
- Students will also understand the interfacing of various peripheral elements with microcontrollers to design an automated system.
- The course will cover 8051, 8-bit Microcontroller in detail with sufficient exposure to design an automated system.

Course Scheme :

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA(M)	ESE (V)	PA (I)	
03	00	02	04	70	30	30	20	150

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	**Introduction To 8-bit Microcontroller:** Microcontrollers and Embedded processors, Overview of 8051 family, 8051 Microcontroller architecture, Register, 8051 status register, ROM space and other hardware modules, 8051 pin configuration & function of each pin.	**8**	**20**
2	**8051 Assembly Language Programming:** Addressing modes of 8051, Introduction to 8051 Assembly Programming, Assembling and Running an 8051 Program, The Program Counter and ROM Space in the 8051, 8051 Data Types and Directives, 8051 Flag Bits and the PSW Register, 8051 Register Banks and Stack, RISC Architecture.	**8**	**20**

3	**Arithmetic, Logic Instructions, and Programs**: Arithmetic Instructions, Signed Number Concepts and Arithmetic Operations, Logic and Compare Instructions, Rotate Instruction and Data Serialization, BCD, ASCII, and Other Application Programs, 8051 Stack, Stack and Subroutine instructions. Assembly language program examples on subroutine and involving loops - Delay subroutine, Factorial of an 8 bit number	**8**	**20**
4	**8051 Programming in C** : Data types, I/O programming, logic operations, Intel HEX file, Timer programming in assembly and C, Interrupt programming in assembly and C, Serial Port programming in assembly and C	**8**	**20**
5	**Peripheral Interfacing** : LCD and Keyboard Interfacing, ADC, DAC and sensor interfacing, Relay, Opto-isolator and Stepper Motor Interfacing, Input capture and Wave Generator, PWM programming and DC motor control, SPI protocol and Display interfacing, I2C Protocol and RTC interfacing	**10**	**20**

Reference Book :

1. Artificial Intelligence in Healthcare

   Edited by Michael Matheny, Sonoo Thadaney Israni, Mahnoor Ahmed and Danielle Whicher

   National Academy of Sciences

2. The AI Book: The Artificial Intelligence Handbook for Investors, Entrepreneurs and FinTech Visionaries

   Susanne Chishti (Editor-in-Chief), Ivana Bartoletti (Editor), Anne Leslie (Editor), Shân M. Millie (Editor), ISBN: 978-1-119-55190-4, Wiley

Course Outcome :

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
1	**Understand the basic of 8051 microcontroller architecture, its functioning and interfaces**	**UN**
2	**Apply knowledge of fundamental programming concepts and instruction set of microcontrollers.**	**AP**
3	**Apply fundamental of embedded C programming concepts**	**AP**
4	**Analysis of interfacing devices and memory with controller**	**AN**

5	**Implementation of real time solutions for product design**	**CR**

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List:

The practical work will be carried out based on the content covered during the academic session

List of Laboratory/Learning Resources Required:

- Data transfer/exchange between specified memory locations.
- Largest/smallest from a series.
- Sorting (Ascending/Descending) of data.
- Addition / subtraction / multiplication / division of 8/16 bit data.
- Sum of a series of 8 bit data.
- Multiplication by shift and add method.
- Square / cube / square root of 8 bit data.
- Matrix addition.
- LCM and HCF of two 8 bit numbers.
- Code conversion – Hex to Decimal/ASCII to Decimal and vice versa

Suggested Course Practical List :

List of Laboratory/Learning Resources Required :

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