Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-5 (Diploma)

Subject:Microprocessor and Controller - DETEE15214

Type of course: Major

Prerequisite: Digital Circuits and Basic Electronics.

Rationale:

This course lays a solid foundation to provide optimized solutions for different computing needs. Microprocessors handle complex, general-purpose tasks, while microcontrollers excel at dedicated, real-time control within embedded systems. The evolution of microprocessors and microcontrollers, enabling new possibilities in various fields, from AI and IoT to high-performance computing and space exploration.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T -- Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No.	Course content	Hrs	% Weightage
1.	**Introduction to Microprocessors** Introduction to Microcomputer,Microprocessor, Microcontroller, Von Neumann Architecture, Internal Architecture, ALU (Arithmetic Logic Unit), Register organization, Accumulator, general purpose registers, program counter, stack pointer, Flag register, Internal data bus and address bus, Pin Diagram and Signal Description: Detailed explanation of each pin and its function, Address bus, data bus,	15	10%

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	Control signals, status signals, multiplexed address/data bus, Timing Diagrams:Instruction fetch and execute cycles, Memory read/write cycles, I/O read/write cycles.	15	10%
2.	**Basic Programming Concepts** 8085 Instruction Set: Data transfer instructions, Arithmetic instructions, Logical instructions, Branching instructions, Addressing Modes, Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Implied addressing, Instruction Format, Opcode and operand, 8085 Assembly Language Programming, Assembly Language Basics, Assembler directives, Writing simple assembly language programs, 8085 Interrupts.	15	25%
3.	**Introduction to Microcontroller** Comparison of microprocessors and microcontrollers, Overview of 8051 Microcontroller, Architecture, Block Diagram of 8051, PSW and Flag Bits, 8051 Register Bank and Stack, I/O Ports, General Purpose and Special Function Register, Addressing modes ,Timers, Counters	15	25%
4.	**Assembly Programming and Instruction of 8051** Introduction to 8051 assembly programming, Assembling and running an 8051 program, Data types and Assembler directives, Arithmetic, logic instructions and programs, Jump, loop and call instructions, IO port programming. Simple programs, Programming 8051 Timers, Serial Port Programming,	15	25%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Reverse Engineering Code Analysis:** Faculty will provide students with a working assembly language program without comments. Students must analyze the code and explain the program's functionality by adding comments & Flow Diagram to the code. Upload final program on GMIU portal.(Student in a Group size of 3)	10
2	**Embedded System Design** Present a real-world problem (e.g., automated plant watering, a simple security system). Students must design and simulate a microcontroller-based solution. Upload simulation Result on GMIU web portal.(Student in a Group size of 3).	10
3	**Micro Project** Students will design hardware module based on Microcontroller Application and Upload video of working Model on GMIU portal.(Student in a Group size of 3)	10
Total		30

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	30%	15%	10%	25%	0

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand the basics of microprocessors and 8085 Architecture.
CO2	Write and Debug 8085 Assembly Language Programs.
CO3	Develop an in-depth understanding of the operation of microcontrollers.
CO4	Implement 8051 programming Skills.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs
1.	Write a program using 8085 Microprocessor for addition of 2 two 8-bit number and store Result on Memory Location	1,2	4
2.	Program to perform multiplication of two 8-bit numbers using a bit addition (8085)	1,2	2
3.	Find 1's & 2's complement of an 8-bit number (8085)	1,2	2
4.	Transfer a Block of data bytes from one memory location to another.	1,2	2
5.	Program to demonstrate the LED blinking(ON & OFF). LEDs are connected to P2 ON (8051)	3,4	4
6.	Transfer N bytes of data from location A to location B in 8051 controller	3,4	2
7.	Implement program to exchange N bytes of data at location A and at location B (8051)	3,4	2
8.	Assembly language program to find the largest element in a given array of N bytes at location 4000h. Store the largest element at location 4062h. (8051)	3,4	2

9.	Perform an assembly language program to perform the subtraction of two 16-bit numbers (8051).	3,4	2
10.	Compare two eight bit numbers NUM1 and NUM2 stored in external memory locations 8000h and 8001h respectively. Reflect your result as: If NUM1NUM2, SET MSB of location 2FH (bit address 7FH). If NUM1 = NUM2, then clear both LSB & MSB of bit addressable memory location 2FH. (8051)	3,4	2
11.	Write an assembly language program to count number of ones and zeros in an eight bit number (8051)	3,4	2
12.	Implement a Program to check whether a given number is palindrome or not. If palindrome store FFh in accumulator, else store 00h in accumulator (8051).	3,4	2
13.	Write an assembly language program to implement (display) an eight bit UP/DOWN binary (hex) counter on watch window (8051)	3,4	2
	Total		**30**

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content, 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

[1] R. Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 6th ed., Penram International Publication (India) Pvt. Ltd., 2013.
[2] D. V. Hall, Microprocessors Interfacing, 3rd ed., TMH.
[3] A. M. Mazidi, G. Mazidi, and R. D. McKinlay, The 8051 Microcontroller and Embedded Systems using Assembly and C, 2nd ed., Pearson, 2006.
[4] K. L. Short, Microprocessors and Programmed Logic, 2nd ed., Pearson Education Inc., 2003.
[5] S. Shah, 8051 Microcontrollers MCS 51 Family and its Variants, Oxford, 2010.