GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA IN BIO-MEDICAL ENGINEERING
SEMESTER: V

Subject Name: **Micro Controller & Its Application in Medical Instrumentation**

Sr. No.	Course Content
1.	**Microprocessors and Micro Controllers:** 1.1. Microprocessor **:** general idea and block diagram 1.2. Block diagram of a micro controller 1.3. Introduction to micro controller 1.4. Operating principle 1.5. Comparison between microprocessor and micro controller
2.	**8051 Micro Controller Hardware:** 2.1 Introduction 2.2 8051 micro controller hardware 2.3 8051 block diagram 2.4 Function of each block 2.5 8051 Programming model 2.6 8051 DIP Pin assignment 2.7 8051 oscillator and clock 2.8 Ceramic resonator oscillator circuit 2.9 Program counter and data pointer 2.10 A and B CPU registers 2.11 Flags and the program status word PSW 2.12 Internal memory 2.13 Internal RAM • Internal RAM organization 2.14 Stack and stack pointer 2.15 Special function registers 2.16 Internal ROM 2.17 Input / output Pins Ports and circuits • Port 0 Pin configuration • Port 1 pin configuration • Port 2 pin configuration • Port 3 pin configuration 2.18 External memory • Connecting external memory 2.19 Counters and timer • TCON and TMOD function registers • TCON (Timer control) function registers • TMOD Time mode control Function Register • Timer counter interrupts • Timer mode 1, 2 & 3 2.20 Serial Data input / output 2.21 Interrupts • Introduction • Types of interrupts

3.	**Moving Data:**
	3.1 Introduction
	3.2 Addressing Modes
	3.3 External Data Moves
	3.4 Code memory Read-only Data Moves
	3.5 Push and Pop opcodes
	3.6 Data exchanges
	3.7 Example programs
4.	**Logical Arithmetic Operations:**
	4.1 Introduction
	4.2 Byte Level Logical Operation
	4.3 Bit Level Logical Operation
	4.4 Rotate and Swap Operation
	4.5 Flags
	4.6 Incrementing and Decrementing
	4.7 Additions
	4.8 Subtraction
	4.9 Multiplications and Division
	4.10 Decimal Arithmetic
	4.11 Example Programs
	4.12 Jump and Call Program Range
	4.13 Calls and Subroutines
	4.14 Interrupts and Returns
5.	**8051 Micro Controller Design:**
	5.1 Introduction
	5.2 Micro controller specifications
	5.3 A micro controller design
	• External memory and memory space decoding
	• Reset and clock circuit
	• Expanding I/O
	5.4 Timing Subroutines
	5.5 Lookup table for 8051
	5.6 Serial data transmission
6.	**Applications:**
	6.1 Introduction
	6.2 Interface keyboards to 8051 based micro controller
	6.3 Interface LED & LCD display
	6.4 Interface the micro controller system to A/D and D/A converters
	6.5 8051 Data communications modes example programmes
	6.6 Data acquisition systems

Suggestive Implementation Strategies:

1) Microprocessor and Micro Controller
1. Demonstration
2. Transparencies
3. Seminar
    i. Handouts
    ii. Microprocessor kits
    iii. Software with PC

2) 8051 Micro Controller Hardware
1. Demonstration
2. Transparencies
3. Group Discussion
    i. Handouts
    ii. Micro controller kit 8051
    iii. Magazines

3) Moving Data
1. Demonstration
2. Transparencies
3. Seminar
    i. Software with PC
    ii. Handouts
    iii. Programming with C

4) Logical and Arithmetic Operations
1. Demonstration
2. Transparencies
3. Practice Work
4. Seminar
    i. Software with PC
    ii. Handouts
    iii. Programming

5) 8051 Micro Controller Design
1. Seminar
2. Group Discussion
3. Demonstration
    i. Magazine
    ii. Model
    iii. Reference Books

6) Applications
1. Industrial Visit
2. Demonstration
    i. Magazines
    ii. Handouts
    iii. Models

Laboratory Experiences:

1. 8051 Oscillator circuit and timing
2. Timer / counter control logic
3. External memory circuit
4. Interrupts circuits
5. Assembly language programming
6. Programming the 8051 - 8051 instruction syntex
7. Use commands to move data
8. Addition programming
9. Subtraction programming
10. Multiplication and division programming
11. Byte and bit logical operation
12. Interface LED display
13. A to D converter
14. D to A converter

Reference Books:

1. The 8051 Micro controller Architecture, Programming and Applications, Kenneth J. Ayala.
2. Microprocessor and Micro controllers, B. P. Singh.