

**Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and
Commerce, Baramati
Autonomous**

**Course Structure & Credit Distribution for S. Y. B. Sc. (Computer Science)
Electronics (Sem. III) (2022 Pattern)
(w.e.f. June, 2023)**

Semester	Paper Code	Title of Paper	No. of Credits
III	UCSEL231	8051 Architecture and Programming	3
	UCSEL232	Instrumentation Systems	3
	UCSEL233	Electronic Practical's	2

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Computer Science)

Electronics (w.e.f. June, 2023)

Class: S.Y. B. Sc. (Comp. Sci.) (Sem III) (2022 Pattern)

Paper Code : UCSEL231

Title of Paper: 8051 Architecture and Programming

Paper : I

Credit : 3

No. of lectures: 48

● **Learning Objectives:**

1. To study the basics of 8051 microcontroller
2. To study the Programming of 8051 microcontroller
3. To study the interfacing techniques of 8051 microcontroller
4. To apply knowledge of 8051 to design different application circuits
5. To introduce the basic concepts of advanced Microcontrollers

● **Learning Outcomes:**

At the end of this course, students should be able:

1. To write programs for 8051 microcontroller
2. To interface I/O peripherals to 8051 microcontroller
3. To design small microcontroller based projects

Unit 1: Architecture of 8051 Microcontroller [12]

Introduction to microcontrollers, difference in controller and processor, architecture of 8051, Internal block diagram, Internal RAM organization, SFRS, pin functions of 8051, I/O port structure & Operation, External Memory Interface- RAM, ROM, EPROM.

UNIT-2: Instruction Set [12]

Instruction classification, Instruction set, Addressing Modes: Immediate, register, direct, indirect and relative, assembler directives (org, end), features with example, I/O Bit & Byte programming using assembly language for LED and seven segment display (SSD) interfacing. Introduction to 8051 programming in C

UNIT- 3: Timer/Counter, Interrupts [12]

Timer / counter: TMOD, TCON, SCON, SBUF, PCON Registers, Timer modes, programming for time delay using mode 1 and mode 2.

Interrupts: Introduction to interrupt ,Interrupt types and their vector addresses, Interrupt enable register and interrupt priority register(IE,IP)

Interfacing: ADC, DAC, LCD, stepper motor, Synchronous and asynchronous serial communication, Programming serial port without interrupt, Use of timer to select baud rate for serial communication.

Study of advanced microcontrollers (ARM & PIC): Features and applications

Reference Books:

1. The 8051 Microcontroller Architecture, Programming and application [Second Edition] Kenneth J. Ayala, Penram International (1999)
2. 8051 microcontroller and Embedded system using assembly and C : Mazidi, Mazidi and McKinley, Pearson publications
3. The 8051 microcontroller – Architecture, programming and applications: K.Uma Rao and AndhePallavi, Pearson publications.
4. The 8051 Microcontroller and Embedded Systems using Assembly and C, Kenneth J. Ayala, Dhananjay V. Gadre. Cengage Learning

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Comp.Sci.)

ELECTRONICS

(w.e.f. June, 2023)

Class : S.Y. B. Sc. (Comp.Sci.) (Semester- I) (2022P)

Paper Code : UCSEL 232

Title of Paper : Instrumentation Systems

Paper : II

Credit : 3

No. of lectures: 48

● **Learning Objectives:**

1. To study sensors and their various features.
2. To study signal conditioning and its different circuits.
3. To study digital instruments and different display devices.

● **Learning Outcomes:**

At the end of this course, students should be able to:

1. Getting knowledge of instrumentation system and sensors.
2. Identify active and passive filters.
3. Designing of different signal conditioning circuits.
4. Solving examples of signal conditioning circuits.

UNIT I: Instrumentation

[12]

Introduction, Block diagram of Instrumentation system, Definition of sensor, transducer and Actuators, Difference between sensors and transducers, Classification of sensors: Active and passive sensors. Specifications of sensors: Accuracy, range, linearity, sensitivity, resolution, reproducibility. Mechanical and Electromechanical sensor: Definition, principle of sensing & transduction, classification.

UNIT II: Sensors and Actuators

[12]

Temperature sensors (LM-35), Optical sensor (LDR), displacement sensor (LVDT), Passive Infrared sensor (PIR), Actuators: DC Motor, stepper motor. Concept of Smart Sensors - Definition, Working, Types (Temperature, motion, light, smog), Difference between base sensors and smart sensors, Benefits of smart sensors.

UNIT III: Signal Conditioning and Data Converters**[12]**

Introduction to Signal Conditioning, Operational Amplifiers : Inverting and Non inverting Op.Amps with expression, Op. Amp. Specifications, Wheatstones bridge, Filters (LPF, HPF, BPF, BRF), Designing of active filters, ADC: Flash,SAR, DAC: Binary weighted, R-2R, Instrumentation Amplifier using OP. AMP.

UNIT IV: Digital Instruments and Display Devices**[12]**

Introduction to digital instruments, Digital Multimeter, Digital Frequency Meter, Block Diagram of CRO, Concept of DSO, LCD technique, Concepts of LCD, LED, OLED Displays.(comparative study). Advantages of Digital instruments over Analog instruments, Introduction to virtual instrumentation (LABVIEW).

Recommended Books:

1. Electronic Instrumentation -Kalsi TMH
2. Transducers & Instrumentation -Murthy PHI (Unit 1)
3. Instrumentation Measurements & Analysis-Nakra&Chaudhry TMH
4. Instrumentation Devices & Systems -Rangan, Sarma, Mani TMH
5. Sensor & transducers, D. Patranabis, 2nd edition, PHI

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Comp.Sci.)

ELECTRONICS

(w.e.f. June, 2023)

Class : S.Y. B. Sc. (Comp.Sci.) (Semester- I) (2022P)

Paper Code : UCSEL 233

Title of Paper : Electronics Practical

Paper : III

Credit : 2

No. of lectures: 32

Objectives:

1. To use basic concepts for building various applications in electronics.
2. To understand design procedures of different electronic circuits as per requirement.
3. To build experimental setup and test the circuits.
4. To develop skills of programming
5. To learn instrumentation systems in electronics.

Outcomes:

After achieving the above objectives, students should be able to

1. Design any operational amp. Based application circuit and test it.
2. Design any instrumentation based application circuit and test it.
3. Write an 8051 program for various applications.
4. Simulate the 8051 program on Keil compiler.

Group A : Activities (Any one)

- A. To study CRO and DSO.
- B. To learn Pinnacle Software
- C. To learn LABVIEW Software
- D. Internet Survey on Recent technologies in Electronics.

Group B : The 8051 Architecture & Programming (Any four)

1. Arithmetic, logical & code conversion problems using assembly/C programming
2. Interfacing the thumbwheel & seven segment display.
3. Traffic light controller using microcontroller.
4. Interfacing LCD to Microcontroller.
5. Waveform generation using DAC Interface.
6. Event counters using opto- coupler using seven segment display / LCD.
7. Speed Controller of stepper motor using microcontroller
8. Interfacing ADC to Microcontroller.

Group C : Instrumentation Systems (Any four)

1. LM-35 based temperature sensing system.
2. IC-741 Op Amp. As Inverting and Non-inverting amplifier
3. Build and test DAC using R-2R Ladder network.
4. Flash ADC using discrete components.
5. Build and test LDR based light control system.
6. Study of Linear Variable Differential Transformer.
7. Build and test Instrumentation Amplifier.
8. Build and test LPF and HPF.

8 experiments are compulsory and 1 activity is compulsory for each semester.
