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

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

Semester	Paper Code	Title of Paper	No. of Credits
III	USEL231	Linear Integrated Circuits and Applications	3
	USEL232	Digital Circuit Design	3
	USEL233	Electronic Practical's	2

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Electronics)

(w.e.f. June, 2023)

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

Paper Code : USEL231

Title of Paper: Linear Integrated Circuits and Applications

Paper : I

Credit : 3 **No. of lectures: 48**

Objectives:

1. To study basic principles of amplifiers and oscillators.
2. To understand the working of various analog circuits.
3. To develop analog circuit design skills.
4. To apply the knowledge of analog circuits in different applications.

Learning Outcomes:

After completing the course student will able to

1. Understand basics of amplifiers, op-amp and oscillators.
2. Explain the concepts of oscillators, filters.
3. Design the circuits of different filters and oscillators.

UNIT- 1: Amplifiers (12)

General classification of amplifiers with respect to signal amplitude, frequency and configuration: Small signal amplifier

Types of coupling (quantitative analysis): RC coupled, transformer coupled and direct coupled. Multi-stage RC coupled CE amplifier: effect of coupling capacitor and bypass capacitor on frequency response (qualitative approach).

Concept of small signal and large signal amplifiers. Comparison with respect to gain, efficiency, distortion. Concept of thermal run away and use and types of heat sinks.

UNIT 2: Oscillators (12)

Concept of negative and positive feedback and Barkhausen criterion. Types of feedback circuits: current shunt, current series, voltage shunt and voltage series, comparison and applications. Effect of negative feedback: on gain ,Bandwidth, input and output impedance, stability of an amplifier.

Positive feedback: RC oscillators -Wien bridge , Phase Shift. LC oscillators- Hartley ,Colpitts. Crystal oscillator. Design of oscillators for given feedback factor and frequency of oscillations.

UNIT 3: Operational amplifier (12)

Differential Amplifier, Block diagram of an operational amplifier, Op-Amp characteristics(Ideal and practical) input offset voltage, output offset voltage,input offset current, input bias current,

common mode rejection ratio, slew rate, supply voltage rejection ratio.Open loop frequency response. Gain bandwidth product. Concept of virtual Ground, offset null.
Inverting and non-inverting amplifiers.Adder and subtractors.Voltage follower, Integrator, Differentiator.

UNIT 4: Applications of Op-amp (12)

Comparators, Schmitt Trigger,Voltage to current converter, Current to voltage converter, Bridge amplifier, Instrumentation amplifiers with three op-amp.
Active and passive filters, First order low pass, high pass, band pass and band reject filters. Designing of filters.

Recommended Books:

1. Electronic Principles by Malvino A.P TMH
2. Operational amplifiers and linear Integrated Circuits by Gaykawad R. PHP
3. Operational amplifier by Clayton G.B. ELBS
4. Electronic devices and circuits by Millman, HalkiasMcGrawHill
5. Electronic devices and circuits by Boylestead PHP
6. Principles of Electronics by Meheta V.K. S.Chand and Company
7. Principles of Electronics by B.L.TherejaS.Chand and Company
8. Basic Electronic Devices and Circuits: R.Y. Borse 1st Edition 2012 Adhayan Publishers and distributors, New Delhi.

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Electronics)

(w.e.f. June, 2023)

Class: S.Y. B. Sc. (Sem III) (2022 Pattern)
Paper Code : USEL232
Title of Paper: Digital Circuit Design
Paper : II
Credit : 3 **No. of lectures: 48**

- **Learning Objectives:**

1. To utilize k-maps in the design of combinational circuits.
2. To understand the design principles of sequential circuits.
3. To study the design and working of various data converters
4. To configure the digital circuits in system interfacing.
5. To be familiar with different logic families.

- **Learning Objectives:**

Student should able to:

1. Design combinational circuits using logic gates.
2. Design various counters and determining outputs.
3. Work with different types of counters and design its applications.
4. Understand digital system interfacing and logic families.

UNIT -1: Combinational Logic Circuit Design: (**12)**

Revision of K maps, Design of code converters: BCD to Seven segments, Binary to Gray, Gray to binary, Half adder, Full adder, Priority Encoder, Error Detection Technique: Hamming Code

UNIT -2: Sequential Circuits: **(12)**

State table, State diagram, excitation table and transition table, Design of counters using state machines: Asynchronous, modulus and up-down counter, Sequence generator.
Applications of counters: - Totalizer, Digital clock.

UNIT -3: Data Converters: **(12)**

Digital to analog converters: Weighted resistive network, R-2R ladder network.
DAC parameters: accuracy and resolution.
Analog to Digital converters: Simultaneous conversion, Counter type, Successive approximation method, Single slope, Dual slope, Delta Sigma ADC, Study of ADC IC 0808, ADC parameters.

UNIT -4: Digital System interfacing and Logic families: **(12)**

Digital system interfacing of LED's, Single and multi-digit 7 segment display/driver. Introduction and comparative study of TTL, NMOS, CMOS, ECL logic families with reference to their performance parameters

Recommended Books:

1. Digital Fundamentals by Floyd Thomas (Pearson)
2. Digital Circuit design by Morris Mano (PHP)
3. Digital Principles and applications by Malvino Leach (TMH)
4. Modern digital Electronics by R.P.Jain (TMH)

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Electronics)

(w.e.f. June, 2023)

Class: S.Y. B. Sc. (Sem III) (2022 Pattern)
Paper Code : USEL233
Title of Paper: Electronic Practical's
Paper : III
Credit : 2 **No. of lectures: 32**

Objectives:

1. To make use different basic concepts for building different applications
2. To understand design procedures of different electronic circuit as per requirement
3. To build experimental setup and test the circuits.
4. To develop skills of analyzing test results of given experiments.

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. Understand basic parameters in electronics.
4. Know operation of different instruments used in the laboratory.
5. Connect circuit and do required performance analysis.

Group A : Activities: Any One

1. To study CRO/DSO.
2. To learn Pinnacle Software
3. To learn LABVIEW Software
4. Internet survey on recent technologies in Electronics
5. Study tour and its report writing

Group B : (Linear Integrated Circuits and Applications): Any Four

1. Designing Wein bridge oscillator/Phase shift oscillator.
2. Designing and build two stage amplifier using transistor.
3. Designing and build V to I converter using opamp.
4. Designing a first order Low Pass Filter and High Pass Filter using OPAMP IC-741.
5. Study of op-amp adder, subtractor.
6. Designing of an inverting and non-inverting amplifier for given gain.
7. Designing of an integrator and differentiator using op-amp for a given specification and study its frequency response.

Group C : (Digital Electronics): Any Four

1. Code conversion using logic gates – binary to gray, gray to binary.
2. Hamming Code generation and error detection.
3. 3-bit synchronous counter using flip flops.
4. DAC using R-2R ladder network.
5. ADC using IC 0808.
6. Study of Single digit 7 segment display / driver.