

**S.Y.B.Sc. (Electronic Science) 2020
Proposed Syllabus**

Sem-III	Paper-I : Analog Circuit Design (ELE2301)	Paper-II: Digital Circuit Design (ELE2302)
Sem-IV	Paper-I: Instrumentation (ELE2401)	Paper-II: Communication Electronics (ELE2402)
Sem-III	Paper- III: Practical Course (ELE2303)	
Sem-IV	Paper- III: Practical Course (ELE2403)	

**S.Y.B.Sc. Electronic Science -Semester III
Paper -I : Analog Circuit Design (ELE2301)**

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.

UNIT- 1: Transistor 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) and application area.

UNIT-2: Power Amplifiers : (12)

Concept of small signal and large signal amplifiers. Comparison with respect to gain, efficiency, and distortion.

Classification of power amplifiers on the basis of conduction: class-A, class-B, class-AB, class-C. Class-A amplifier: resistive load/transformer coupled load, efficiency calculation. Concept of harmonic distortion. Class B Push-pull amplifier: concept, complimentary symmetry class-B push pull amplifier, crossover distortion, class AB push pull amplifier. Concept of thermal run away and use and types of heat sinks.

UNIT 3: Feedback Systems : (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: Oscillator circuits -Wien bridge , Phase Shift , Hartley , Colpitts , Concept of Crystal oscillator. Design of oscillators for given feedback factor and frequency of oscillation.

UNIT 4: Differential Amplifiers and Operational amplifier applications: (12)

Concept and working of differential amplifier. Configurations of differential amplifier: Single ended, double ended. Differential and Common mode gains, Use of constant current source and its effect on CMRR.

Op-amp Applications: Integrator, Differentiator, Voltage to current converter, Current to voltage converter, Bridge amplifier, Instrumentation amplifiers with three op-amp, Precision rectifier,

Recommended Books:

1. Electronic Principles by Malvino A.P. TMH
2. Operational amplifiers and linear Integrated Circuits by Gaykawat R. PHP
3. Operational amplifier by Clayton G.B. ELBS
4. Electronic devices and circuits by Millman, Halkias McGrawHill
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. Thereja S.Chand and Company
8. Basic Electronic Devices and Circuits: R.Y. Borse 1st Edition 2012 Adhayan Publishers and distributors, New Delhi.

S.Y.B.Sc. (Electronic Science)-Semester-III
Paper-II: Digital Circuit Design (ELE2302)

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 and applications.

UNIT -1: Combinational Circuits: (12)

Revision of K maps, Design of code converters: BCD to Seven segments, Binary to Gray, Gray to binary, Half adder, Full adder, Parity generator/Checker, One bit and Two bit Magnitude comparator.

UNIT -2: Sequential Circuits: 12)

State table, State diagram, excitation table and transition table, Design of counters using state machines: Synchronous, asynchronous, modulo-N and up-down counter, Sequence generator

UNIT -3: Data Converters : (12)

Digital to analog converters : Weighted resistive network, R-2R ladder network, DAC accuracy and resolution.

Analog to Digital converters: Simultaneous conversion, Counter type, Tracking method, Successive approximation method, Single slope, Dual slope, ADC accuracy and resolution.

UNIT -4: Digital System interfacing and applications : (12)

Digital system interfacing of LED's, Single and multi digit 7 segment display / driver, Study of Thumb wheel switches, Electromechanical relays.

Applications of counters :- Totalizer, Digital clock, Auto-parking system, Two digit bank token display.

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)

S. Y. B. Sc. Electronic Science – Semester IV
Paper – I: Electronic Instrumentation (ELE2401)

Objectives:

1. To study the block diagram of electronic instruments
2. To understand the working principles of popular instruments.
3. To know important technical specifications of an instruments.
4. To learn the operating procedure of instruments.

Unit 1: Measurement principles and basic instruments (12)

Measurement of physical parameters, measurement system block diagram, Measurement characteristics like accuracy, precision, sensitivity, linearity, resolution, reliability, repeatability, errors. Construction and working principles of Volt meter, Current meter, Ohm meter, multi-range meters, multi-meter.

Unit 2: Signal sources and Oscilloscope (12)

Principle, block diagram, working and important specifications of signal and function generators, single trace CRO, dual channel and dual trace CRO comparison and applications, Concept of Digital Storage Oscilloscope (DSO).

Unit 3: Digital Instruments (12)

Block diagram, working principle and specifications of DPM, DMM, DFM, LCR meter, Digital thermometer, Lux meter, Speedometer, pH meter.

Unit 4: Power Supplies (12)

Principle, block diagram, working, important specifications and operating procedures for- Fixed voltage power supply, variable power supply, dual power supply, CVCC supply, SMPS, Concept of UPS, Types and application areas.

Recommended Books:

1. Helfrik A. & Copper W., Modern Electronic Instrumentation and measurement techniques, PHI.
2. Kalsi H. S., Electronic Instrumentation, TMH.
3. Bouwens, Digital Instrumentations, TMH
4. Rashid Muhammad H, Power Electronics, PHI
5. B. S. Sonde, Power Supplies, TMH

S.Y.B.Sc. (Electronic Science)-Semester-IV

Paper-II: Communication Electronics (ELE2402)

Objectives:

1. To study basics of communication systems and telephone system.
2. To understand Amplitude Modulation /demodulation techniques and receiver
3. To understand Frequency Modulation /demodulation techniques and receiver
4. To learn the Digital communication system

UNIT- 1: Basics of communication and telephone systems (12)

Block diagram of communication system, Types of communication system: simplex, duplex, analog and digital communication, Electromagnetic spectrum ,base band and broad band communication, Noise concept and types, Signal to noise ratio, Noise figure, Noise temperature. Problems based on noise calculations.

Block diagram of Telephone handset, types of dialing, Block diagram of PSTN.

UNIT- 2: Amplitude Modulation and AM Receiver (12)

Need of modulation, Concept of modulation, AM waveform, mathematical expression of AM, Concept of sideband, Definition and problems: modulation index, power distribution. AM using diode/transistor, Demodulation principles, Demodulator circuit using diode.

AM Receiver: TRF and super-heterodyne receiver, characteristics of receiver: Selectivity, Sensitivity, Image frequency and Dynamic range.

UNIT-3: Frequency Modulation and FM receiver (12)

FM modulation: definition, mathematical representation, frequency spectrum, bandwidth and modulation index. FM using varactor diode,

FM Demodulator: Slope detector, Balanced slope detector, Foster-Seeley detector.

Block Diagram of FM Receiver.

UNIT- 4: Pulse Digital Communication Systems (12)

Block diagram of digital communication system, advantages of digital communication system, bit rate, baud rate and bandwidth. Serial and parallel communication, concept of sampling, Sampling theorem, concept of ASK, PSK, FSK, PAM, PWM, PPM, PCM, Concept of FDM and TDM, Concept of MODEM, Concept of Set Top Box.

Recommended Books:

1. Communication Electronics : Principles and applications by Louis E Frenzel
3rd edition TMH Publications.
 2. Electronics Communication Systems : Keneddy
 3. Telecommunication Switching Systems and Network : Vishwanathan
Thiagarajan, PHI publication.
 4. Electronics Communication Systems by Denis Roddy, John Coolen, PHI
publication.
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S.Y.B.Sc. (Electronic Science)
Paper- III: Practical Course (ELE2303)

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.

List of Practicals (Analog Electronics): Any Four

1. Wein bridge oscillator/Phase shift oscillator
2. Design and build two stage amplifier using transistor
3. Design and build V to I converter using Opamp
4. Design of Low Pass Filter and High Pass Filter using OPAMP IC-741
5. Push pull amplifier
6. Effect of negative feedback on amplifier parameters

List of Practicals (Digital Electronics): Any Four

1. Code conversion using logic gates – binary to gray , gray to binary
2. DAC using R-2R ladder network
3. ADC using IC 0808/IC 7109/IC 741/IC 324
4. Sequence generator for stepper motor
5. 3 bit synchronous counter using flip flops
6. Decimal to BCD encoder using logic gates

S.Y.B.Sc. (Electronic Science)
Paper- III: Practical Course (ELE2403)

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.

List of Practicals (Instrumentation): Any Four

1. Temperature measurement system using LM – 35
2. Study of Function generator
3. Multirange voltmeter
4. Study of CVCC/SMPS.
5. Study of LDR based system
6. Variable power supply using IC 317.

List of Practicals (Communication Principles): Any Four

1. Design, Build and test Amplitude Modulator and Demodulator.
2. Time Division Multiplexing circuit.
3. Frequency Shift Keying(FSK) using XR 2206
4. Delta Modulation circuit using opamp
5. Hamming Code generation and error detection.
6. Study of PAM,PPM and PWM