S.Y.B.Sc. (Electronic Science)
Revised Syllabus
To be implemented from A.Y. 2014-15

Structure of S. Y. B. Sc. (Electronic Science) course

Sem-I	**Paper-I : Analog Circuit Design (EL211)**	**Paper-II: Digital Circuit Design (EL212)**
Sem-II	**Paper-I: Electronic Instrumentation (EL221)**	**Paper-II: Communication Electronics (EL222)**
Sem-I & II	**Paper- III: Practical Course (EL 203)**	

Equivalence Subject/Paper and Transitory Provision

Semester	Old Syllabus	New Syllabus
Semester I	Paper - I : Analog Circuits and Systems	Paper-I : Analog Circuit Design **(EL 211)**
	Paper - II: Digital System Design	Paper-II: Digital Circuit Design **(EL 212)**
Semester II	Paper – I: Electronic Instrumentation	Paper-I: Electronic Instrumentation **(EL221)**
	Paper – II: Communications system	Paper-II: Communication Electronics **(EL222)**
Semester I and II	Practical Course	Paper- III: Practical Course **(EL 203)**

S.Y.B.Sc. Electronic Science -Semester I

Paper - I: Analog Circuit Design (EL 211)

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: A.C.-D.C. analysis, frequency response, gain Bandwidth product. Design of single stage 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: Difference between voltage and power amplifier, Comparison of small signal and large signal amplifiers: 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 amplifier: Push-pull amplifier concept, complimentary symmetry class-B push pull amplifier, crossover distortion, class AB push pull amplifier. Concept, 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 and Crystal. Design of oscillators for given feedback factor and frequency of oscillation.

UNIT-4: Differential Amplifiers and Applications of Operational Amplifier: (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, First order Butterworth active filters -Low pass and High pass filters.and its design for cut off frequency.

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, 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.

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

Paper- II: Digital Circuit Design (EL 212)

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 and Gray to binary. Serial adder, Priority encoder, Parity generator/Checker, Magnitude comparator.

UNIT -2: Sequential Circuits: 12)

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

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

Digital to analog converters : weighted resistive network, R-2R ladder network, D/A accuracy and resolution, Analog to Digital converters: Simultaneous conversion, counter method, Tracking method, successive approximation method, Single slope, dual slope, A/D accuracy and resolution

UNIT -4: Digital System Interfacing and Applications : **(12)**

Interfacing of LED's, single and multi digit 7 segment display/ driver, Switches, Keypad, Thumb wheel switches, Relays, Interface considerations for ADC/DAC with digital systems.

Applications of counters:- Totalizer, Digital clock, auto-parking, 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)
5. Practical Digital IC's by Willams (TMH)

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S. Y. B. Sc. Electronic Science – Semester II

Paper - I : Electronic Instrumentation (EL 221)

Objectives:

1. To study the block diagram of electronic instruments
2. To understand the working principles of frequently used 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, AC Voltmeter.

UNIT- 2: Signal Sources and Oscilloscope (12)

Principle, block diagram, working and important specifications of signal and function generators, sweep generators, dual channel and dual trace CRO, 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, energy meter, power factor meter and decibel 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, DC to DC converter, UPS.

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

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

Paper - II: Communication Electronics (EL 222)

Objectives:

1. To study basics of communication systems and telephone system.
2. To understand Amplitude and Frequency Modulation.
3. To understand basics of AM and FM Receivers.
4. To study 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, problems based on modulation index, frequency deviation, average power. FM Demodulator: Slope detector, Foster-Seeley detector.

Block Diagram of FM Receiver.

UNIT- 4: Pulse and 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 by Keneddy
3. Telecommunication Switching Systems and Network by 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 (EL 203)

Objectives:

1. To make use of basic concepts for building different electronic circuits..
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 .

- Total Practical to be conducted :20.
- 16 experiments compulsory: At least four practical from each of the A B C D groups.
- One activity equivalent to 2 experiments by the student.

  a. Continuation of F. Y. activity.

  b. PSPICE Simulation

  c. Documentation type experiments

  d. Presentation/Seminar on Electronics /advanced topic/research topics.
- One activity equivalent to 2 experiments to be arranged by the teacher – Arrange at least two practical demonstrations / Workshops /Industrial visit which will enhance quality and skills of the student.
- Examination will be conducted on 16 experiments as well as on activities.

Practical Examination –

A) Internal Marks 20: 16 marks for experiments and 04 marks for activities

B) Annual examination: 80 Marks **in Two session of 3 Hrs as usual practice.**

Session I 40 marks

Practical work 32 marks , Oral based on the student's own activities 8 marks

Session II 40 marks

Practical work 32 marks,Oral based on Common activities arranged by teachers 8 marks

32 Marks can be divided as -Circuit diagram		10
	Connection	05
	Demonstration and working explanation	10
	Results	05
	Result analysis / conclusion / comments	02

Group A :List of Practicals (Digital Circuit Design): Any Four

1. Code conversion using logic gates – binary to gray , gray to binary
2. 3 bit synchronous counter using flip flops
3. Decimal to BCD encoder using logic gates
4. Study of RAM
5. Study of 4- Bit Arithmetic Unit using IC 74181
6. DAC using R-2R ladder network
7. ADC using IC 0808/IC 7109/IC 741/IC 324
8. Sequence generator for stepper motor

Group B: List of Practicals (Analog Circuit Design): Any Four

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

Group C: List of Practicals (Communication Electronics): 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. Demonstration of PAM,PPM and PWM
7. Study of radiation pattern of antenna

Group D : List of Practicals (Electronic Instrumentation): Any Four

1. Design and build three opamp Instrumentation Amplifier
2. Variable power supply using IC 317.
3. Temperature measurement system using LM – 35
4. Study of UPS.
5. Study of Function generator
6. Multirange voltmeter
7. Study of CVCC/SMPS.
8. Design and build bridge amplifier for temperature sensors thermistor/RTD/PT100
9. Study of LDR based system
10. Study of LVDT

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