

Deccan Education Society's
Fergusson College (Autonomous), Pune

Syllabus under Autonomy for

S.Y. B.Sc. Electronic Science

From academic year 2017-18

Particulars	Name of Paper	Paper Code	Title of Paper	Type of Paper	No. of Credits
S.Y. B.Sc. Semester III	Theory Paper - 1	ELS2301	Analog Electronics	CORE-1	3
	Theory Paper - 2	ELS2302	Digital Principles and Applications	CORE- 2	3
	Practical Paper - 1	ELS2303	Electronics Practical - III	PCORE-1	2
S.Y. B.Sc. Semester IV	Theory Paper - 3	ELS2401	Operational Amplifiers and Applications	CORE-3	3
	Theory Paper - 4	ELS2402	Electronic Instrumentation	CORE-4	3
	Practical Paper - 2	ELS2403	Electronics Practical - IV	PCORE-2	2

S.Y. B.Sc. Semester III

Electronic Science Paper -1 (ELS2301): Analog Electronics

[Credits-3]

Objectives:

1. To introduce concept of electronic circuit design
 2. To bring out special aspects of power amplifier design
 3. To impart knowledge about feedback in amplifiers and its effects
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Unit-I	Amplifiers Classification of amplifiers: small signal and large signal, low frequency and high frequency, ac and dc analysis of small signal amplifiers. Design of single stage class A amplifiers, multistage amplifiers with RC, transformer, direct coupling. Low and high frequency response of RC coupled amplifiers, effect of coupling and bypass capacitors and transistor parameters on high frequency response.	16
Unit-II	Power Amplifiers Concept of efficiency and harmonic distortion in power amplifiers, Class A, B, AB power amplifiers, Direct coupled and transformer coupled load, Efficiency calculation of these power amplifiers, Concept of harmonic distortion, Thermal considerations and heat sinks	16
Unit-III	Feedback and Oscillators Concept of positive and negative feedback, Types of negative feedback circuits - voltage and current, series and shunt, Effect of negative feedback on gain, stability, nonlinearity, R_{in} , R_{out} , bandwidth, Applications of negative and positive feedback. Oscillators- Wein bridge, phase-shift, Hartley, Colpitts and crystal Oscillator	16
<ol style="list-style-type: none">1. References: Electronic devices and circuit theory (11th edition): Robert Boylestad and Louis Nashelsky, Pearson (2013)2. Electronic devices and circuits: An Introduction, Allen Mottershead, Goodyear Publishing Company (1973)3. Electrical Principals: Albert Malvino and David Bates, Mc Graw Hill (2016)		

S.Y. B.Sc. Semester III

Electronic Science Paper -2 (ELS2302): Digital Principles and applications

[Credits-3]

Objectives:

1. To introduce concept of digital logic families
2. To understand the primary sections of digital circuits viz.- combinational and sequential
3. To impart knowledge about basic digital building blocks and their applications

Unit-I	Logic families : Classification of logic families: TTL, CMOS; their characteristics and comparison	4
Unit-II	Combinational circuits : Multiplexer, de multiplexer, encoder, decoder, parity generator, parity checker, Applications of multiplexer, de multiplexers, encoders and decoders.	12
Unit-III	Sequential circuits : Counters: Types of triggering, Counters - Natural counters: synchronous and asynchronous, up/down counters, modified counters, resetting logic, modulo counters, scaling circuits, Applications – Auto parking system, Digital clock etc. Shift registers: Need of shift operations, Modes of operation - SISO, SIPO, PISO, PIPO, universal shift register, ring counter, Johnson counter. Applications – Time delay generator, Serial to Parallel and Parallel to Serial converter	20
Unit-IV	Data Converters: DAC, ADC : DAC: Binary weighted resistor type DAC, R-2R ladder DAC Specifications of DAC – Resolution, non-linearity, gain error, settling time ADC: Stair-step ramp generator type ADC, Tracking ADC, Successive approximation ADC, Single slope ADC , Dual slope ADC, Flash ADC and applications of data converters, Specifications of ADC – Resolution, input range, linearity, conversion time	12

References:

1. Digital Principles and Applications – Malvino, Leach, Saha, Mc Graw Hill (2013)
2. Digital Fundamentals: Thomas Floyd, Pearson (2015)
3. Digital electronics: Fundamental concepts and applications– Christopher Strangio, Pearson Education (1980)

S.Y. B.Sc. Semester III

Electronic Science Paper -3 (ELS2303): Electronics Practical-III

[Credits-2]

List of practical

	Group-[A]: Analog Electronics (Any Four experiments)
1.	Study of RC coupled amplifier
2.	Study of emitter follower
3.	Class B push pull amplifier
4.	Effect of negative feedback on amplifier
5.	Colpitt's oscillator
6.	Hartley oscillator
7.	RF tuned amplifier
	Group-[B]: Digital Principles and Applications (Any Four experiments)
1.	Multiplexer/ Demultiplexer
2.	Encoder/ Decoder
3.	Scaling circuits of 7490
4.	Study of universal shift register IC7495
5.	Digital to analog converter
6.	Analog to digital converter
7.	3 bit synchronous counter
	Group-[C]: One Hobby Project/Activity (equivalent to 2 experiments)

S.Y. B.Sc. Semester IV

Electronic Science Paper -1 (ELS2401): Operational amplifiers and applications

[Credits-3]

Objectives:

1. To understand various op-amp parameters and their importance in design
2. To learn about basic op-amp configurations
3. To introduce various op-amp application circuits
4. To introduce various timing circuits

Unit-I	Basic Operational Amplifier and Its Characteristics : Concept of differential amplifier, block diagram of op-amp and its working, LM 741. OP-AMP parameters: Input offset voltage, input bias and offset currents, input and output impedance, common mode rejection ratio (CMRR), Slew rate, Open loop gain and frequency response	14
Unit-II	Op Amp Circuits : Inverting and non-inverting amplifiers, summing and difference amplifiers, integrator and differentiator, voltage to current converter and current to voltage converter, comparator, Wein-bridge and phase shift oscillator, Comparator, Schmitt trigger	14
Unit-III	Signal Conditioning Circuits : Sample and hold (S/H) circuit, Its need/application, Active filters (1'st order): Low Pass Filter, High Pass Filter, Band Pass Filter, Band Stop Filter, bridge amplifier, log and antilog amplifiers	12
Unit -IV	Timing Circuits : Concept of multivibrator, three types of multivibrators, Op-amp based multivibrators, IC 555 – block diagram, multivibrator circuits, Applications.	8
References: 1. Operational Amplifiers: G. B. Clayton and S. Winder, Newnes (2003) 2. Op-Amp and Linear ICs – R. A. Gaykwad, Prentice Hall (2004)		

S.Y. B.Sc. Semester IV

Electronic Science Paper -2 (ELS2402): Electronic Instrumentation

[Credits-3]

Objectives:

1. To introduce basic measurement parameters
2. To develop awareness of measurement system for different physical quantities
3. To impart knowledge about analog instruments and their use
4. To understand principles, working and advantages of digital instruments

Unit-I	Introduction : Specifications of instruments, static and dynamic characteristics, Accuracy and precision, sensitivity, linearity, resolution, repeatability; Errors such as gross error, systematic error, absolute and relative error, random error Basic measuring instruments: Construction and working principles of PMMC movement and its conversion into dc ammeter, voltmeter and ohmmeter. Multi-range meters, multi meter, AC voltmeter (electro-dyanamometer movement and rectifier type).	12
Unit-II	Signal generators and Oscilloscopes : Signal generators: Principle, block diagram, working and specifications signal generators (audio and radio frequency, modulation facility), function generator(function generator IC 8038 and VCO), sweep generator and its application. CRO: Construction of CRT, waveform display, focusing, time base and sweep synchronization, triggering. Block diagram of CRO, measurement of amplitude, frequency and phase. Dual trace and dual beam CRO. Special probes, Digital storage oscilloscope and its applications and advantages.CRO specifications such as bandwidth, rise time and sensitivity.	12
Unit-III	Power supplies : Block diagram of regulated power supply, series and shunt regulators. Voltage regulator IC LM 723, three terminal regulators 78xx and 79xx series, LM 317 regulator, Variable power supply, dual power supply, CVCC. Principle and working of SMPS and its advantages. Line and load regulation of a power supply and their determination, Introduction to on-line and off-line UPS.	12
Unit-IV	Digital and other instruments : Principle, block diagram, working and specifications of DMM, DFM and its working modes, LCR meter, LUX meter, Digital thermometer, pH meter. Energy meter and sound level meter.	12

References:

1. Electronic Instrumentation and Measurement Techniques- Cooper, Helfrick, Prentice Hall (1985)
2. Power Supplies- B. S. Sonde, Mc Graw Hill Education (1980)

S.Y. B.Sc. Semester IV

Electronic Science Paper -3 (ELS2403): Electronics Practical-III

[Credits-2]

List of practical

	Group-[A]: Operational Amplifiers and applications (Any Four experiments)
1.	Inverting/ non inverting amplifier
2.	Summing/ difference amplifier
3.	V to I convertor
4.	I to V convertor
5.	Monostable/ astable multivibrator using IC 555
6.	Wein bridge oscillator
7.	Comparator and Schmitt trigger
	Group-[B]: Electronic Instrumentation (Any Four experiments)
1.	Study of CVCC power supply
2.	Study of IC 723
3.	Study of 7805/ 317
4.	SMPS
5.	Study of 8038
6.	Study of DFM
7.	Multirange voltmeter
	Group-[C]: One Poster/Activity (equivalent to 2 experiments)