

Deccan Education Society's
FERGUSON COLLEGE, PUNE
(AUTONOMOUS)

SYLLABUS UNDER AUTONOMY
FIRST YEAR B.Sc.
ELECTRONIC SCIENCE

SEMESTER - I

Academic Year 2016-2017

F.Y. B.Sc. (Electronic Science)

Particulars	Paper Code	Title of Paper	No. of Credits
Semester I	ELS1101	Basic Circuit Theory and Networks	2
	ELS1102	Semiconductor Devices	2
	ELS1103	Networks and Semiconductor Devices Lab	2
Semester II	ELS1201	Electronic Circuits	2
	ELS1202	Digital Electronics	2
	ELS1203	Electronic Circuits and Digital Electronics Lab	2

F.Y. B.Sc. Semester I

Theory Paper – 1 (ELS1101): Basic Circuit Theory and Networks

[Credits-2: Lectures-36]

Objectives:

1. To get familiar with basic circuit elements and passive components
2. To understand DC circuit theorems and their use in circuit analysis
3. To know the AC circuits and related terminologies

Unit-I	Basic Circuit Concepts Concept of Ideal Voltage and Current source, internal resistance, dc sources(voltage/current) Study of basic circuit elements and passive components (working principle, circuit symbols, types, specifications and applications): Resistor, Capacitor, Inductor, Transformer, Relays, Batteries, Switches, Fuses, Cables, Connectors.	12 L
Unit-II	Circuit Analysis and Network theorems Circuit and Network terminology, Ohms law, series and parallel circuits of resistors, capacitors and inductors, voltage and current dividers, Kirchhoff's Laws, (KCL, KVL), Superposition theorem, concept of black box, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Node Analysis, Mesh Analysis, Star-Delta Conversion. RC Circuits- Charging and discharging with initial charge, RL Circuit with Initial Current, Time Constant, RL and RC Circuits With Sources, DC Response of Series RLC Circuits.	16 L
Unit-III	AC Circuits Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values. Voltage-Current relationship in Resistor, Inductor and Capacitor, Phasor, Complex Impedance, Power in AC Circuits: Instantaneous Power, Average Power, Reactive Power, Power Factor. Passive Filters: Low Pass, High Pass, Band Pass and Band Stop. Resonance in Series and Parallel RLC Circuits, Frequency Response of Series and Parallel RLC Circuits, Quality (Q) Factor and Bandwidth.	8 L

References:

1. Theory and problems of basic circuit analysis, Schaum's outline series, John O'malley (2004)
2. Electric Circuits, Schaum's outline series, S. A. Nasar, Tata Mc Graw Hill (2004)
3. Electric circuits, Schaum's outline series, M. Nahvi and J. Edminister, Tata McGraw Hill (2005)
4. Basic Electronic, B. Grob, Mc Graw Hill (2007)

F.Y. B.Sc. Semester I

Theory Paper – 2 (ELS1102): Semiconductor Devices

[Credits-2: Lectures-36]

Objectives:

1. To get familiar with semiconductor basics
2. To study the construction and characteristics of semiconductor devices

Unit-I	Semiconductor Basics Classification of materials, Introduction to Semiconductor Materials, Intrinsic Semiconductors and Extrinsic semiconductors, Energy Band in Solids, Fermi Level for Intrinsic & Extrinsic Semiconductors, Donors, Acceptors, Dependence of Fermi Level on Temperature and Doping Concentration, Carrier Concentrations.	4 L
Unit-II	PN junction diode Study of semiconductor devices with reference to symbol, working principle, I-V characteristics, parameters, specifications: diode (Formation of Depletion Layer, Space Charge at a Junction, barrier potential) zener diode, light emitting diode, photo diode, solar cell	10 L
Unit-III	Bipolar junction transistor PNP and NPN Transistors, Basic Transistor Action, Emitter Efficiency, Base Transport Factor, Current Gain, Bipolar Junction Transistor (BJT) symbol, types, construction, working principle, I-V characteristics, parameters, specifications. Biasing circuits voltage divider, collector feedback bias and emitter feedback bias, DC load line, Q point and factors affecting the stability, Transistor configurations - CB, CC and CE	14 L
Unit-IV	UJT, JFET and MOSFET Symbol, types, construction, working principle, I-V characteristics, Specifications parameters of: Uni-Junction Transistor (UJT), Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor FET (MOSFET), comparison of JFET, MOSFET and BJT	8 L
References: <ol style="list-style-type: none">1. Solid state Electronic Devices, B. G. Streetman and S. Banerjee, Pearson Education (2006)2. Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, Tata Mc Graw Hill (2008)3. Semiconductor Device Physics and Design, Umesh k. Mishra and Jasprit Singh, Springer (2008)		

F.Y. B.Sc. Semester I

Practical Paper – 1 (ELS1103): Networks and Semiconductor Devices Lab

[Credit-2]

1.	Study of Series and Parallel combination of Resistors
2.	Verification of Kirchoff's Law.
3.	Verification of Thevenin's Theorem.
4.	Verification of Norton's theorem.
5.	Verification of Superposition Theorem.
6.	Verification of the Maximum Power Transfer Theorem
7.	Measurement of Amplitude, Frequency & Phase difference using CRO.
8.	Designing of a Low Pass RC Filter and study of its Frequency Response.
9.	Designing of a High Pass RC Filter and study of its Frequency Response.
10.	Study of the I-V Characteristics of Diode – Ordinary and Zener Diode.
11.	Study of the I-V Characteristics of the CE configuration of BJT and obtain r_i , r_o , β
12.	Study of the I-V Characteristics of the Common Base Configuration of BJT and obtain r_i , r_o , α .
13.	Study of the I-V Characteristics of the Common Collector Configuration of BJT and obtain voltage gain, r_i , r_o .
14.	Study of the I-V Characteristics of JFET.
15.	Study of the I-V Characteristics of MOSFET
16.	Study of Characteristics of Solar Cell

Any 10 experiments (8 compulsory +2 Activity)

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SEMESTER - II

Academic Year 2016-2017

F.Y. B.Sc. Semester II

Theory Paper – 1 (ELS1201): Electronic Circuits

[Credits-2: Lectures-36]

Objectives:

1. To get familiar with Diode circuits and applications
2. To understand Transistor Circuits and Applications
3. To learn power semiconductor devices and applications

Unit-I	Diode Circuits Clipper and clamper circuits, Voltage doubler, voltage multipliers, Rectifiers (half and full wave), rectifier with capacitor-filter, Zener regulator, Block diagram of power supply	12 L
Unit-II	Transistor Circuits Transistor as a switch, concept of class A, B and class C amplifiers, Emitter follower amplifier, Single stage RC coupled CE amplifier, concept of frequency response and bandwidth, JFET as voltage variable resistor, MOSFET as a switch	16 L
Unit-III	Power Devices Symbol, types, construction, working principle, I-V characteristics, Specifications parameters of: SCR, DIAC, TRIAC, Other power devices and Applications	10 L

References:

1. Basic Electronic, B. Grob, Mc Graw Hill (2007)
2. Basic Electronics and Linear circuits, N. N. Bhargava, D. C. Kulshreshtha, S. C. Gupta, Tata Mc Graw Hill (2008)
3. Semiconductor devices, Kanaan Kano, Pearson education (2004)

F.Y. B.Sc. Semester II
Theory Paper – 2 (ELS1202): Digital Electronics
[Credits-2: Lectures-36]

Objectives:

1. To get familiar with various numbers systems and Boolean algebra.
2. To study basic building block of digital electronics like logic gates and arithmetic circuits.
3. To learn about latches and Flip flops

Unit-I	<p>Number System and codes Decimal, binary, octal, hexadecimal number systems Conversion of number from one number system to another including decimal points Binary addition, subtraction, multiplication, division, 1's and 2's complement method of subtraction BCD code numbers and their limitations, addition of BCD coded numbers, conversion of BCD to decimal and vice-versa, Excess-3 code, gray code, binary to gray and gray to binary conversion, Concept of parity, single and double parity, error detection and correction using parity</p>	10 L
Unit-II	<p>Logic gates and Boolean Algebra Logic gates, positive and negative logic, pulse waveform, definition, symbols, truth tables, pulsed operation of NOT, OR, AND, NAND, NOR, EX-OR, EX-NOR gates, NAND and NOR as universal logic gates Rules and laws of Boolean algebra, logic expression, Demorgan's theorems, their proof, Sum of products form (minterm), Product of sum form (maxterms), simplification of Boolean expressions with the help of Rules and laws of Boolean algebra , Karnaugh mapping techniques upto 4 variables and their applications for simplification of Boolean expression</p>	12 L
Unit-III	<p>Arithmetic circuits Half adder, full adder circuits and their operation, subtractor, half and full, Comparator, Parallel binary adder, 2-bit and 4-bit binary full adder, block diagram, working</p>	6 L
Unit-IV	<p>Flip flops Latch, SR-latch, D-latch, Flip-flop, difference between latch and flip-flop, S-R, D flip-flop their operation using waveform and truth tables, race around condition, JK flip-flop, master slave, T flip flop and their operation using waveform and truth tables</p>	10 L
<p>References:</p> <ol style="list-style-type: none"> 1. Digital Principals, Schaum's outline series, Tata Mc Graw Hill (2006) 2. Digital Fundamentals, T. L. Floyd, Pearson Education (2013) 3. Digital System Design, Morris Mano, Pearson Education (2014) 		

F.Y. B.Sc. Semester II

Practical Paper – 1 (ELS1203): Electronic Circuits and Digital Electronics Lab

[Credit-2]

1.	Study of the half wave rectifier and Full wave rectifier.
2.	Study of power supply using C filter and Zener diode.
3.	Study of clipping and clamping circuits .
4.	Study of Fixed Bias, Voltage divider and Collector-to-Base bias Feedback configuration for transistors.
5.	Study of transistor as switch / inverter
6.	Designing of a Single Stage CE amplifier
7.	Study of the frequency response of Common Source FET amplifier
8.	Study of Voltage doubler
9.	To verify and design AND, OR, NOT and XOR gates using NAND gates.
10.	To convert a Boolean expression into logic gate circuit and assemble it using logic gate IC's.
11.	Design a Half and Full Adder
12.	Design a Half and Full Subtractor.
13.	De Morgan's theorem verification
14.	Study of RS, JK and D flip flops using NAND gates
15.	Study of Flip flop ICs
16.	Study of Tristate Buffer

Any 10 experiments (8 compulsory +2 Activity)