

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

**Autonomous**

**Course Structure For F. Y. B. Sc. Computer Science**

<b>Semester</b>	<b>Paper Code</b>	<b>Title of Paper</b>	<b>No. of Credits</b>
I	CSEL1101	Circuit Theory and network Analysis	2
	CSEL1102	Fundamentals of Digital Electronics	2
II	CSEL1201	Semiconductor Devices and Memories	2
	CSEL1202	Sequential Circuits Design	2
Annual	CSEL1203	Practical	4

# SYLLABUS (CBCS) FOR F. Y. B. Sc. Computer Science (w.e. from June, 2019)

Academic Year 2019-2020

Class : F.Y. B. Sc.(Comp. Sci.) (Semester- I)

Paper Code: CSEL1101

Paper : I

Title of Paper : **Circuit Theory and network Analysis -I**

Credit : 2

No. of 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 study elementary electronic circuits and applications.

## Unit 1: Basic Components and Combination Circuits: (12L)

Study of basic circuit elements and passive components (with special reference to working principle, circuit symbols, types, specifications and applications): Resistor, Capacitor, Inductor, Transformer, Cables, Connectors, Switches, Fuses, Relays, Batteries. Concept of Ideal voltage and current with AC and DC sources, Impedance, Series and parallel circuit of resistor, capacitor and inductor.

## Unit 2: Circuits Analysis and Network Theorems (12L)

Network terminology, Ohms law, voltage and current dividers, Kirchhoff's Laws (KCL, KVL), Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, numerical problems related to all theorems, Charging-discharging of capacitor, LCR series resonant circuit with DC response.

## Unit 3: AC Circuits (12L)

Introduction to AC Circuits: Sinusoidal voltage and current and their rms, peak to peak and average values, voltage current relationship. Passive Filter: Low Pass, High Pass, Band Pass and Band Reject (Designing, Construction, working principle, Frequency Response, Quality factor, Bandwidth and Application. Introduction to semiconductor devices: Types of semiconductor material, its formation and conduction.

## Text/ Reference Books:

1. Basic Electronics: Bernard Grob, McGraw Hill Publication, 8th Revised Edition, 2010
2. Electronic Principles: Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
3. Principals of Electronics: V.K. Mehta, S.Chand and and Co.
4. A text book of electrical technology: B.L.Theraja, S.Chand and Co.

Paper Code: CSEL1102

**Paper II : Fundamentals of Digital Electronics**

**Credits:2**

**Unit I : Number Systems and Logic Gates (8L)**

Introduction to decimal, Octal, Binary and hexadecimal number systems, interconversions of number systems , BCD, Excess-3 and Gray codes and their inter conversions, Alphanumeric representation using ASCII code. Positive and Negative Logic, Basic Logic gates (NOT, OR, AND) & derived gates (NAND, NOR), EX-OR , EX-NOR gates ( Symbol and truth table), Study of Gate ICs ( 7408, 7432, 7404, 7400, 7402, 7486).

**Unit II : Boolean Algebra and Karnaugh maps (14L)**

Boolean algebra rules and Boolean laws: Commutative, Associative, Distributive, AND, OR and Inversion laws, De Morgan's theorem, inter conversion of Universal gates . Min terms, Max terms , Boolean expression in SOP and POS form, conversion of SOP / POS expression to its standard SOP/POS form, Simplifications of Logic equations using Boolean algebra rules and Karnaugh map (2,3, 4 variables) , Ex-OR gate as parity checker and generator.

**Unit III : Arithmetic and Combinational Circuits (14L)**

Rules of binary addition and subtraction, subtraction using 1's and 2's complements, half adder, full adder, Half subtractor, Full subtractor, 4 bit parallel adder, Universal adder / subtractor, Digital comparator, Introduction to ALU. Multiplexer (2:1, 4:1), Demultiplexer (1:2, 1:4) and their applications, Code converters - Decimal to binary, Hexadecimal to binary, BCD to decimal, Encoder & Decoder, Priority Encoder , BCD to Seven Segment Decoder.

**Text/ Reference Books:**

1. Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications :Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education

Class : F.Y. B. Sc.(Comp. Sci.) (Semester- II)

Paper Code: CSEL1201

Paper : I

Title of Paper : Semiconductor Devices and Memories

Credit : 2

No. of lectures: 36

Objectives:

1. To study characteristic features of semiconductor devices
2. To study elementary electronic circuits and applications
3. To understand basics of basics of Memories.

**Unit 1: Diodes**

**(10L)**

Study of semiconductor devices with reference to symbol, working principle, I-V characteristics, parameters, specifications: diode, zener diode, light emitting diode, photo diode, Optocoupler, solar cell, Rectifiers (half and full wave), Block diagram of power supply.

**Unit-2: Transistor and its types:**

**(12L)**

BJT: symbol, types, construction, working principle, I-V characteristics, parameters, specifications, concept of amplifier, configurations of transistors (CC,CE& CB)  
Brief study of : Uni-Junction Transistor (UJT), Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor FET (MOSFET) , Applications of transistors.

**Unit 3: Memories**

**(14L)**

Data storage principle, Types of memories: Random Access memory(RAM), Read only Memory(ROM) , Static RAM(SRAM), Dynamic RAM(DRAM), Programmable ROM(PROM), Erasable PROM(EPROM), Electrical EPROM(EEPROM), compare DRAM & SRAM , RAM & ROM ,Roll of memories in PLD(Programmable Logic Devices), Need of PLD, Simple PLD(SPLD),Complex PLD(CPLD) , Field Programmable Gate Array (FPGA)

**Text/ Reference Books:**

1. Basic Electronics: Bernard Grob, McGraw Hill Publication, 8th Revised Edition,2010
2. Electronic Principles: Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
3. Modern Digital Electronics: R.P. Jain, Mcgraw Hill
4. A text book of electrical technology: B.L.Theraja, S.Chand and Co.

**Unit I : Flip Flops (12L)**

Introduction to sequential circuits, Flip flops – Introduction, Block diagram, Truth table, Logic diagrams for RSFF , latch, clocked RSFF, JKFF, Master slave JKFF, D flip-flop and T-flip-flop. Excitation table for SR, JK, T and D flip flops, Advantages and disadvantages of flip-flop, application of flip-flops.

**UNIT II : Counters (14L)**

Introduction to Counters, Ripple counter, 3 bit Asynchronous up and down counter ( Logic diagram, timing diagram, truth table), Design of 3-bit Synchronous up and down Counter using JKFF ( Excitation table, Truth table, K-map, Logic Diagram, timing diagram), Concept of modulus counter and mod n counters using Decade counter(7490) , Applications of Counter.

**Unit III : Shift registers (10L)**

Introduction, SISO, SIPO, PISO, PIPO shift registers with truth table and timing diagrams, ring counter, universal 4-bit shift register, Applications of Shift Registers.

**Text/ Reference Books:**

1. Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications : Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education

Preparatory experiments (2 Compulsory)

1. Study of Components.
2. Study of Basic Electronic Devices ( Multimeters, Signal Generators, CRO)
3. Study of AC and DC sources

All the students are required to complete **16** experiments from the following list :

**Group A (Any Four)**

1. Study of forward and Reverse biased characteristics of PN Junction Diode
2. Study of breakdown characteristics and voltage regulation action of Zener diode.
3. Study of output characteristics of Bipolar Junction Transistor in CE mode
4. Study of output and transfer characteristics JFET/MOSFET
5. Study of I-V characteristics of UJT and Demonstration of UJT based relaxation oscillator.
6. Study of solar cell.

**Group B (Any four)**

1. Verification of network theorems: KCL / KVL, Thevenin, Norton.
2. Verification of network theorems: Maximum Power Transfer, Superposition theorem.
3. Study of low voltage Half-wave, Full-wave and Bridge rectifier circuits.
4. Study of amplification action of BJT.
5. Build and test Inverting and non inverting amplifier using OPAMP.
6. Build and test adder and subtractor circuits using OPAMP.

**Group C ( Any Four)**

1. Basic Logic gates using Diodes and transistors
2. Inter conversions and realizations of logic expressions using ICs
3. Study of RS, JK and D flip flops using NAND gates
4. Study of Up/Down Counter
5. Study of decade counter IC circuit configurations
6. Study of 4-bit Shift register IC

**Group D (Any Four)**

1. Build and Test 4 bit parity checker/ generator using X-OR gate IC
  2. Build and Test Half Adder, Full Adder and Subtractor using basic gate
  3. Build and Test 2:1 Multiplexer and 1:2 Demultiplexer using gates
  4. Build and Test a Denounce switch using NAND or NOR gate IC
  5. Build and Test Diode matrix ROM
  6. Study of Four bit Universal Adder/Subtractor / ALU
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