

# Solapur University, Solapur

## Faculty of Science

### Syllabus for B.Sc.-I Electronics

#### Semester System

#### Choice Based Credit System (CBCS) Pattern

With effect from Academic Year 2016-17

#### 1. Course Structure:

Sr. No.	Semester	Paper No	Title	No. of Lectures	Marks
1	Semester-I	I	Basic Circuit Theory and Network Analysis	35	100
		II	Digital Fundamentals	35	100
2	Semester-II	III	Semiconductor Devices	35	100
		IV	Digital Electronics	35	100
3	Practical (Sem. I and II)		Practical Course (Annual)		100
				<b>Total Marks</b>	<b>500</b>

#### 2. Distribution of Theory Marks

University Assessment (UA)	:	70 Marks
College Assessment (CA)	:	30 Marks

#### Scheme of College Assessment

1. Unit Test	:	15 Marks
2. Home Assignment/Tutorials/ Seminars/Group Discussion/ Viva/ Industrial Visit	:	15 Marks

#### 3. Distribution of Practical Marks

Practical examination will be at the end of second semester. The candidate has to perform two practicals, one from each group.

#### University Assessment (UA)

1. Group-A	:	30 Marks
2. Group-B	:	30 Marks
3. Journal	:	10 Marks

**Break up of 30 marks of practical from each group**

- a) Circuit diagram : 7 Marks
- b) Connections / Procedure : 7 Marks
- c) Observations : 7 Marks
- d) Calculation and Graphs/  
Verification of Truth table/  
Timing diagrams : 7 Mark
- e) Result/Comments : 2 Marks

**College Assessment (CA): Break up of 30 marks**

- a) Practical Unit Test : 15 Marks
- b) Home Assignment and Oral : 15 Marks

## **B.Sc. I Electronics**

### **Semester-I (CBCS Pattern)**

#### **Paper-I: Basic Circuit Theory and Network Analysis**

**Total Marks 100**  
**(35 periods)**

**1. Circuit Elements (6)**

Active and passive elements, Resistors, Capacitors, Inductors, Transformers, Relays and Fuses (Classification, Specifications and Applications only)

**2. Circuit Fundamentals (6)**

DC sources, Constant voltage and current sources, AC sources, Sinusoidal and non sinusoidal sources, rms current and voltage, Phase relationship of current and voltage with pure resistor, capacitor and inductor. (Numerical examples are expected)

**3. AC Circuits (9)**

Series and Parallel RLC circuits, Phase diagram, Impedance, Admittance, Series and Parallel resonance, Response curve, Band width, Quality factor (Numerical Examples are expected)

**4. Network Theorem (8)**

Kirchhoff's Laws, Mesh and Nodal analysis [Only DC resistive circuits], Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Millman's Theorem, Maximum power transfer theorem (Numerical examples are expected)

**5. Two Port Network (6)**

Black box theory, Concept of equivalent network, Z, Y, H & Transmission (ABCD) parameters, T-network,  $\pi$ -network and their interconversion expressions only (Numerical examples are expected)

**Recommended Books:**

1. Circuit and Networks: Analysis and Synthesis by A. Sudhakar & S.P. ShamMohan, (TMH)
2. Network Lines and Fields by J.D. Ryder, McGraw Hill
3. Network Analysis by M.E. Van Valkenberg, PHI, New Delhi
4. Basic Electronics by Bernard Grob
5. A Text Book of Applied Electronics by R.S. Shedha (S. Chand & Co.)

**B.Sc. I Electronics**  
**Semester-I (CBCS Pattern)**  
**Paper-II: Digital Fundamentals**

**Total Marks 100**  
**(35 periods)**

- 1. Number Systems** (7)  
Binary, Octal, Decimal, Hexadecimal number systems and their inter-conversions, 1's compliment, 2's compliment, Arithmetic operations, Signed binary numbers
- 2. Binary Codes** (5)  
8421 code, Excess-3 code, Gray code, ASCII code, Parity
- 3. Logic Gates** (8)  
OR, AND, NOT, NAND, NOR, Ex-OR, Ex-NOR gates, Positive and Negative logic, De Morgan's Theorems, Universality of NAND and NOR gates, Study of IC 7400, 7402, 7404, 7408, 7432, 7486
- 4. Boolean Algebra** (8)  
Rules and laws of Boolean algebra, Simplification of Boolean expression, K-map, K-maps for 2, 3 and 4 variables, Use of K-map for reduction of Boolean expressions
- 5. Arithmetic Circuits** (7)  
Exclusive OR gate as a Binary to Gray converter, Parity checker, Controlled inverter, Half adder, Full adder, Parallel binary adder, Half and Full subtractor, Block diagram of digital computer and its organization

**Recommended Books:**

1. Digital Fundamentals by Floyd, Pearson Education.
2. Digital Principles & Applications by A.P. Malvino & D.P. Leach (TMH), New Delhi.
3. Modern Digital Electronics by R.P. Jain
4. Digital Systems: Principles and Applications by Ronald J Tocci, Neat S. Wideman, PEA
5. Digital Electronics, Circuits & Systems by V. K. Puri, TMH, New Delhi.

## **B.Sc. I Electronics**

### **Semester-II (CBCS Pattern)**

#### **Paper-III: Semiconductor Devices**

**Total Marks 100**  
**(35 periods)**

**1. Semiconductor and p-n Junction (6)**

Intrinsic and extrinsic semiconductors, Formation of p-n junction, Barrier potential, I-V characteristics, Diode equation, Static and dynamic resistance, Junction capacitance

**2. Special Diodes (10)**

Zener diode, Breakdown mechanism (Zener & avalanche), I-V characteristics, LED, Photo diode, Varactor Diode, Tunnel Diode (Construction, working and applications only)

**3. Bipolar Junction Transistor (BJT) (8)**

BJT construction and operation, Transistor configurations, I/P and O/P characteristics of CE and CB configurations, Graphical determination of  $\alpha$  and  $\beta$ , Graphical determination of h-parameters for CE configuration (Numerical examples are expected)

**4. Field Effect Transistor (FET) (5)**

FET, Comparison between BJT and FET, Structure and operation of n-channel JFET, I-V characteristics, Parameters, Applications (Numerical examples are expected)  
Depletion and Enhancement MOSFET, Structure and operation, I-V characteristics

**5. Power Devices (6)**

Construction, working and characteristics of SCR, Diac, Triac and UJT

**Recommended Books:**

1. Electronic Devices and Circuits by Jacob Milman & Chrstes S Halkias, MGH
2. Electronic Devices and Circuits: An introduction by Allen Mottershed (PHI) New Delhi
3. A Text Book of Applied Electronics by R.S. Shedha (S. Chand & Co.)
4. Basic Electronics & Linear Circuits by N.N Bhargava, D.C. Kulshreshta, S.C. Gupta (TMH)
5. Principles of Electronics- V.K. Mehata (Rev. Edition) S. Chand & Co.

**B.Sc. I Electronics**  
**Semester-II (CBCS Pattern)**  
**Paper-IV: Digital Electronics**

**Total Marks 100**  
**(35 periods)**

**1. Digital Logic Families (7)**

Introduction to logic families, TTL NAND gate, Specifications of TTL logic family (Sinking, sourcing current, Input/output voltage limits, Fan-in, Fan-out, Noise margin, Propagation delay, Power dissipation)

**2. Combinational Logic (8)**

Encoder: Decimal to BCD encoder, Priority encoder (IC 74147)  
Decoder: 2-4 and 3-8 decoders (IC 74138), BCD-Decimal decoder, BCD-7 segment decoder (IC 7447)  
Multiplexer: 4-1 and 8-1 multiplexer (IC 74153)  
Demultiplexer: 1-4 and 1-8 demultiplexer

**3. Flip Flops (7)**

RS flip flop using NOR gates, Clocked RS flip flop, D-flip flop, Edge triggered D-flip flop, JK-flip flop, Master slave JK flip flop, T flip flop, (Timing diagrams are expected)

**4. Shift Registers (6)**

Shift register, Types of shift registers, SISO, SIPO, PISO and PIPO, Serial and parallel loading, Study of Right shift, Left shift, Ring counter, Johnson counter (IC 7495) (Timing diagrams are expected)

**5. Counter Techniques (7)**

Basic counter operation, 4-bit asynchronous and synchronous counters, Combination counter, MOD-2, MOD-5 counter, Decade counter (IC 7490) (Timing diagrams are expected)

**Recommended Books:**

1. Digital Fundamental by Floyd, Pearson Education
2. Digital Principles and Applications by A. P. Malvino & D.P. Leach (TMH), New Delhi
3. Modern Digital Electronics by R.P. Jain
4. Digital Systems: Principle and Applications by Ronald J. Tocci, Neat S Widemer, PEA
5. Digital Electronics, Circuits and Systems by V.K. Puri, TMH, New Delhi
6. Digital Computer Electronics by Malvino Brown, 3rd Edition, TMH

## B.Sc. I Electronics

### List of Experiments

#### Group-A

1. Kirchhoff's Laws
2. Series /Parallel Resonance
3. Thevenin's Theorem
4. Superposition Theorem
5. Maximum Power Transfer Theorem
6. Measurement of Z, Y, and h-parameters for two port resistive network
7. Characteristics of Semiconductor Diode
8. Characteristics of Zener Diode
9. Characteristics of CE/CB configuration
10. Characteristics of JFET
11. Characteristics of SCR
12. Characteristics of UJT

#### Group-B

1. De Morgan's Theorems
2. Universal Gates
3. Half and Full Adder
4. Half Subtractor
5. Study of RS, D and JK Flip flop
6. Study of Counters (divided by 2, 5 and 10) using IC-7490
7. Study of Left shift and Johnson counter using IC 7495
8. Study Right shift and Ring counter using IC7495
9. Study of Multiplexer and Demultiplexer
10. Study of Encoder (74148) and Decoder (74138)
11. Study of BCD to 7 segment decoder
12. TTL Characteristics (sourcing /sinking/Transfer)

- N.B.:**
1. Minimum **08** experiments from each group should be completed.
  2. In addition to above experiments, the students should be exposed to the laboratory equipment such as, CRO, FG, Power supplies, Multimeters, etc.
  3. Students should be encouraged to use data sheets, manuals, etc.
  4. They should be encouraged for employing innovative ideas in current trends of Electronics.