

# Solapur University, Solapur

## Syllabus for B.Sc.-I Electronics

(As per Credit and Grading System of Evaluation)

### Semester System

To be implemented from A.Y. 2014-15

#### 1) Course Structure:

Sr. No.	Semester	Paper	Title	Total Marks
1.	Semester-I	I	Fundamentals of Electronics	100
2.	Semester-II	II	Electronic Devices and Digital Electronics	100
3.	Practical		Practical	100
				<b>300</b>

#### 2) Distribution of Theory Marks

University Examination: 70 Marks

Internal Continuous Assessment: 30 Marks

Scheme of internal marking:

1. Internal Tests: 20 Marks

2. Home Assignment/Tutorials/Seminars/  
Group Discussion/ Viva/ Field Visit /  
Industrial Visit: 10 Marks

#### 3) Distribution of Practical Marks (100=70+30)

Practical examination will be at the end of second semester.

The candidate has to perform two practicals, one from each group.

1. Group-A : 35 Marks

2. Group-B : 35 Marks

University Exam: Break up of 35 marks for practical

a) Circuit diagram : 8 Marks

b) Connections : 8 Marks

c) Observations : 8 Marks

d) Calculation and Graphs/Verification  
of Truth table/Timing diagrams : 8 Mark

e) Result/Comments : 3 Marks

Internal Exam: Break up of 30 marks

a) Unit test : 20 Marks

b) Laboratory Journal, Viva etc : 10 Marks

# Semester-I

## Paper-I: Fundamentals of Electronics

### Section –I Electronics Fundamentals

- 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, Mc Graw Hill.
- 3) Network Analysis by M.E. Van Valkenberg, PHI, New Delhi.
- 4) Basic Electronics by Bernord Grob
- 5) A Text Book of Applied Electronics by R.S. Shedha (S. Chand & Co.)

### Section-II Digital Fundamentals

- 1) **Number Systems:** (7)  
Binary, Octal, Decimal, Hexadecimal number system and their interconversions  
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, DeMorgan'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-map 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. Widerman, PEA.
- 5) Digital Electronics, Circuits & Systems by V. K. Puri, TMH, New Delhi.

## Semester-II

### Paper-II Electronic Devices and Digital Electronics

#### Section-I Electronic Devices

- 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 configuration, 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:** (5)  
JFET, Structure and operation of n-channel FET, I-V characteristics, Parameters, Applications [Numerical examples are expected]  
Depletion and Enhancement MOSFET, Structure and operation, I-V characteristics
- 5) **Thyristor and UJT:** (6)  
Construction, working of SCR, Diac and Triac, Construction and characteristics of UJT

**Recommended Books:**

- 1) Electronic Devices and Circuits by Jacob Milman & Chrstes S Halkias, MGH, Inter National Edition
- 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.

#### Section -II Digital Electronics

- 1) **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 F/F, D- F/F, Edge triggered D F/F, JK F/F,

Master slave JK F/F 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

## Experiments

### Group-A

- 1) Kirchhoff's Laws
- 2) Series Resonance/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) Study of Photodiode
- 8) Characteristics of CE/CB configuration
- 9) Characteristics of JFET
- 10) Characteristics of SCR
- 11) Characteristics of UJT

### Group-B

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

### 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 equipments such as, CRO, FG, Power supplies, Multimeters, etc.
- 3) The student should be encouraged to use data sheets, manuals, etc.
- 4) The students should be encouraged for employing innovative ideas in current trends of Electronics.

