Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Electronics

Name of the Course: B.Sc. I (Sem–I & II)

(To be effective from the academic year June-2019).
Syllabus
For B.Sc. I Electronics
Choice Based Credit System (CBCS) Pattern
To be implemented from Academic Year 2019-20

1. Course Structure: (Discipline Specific Core) - Electronics

<table>
<thead>
<tr>
<th>Paper No</th>
<th>Title of the course</th>
<th>Marking Scheme</th>
<th>L</th>
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<th>Credits</th>
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<td>Digital Fundamentals</td>
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<td>III</td>
<td>Semiconductor Devices</td>
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<td>IV</td>
<td>Digital Electronics</td>
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<td>Practical I &amp; II</td>
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2. Distribution of each Theory paper (Marks 50)
   a. University Assessment (UA) : 40 Marks
   b. College Assessment (CA) : 10 Marks

   Scheme of College Assessment(10)
   1. Unit Test : 5 Marks
   2. Home Assignment/Tutorials/
   Seminars/Group discussion/
   Viva/ Industrial Visit

3. Distribution of Practical Marks (100)
   Practical examination will be at the end of second semester. The candidate has
to perform two practicals, one from each group.

   A. University Practical Examination (80) Marks(UA)
      a) Practical from group A : 35
      b) Practical from group B : 35
      c) Journal : 10

   B. Break up of 35 marks for each practical (UA)
      a) Circuit diagram : 08
      b) Assembly of the circuit : 08
      c) Observations : 08
      d) Calculation and Graphs/
      Verification of Truth table/ Timing diagrams
      e) Results/Comments : 03

   C. College Assessment CA (20 marks)
      Break up of 20 marks
      • Practical Unit Test : 10 Marks
      • Home Assignment and Oral : 10 Marks
B.Sc. I-Electronics (CBCS Pattern)
Semester – I
Paper – I Basic Circuit Theory and Network Analysis
Total Marks: 50
(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
   nonsinusoidal 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, π-network and their interconversion
   expressions only (Numerical examples are expected)

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

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
B.Sc. I-Electronics (CBCS Pattern)
Semester – II
Paper –III Semiconductor Devices

Total Marks: 50
(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**
   (6)
   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: Jacob Milman & Chrstes S Halkias, MGH
2. Electronic Devices and Circuits, An introduction: Allen Mottershed (PHIDelhi)
B.Sc. I-Electronics (CBCS Pattern)
Semester – II
Paper –IV Digital Electronics

Total Marks: 50
(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)
   De-multiplexer: 1-4 and 1-8 de-multiplexer

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 : Floyd, Pearson Education
2. Digital Principles and Applications : A. P. Malvino & D.P. Leach (TMH Delhi)
5. Digital Electronics, Circuits and Systems : V.K. Puri, TMH, New Delhi
B.Sc.–I Electronics (CBCS Pattern)
Practical Course
List of Experiments

Group-A

1. Study of Kirchhoff’s Laws
2. Study Series /Parallel Resonance
3. Study Thevenin’s Theorem
4. Study Superposition Theorem
5. Study 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

Group-B

1. Study De Morgan’s Theorems
2. Study of Universal Gates
3. Study Half and Full Adder
4. Study 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 De-multiplexer
10. Study of Encoder (74148) and Decoder (74138)
11. Study of BCD to 7 segment decoder

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, Cathode Ray Oscilloscope, Function Generator, Power supplies, Multi-meters, 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