## Sree VidyaniKethan Engineering College
(Autonomous)

### COURSE STRUCTURE
Computer Science and Systems Engineering

### II B.Tech (CSSE) I-Semester (SVEC-10)

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Periods per week</th>
<th>C</th>
<th>Scheme of Examination</th>
<th>Max. Marks</th>
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<td>L   T   P</td>
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<td>Internal</td>
<td>External</td>
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<tr>
<td>10BT3BS01</td>
<td>Probability and Statistics</td>
<td>4    1    -</td>
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<td>10BT30421</td>
<td>Electronic Devices and Circuits</td>
<td>4    1    -</td>
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<td>10BT30222</td>
<td>Foundations of Electrical Engineering</td>
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<td>4</td>
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<td>Discrete Mathematical Structures</td>
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<td>10BT30502</td>
<td>Data Structures</td>
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<td>10BT30431</td>
<td>Analog and Digital Electronics Lab</td>
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<td>10BT30511</td>
<td>Data Structures Lab</td>
<td>-    -    3</td>
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<td><strong>TOTAL</strong></td>
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<td><strong>24</strong></td>
<td><strong>6</strong></td>
<td><strong>28</strong></td>
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UNIT – I: PROBABILITY & MATHEMATICAL EXPECTATIONS
Introduction to probability: Definition of Random Experiment, Events and Sample space, Definition of probability, Addition and Multiplication theorems, Conditional probability, Baye's Theorem, Simple Problems on Baye's theorem. Random Variables: Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical expectation, Properties of Mathematical expectations, Mean and Variance.

UNIT – II: PROBABILITY DISTRIBUTIONS

UNIT-III: CORRELATION AND REGRESSION
Correlation: Definition, Measures of correlation, Correlation for Bivariate Distribution, Rank correlation coefficients. Regression: Simple linear regression, regression lines and properties.

UNIT-IV: SAMPLING DISTRIBUTIONS
Population and Sample, Parameter and Statistic, Sampling Distribution of Statistic, Standard Error of Statistic, Null and Alternative Hypotheses, Type I and II errors, Level of Significance, Critical region, Degrees of freedom.

UNIT-V: LARGE SAMPLES TEST OF SIGNIFICANCE
Test of Significance for Single Proportion, Test of Significance for Difference of Proportions, Test of Significance for a Single Mean, Test of Significance for Difference of Means and Test of Significance for Difference of standard deviations.

UNIT – VI: SMALL SAMPLES TEST OF SIGNIFICANCE
Student's t-test, F-test for equality of population variance, Chi-square Test for Goodness of Test, contingency table, Chi-square Test for Independence of Attributes.

UNIT – VII: STATISTICAL QUALITY CONTROL

UNIT – VIII: QUEUING THEORY
Queueing Theory, Pure Birth and Death Process, M/M/1 Model, Problems.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT-I: PN JUNCTION DIODE

UNIT-II: RECTIFIERS AND FILTERS
PN Junction as a Rectifier, Half wave rectifier, ripple factor, full wave rectifier, Bridge Rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L-section filter, pi-section filter, Use of Zener Diode as a Regulator.

UNIT-III: BIPOLAR JUNCTION TRANSISTOR (BJT)
Transistor construction, BJT Operation, BJT Symbol, Transistor as an Amplifier, Transistor currents and their relations, Input & Output Characteristics of a Transistor in CB, CE and CC Configurations, BJT specifications.

UNIT-IV: TRANSISTOR BIASING AND STABILIZATION
Operating Point DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization against Variations in VBE and β.

UNIT-V: BJT AMPLIFIERS
BJT Hybrid Modeling for CB, CE and CC Configurations, Determination of h-Parameters from Transistor Characteristics, Comparison of CB, CE and CC configurations, Simplified Hybrid Model.

UNIT-VI: FIELD EFFECT TRANSISTOR (FET)
FET AMPLIFIERS: Common Source, and Common Drain Amplifiers using FET, Generalized FET Amplifier, Biasing of FET, Comparison between BJT and FET.

UNIT-VII: FEEDBACK AMPLIFIERS AND OSCILLATORS (Qualitative treatment)

UNIT-VIII: SPECIAL PURPOSE ELECTRONIC DEVICES
Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Control Rectifier (SCR) and applications.

TEXT BOOKS:

REFERENCE BOOKS:
**II B.Tech., I Sem.  10BT30222: FOUNDATIONS OF ELECTRICAL ENGINEERING  L T P C**  
4 1 0 4

**UNIT–I: INTRODUCTION TO ELECTRICAL ENGINEERING**
Essence of electricity-Basic circuit components, Basic definitions: Electric field, Electric Current , Potential and potential deference-EMF-electric power- Ohm’s law, resistive networks, Inductive networks, capacitive networks, Kirchoff’s laws, series parallel circuits, star delta and delta star transformations- Fuses- Earthing.

**UNIT–II: NETWORK ANALYSIS**
Basic definitions: Node, Path, Loop, Branch - Nodal analysis– Mesh analysis- Source Transformation Technique –Problems.  
Network Theorems: Superposition-Thevenin’s - Maximum Power Transfer Theorems.

**UNIT-III: ALTERNATING QUANTITIES**
Principle of AC voltages, wave forms and basic definitions, RMS and average values of alternating currents and voltage, form factor and Peak factor, phasor representation of alternating quantities, the J operator and phasor algebra, analysis of AC circuits with single basic network element, single phase series and parallel circuits- Fundamentals of 3-phase supply.

**UNIT-IV: DC MACHINES**
Constructional details of a DC machine, principle of operation of a DC generator, types of DC generators, emf equation of a generator –Applications.  
DC motors- Principle of operation, types of DC motors, Torque equation, losses and efficiency- Applications.

**UNIT-V: AC MACHINES**
Transformers- principle of operation, constructional details, losses and efficiency, regulation of transformer, testing of Transformers: OC and SC test- Simple problems.  
Three phase Induction motors- Constructional details- principle of operation, slip, rotor frequency.

**UNIT - VI: BASIC MEASURING INSTRUMENTS & VOLTAGE CONTROL**
Introduction, classification of instruments, operating principles, essential features of measuring instruments, moving coil permanent magnet and moving iron instruments(voltmeters and ammeters )- Extension of range of meters- Voltage Stabilizers-UPS.

**UNIT- VII: INTRODUCTION TO CONTROL SYSTEMS**
Introduction, classification of Control Systems- Open loop and closed loop systems, linear and non-linear systems, time variant and time invariant systems, feedback and effect of feedback systems.

**UNIT-VIII: TRANSFER FUNCTIONS**
Transfer Functions, formation of transfer functions for Mechanical and Electrical systems, block diagram reduction technique, signal flow graphs- Mason’s gain formula (elementary treatment only).

**TEXT BOOKS:**

**REFERENCE BOOKS:**
UNIT-I: BINARY SYSTEMS
Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic.

UNIT-II: BOOLEAN ALGEBRA AND LOGIC GATES
Basic Definitions, Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra, Boolean functions canonical and standard forms, other logic operations, Digital logic gates, integrated circuits.

UNIT-III: GATE – LEVEL MINIMIZATION
The k-map method - Four-variable map, Five-Variable map, product of sums simplification and sum of products, Don’t-care conditions, NAND and NOR implementation other Two-level implementations, Exclusive – Or function, Hardware Description language (HDL).

UNIT-IV: COMBINATIONAL LOGIC
Combinational Circuits, Analysis procedure, Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

UNIT-V: SYNCHRONOUS SEQUENTIAL LOGIC
Sequential circuits, latches, Flip-Flops, Analysis of clocked sequential circuits, HDL for sequential circuits, State Reduction and Assignment, Design Procedure.

UNIT-VI:
Registers, shift Registers, Ripple counters, synchronous counters, other counters, HDL for Registers and counters.

UNIT-VII:
Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction, Read-only memory, Programmable Logic Array, Programmable Array logic, Sequential Programmable Devices.

UNIT-VIII: ASYNCHRONOUS SEQUENTIAL LOGIC

TEXT BOOKS:

REFERENCE BOOKS:
UNIT–I: MATHEMATICAL LOGIC
Statements and notations, Connectives, Well formed formulae, Truth Tables, Tautology, Equivalence of formulae, Normal forms.

UNIT–II: PREDICATES

UNIT–III: RELATIONS
Properties of binary relations, Equivalence relations, Compatibility relations Partial ordering relations, Hasse diagram and related applications.
Functions: Inverse Functions, Composition of functions, Recursive functions, Lattice and its Properties.

UNIT–IV: ALGEBRAIC STRUCTURES
Algebraic System Examples and General Properties Semi Groups and Monoids, Groups, Subgroups, Homomorphism and Isomorphism.

UNIT–V: MATHEMATICAL REASONING
Methods of Proof, Mathematical Induction.


UNIT–VI: RECURRENCE RELATION
Generating Functions of Sequences, Calculating coefficients of Generating function, Recurrence relation, solving recurrence relations by substitution and Generating functions, Methods of Characteristic Roots, Solutions of Inhomogeneous Recurrence Relation.

UNIT–VII: GRAPHS
Introduction to Graphs, Types of Graphs, Graph basic terminology and Special Types of Simple Graphs, Representation of Graphs and graph Isomorphism, Euler Paths and Circuits, Hamiltonian Paths and Circuits, Planar Graphs, Euler’s Formula and Graph Coloring, 4-color theorem, 5-color theorem.

UNIT–VIII: GRAPH THEORY AND ITS APPLICATIONS
Introduction to Trees, Properties of Trees, Applications of Trees, Spanning Trees, Counting trees, Depth-First Search, Breadth-First Search, Minimum Spanning Trees, Kruskal’s Algorithm and Prim’s Algorithm.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT-I: INTRODUCTION TO DATA STRUCTURES
Definition, Classification, The Abstract Data Type (ADT), model for ADT, ADT implementation, Generic code for ADTs.
Sorting: Sort concepts, Merge sort, Shell sort, Quick sort, Heap sort.
Searching: Sequential search, variations on sequential search, Binary search, Fibonacci search.

UNIT-II: GENERAL LINEAR LISTS
Singly linked list, Basic Operations, Implementation, List ADT, Circularly linked lists, Doubly linked lists, Multi linked lists.

UNIT-III: STACKS AND QUEUES
Basic stack operations, Stack linked list, implementation, Stack ADT, Applications: Reversing data, Convert Decimal to binary, Postponement.
Queues: Queue operations, Queue linked list design, Queue ADT, Applications: Categorizing data, Queue simulations.

UNIT-IV: NON LINEAR LISTS
Basic tree concepts, Binary trees: properties, traversals, expression trees, Binary search trees: Basic concepts, Operations, Binary Search Tree ADT, Threaded trees.

UNIT-V: AVL TREES
Basic Concepts, Balance Factor, implementation, ADT, Algorithms and Applications: Count words.
Heaps: Basic Concepts, Implementation, ADT, Heap Application.

UNIT-VI: MULTIWAY TREES

UNIT-VII: GRAPHS
Basic Operation, Review of traversals- Breadth FirstTraversal, Depth First Traversal, Graph storage structures, Graph ADT, Networks: Minimum spanning trees, Shortest path algorithm.

UNIT-VIII: HASH TABLES
Introduction, Hash Table structure, Hash functions, Linear open Addressing, Chaining, Applications.

TEXT BOOKS:

REFERENCE BOOKS:
PART A: ELECTRONIC WORKSHOP PRACTICE (Only for Viva-Voce)

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards. Identification, Specifications and Testing of Active Devices: Diodes, BJTs, Low-power JFETs, MOSFETs, LEDs, LCDs, SCR, UJT, Linear and Digital ICs.

PART B: Analog Devices and Circuits (Minimum seven experiments to be conducted)

1. PN Junction and Zener diodes characteristics
2. Ripple Factor and Load Regulations of Rectifier with and without filters (Fullwave or Halfwave)
3. Input and Output characteristics of Transistor in CE configuration
4. Drain and Transfer Characteristics of JFET
5. Gain and Frequency response of CE Amplifier
6. Gain and Frequency response of Feedback Amplifier (Voltage series or current series)
7. Frequency of oscillations of Hartley and Colpitts Oscillator
8. UJT relaxation oscillator
9. SCR characteristics

PART C: Digital Circuits

Realization of

1. Flip Flops using Logic Gates
2. Two Problems on Combinational Circuits
3. Asynchronous Counter
4. Synchronous Counter

Demonstration of

5. VHDL Programme
II B.Tech., I Sem.  10BT30511: DATA STRUCTURES LAB

1. a) Implement Quick sort algorithm on the list \( L = \{67, 78, 34, 11, 99, 42, 56, 23\} \) and display the output list at the end of each pass.
   b) Implement Merge sort algorithm on the lists \( L1 = \{123, 678, 345, 225, 890, 650, 111\} \), \( L2 = \{654, 789, 912, 144, 255, 666\} \).

2. a) Implement Heap sort for the list \( L = \{H, V, A, T, L, M, K, U\} \)
   b) Implement Heap sort for the list \( L \) of 1 (a).

3. Implement binary search and Fibonacci search algorithms on an ordered list \( L = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\} \). Undertake search for the elements in the list \( \{3, 18, 1, 25\} \).
   Compare the number of keys comparisons made during the searches.

4. Write a program to implement the following operations on singly linked list
   i) Creation  ii) Insertion  iii) Deletion  vi) Display

5. Write a menu driven program which will maintain a list of car models, their price, name of the manufacturer, engine capacity etc., as a doubly linked list. The menu should make provisions for inserting information pertaining to new car models, delete obsolete models, update data such as price besides answering queries such as listing all car models within a price range specified by the client and listing all details given a car model.

6. Write C programs to implement the following using an array.
   i) Stack ADT  ii) Queue ADT

7. Write C programs to implement the following using a singly linked list.
   i) Stack ADT  ii) Queue ADT

8. Write a C program to perform the following operations:
   i) Insert an element into a binary search tree.
   ii) Delete an element from a binary search tree.
   iii) Search for a key element in a binary search tree.

9. Write C program that use recursive functions to traverse the given binary tree in
   i) Preorder  ii) Inorder  iii) Postorder (Non recursive)

10. Write a C program to perform the following operation
    i) Insertion into an AVL - tree
    ii) Deletion from an AVL – tree

11. Write a C program to perform the following operations
    i) Insertion into a B-tree
    ii) Deletion from a B-tree

12. Write C programs for the implementation of BFS(Breadth First Search) and DFS(depth First Search) for a given adjacency matrix

Adjacency Matrix for a Simple Graph:

Example: Given a graph \( G \) as follows

From the chart above, the adjacency matrix for the graph \( G \) is:

\[
\begin{bmatrix}
0 & 1 & 0 & 1 & 0 \\
1 & 0 & 1 & 0 & 1 \\
0 & 1 & 0 & 0 & 1 \\
0 & 1 & 0 & 0 & 1 \\
0 & 0 & 1 & 1 & 1
\end{bmatrix}
\]
13. a) Implement a hash table using an array data structure. Design functions to handle overflows using
i) linear probing     ii) quadratic probing     iii) rehashing for a set of keys.
b) Implement a hash table for a given set of keys using chaining method of handling overflows. Maintain the chains in the ascending order of keys. Design a menu driven front end to perform the insert, delete, and search operations on the hash table.

Text Books:

Reference Books: