# B.Tech (Computer Engineering) Semester III

**HF-201 Humanities and Social Sciences (X-X-X) 2**

Please refer to Department of Humanities and Social Sciences.

**CP-221 Logic System Design (3-0-0) 3**

**Introduction to Boolean algebra**: Binary connectives, Evaluation of truth functions, Truth – function
calculus as Boolean Algebra, Duality, Fundamental theorems of Boolean Algebra and simplification of
Boolean expressions.

**Realisation of Logic Circuits**: Standard forms of Boolean Functions, Minterm and Maxterm, designation of functions. Simplification of functions on Karnaugh maps, incompletely specified functions.

**Combinational circuits**: Adder, subtract, encoder, decoder, multiplexer, demultiplexer, parity checker
and generator.Cubical representation of Boolean functions and determination of prime implicants.
Selection of an optimal set of prime implicants, multiple output circuits and map minimization of multiple output circuits. Tabular determination of multiple output prime implicants.

**Latches, Flip Flops** : JK, SR, D Type and T type Flip Flops and their working principals.
Counters and shift registers: Ripple, decade, up-down counters, Mod-n counters and series, parallel
registers. General characteristic of sequential circuits, clock, pulse and level mode sequential circuits.
Analysis and design of sequential circuit. Synthesis of state diagrams, finite memory circuits, equivalence relations, equivalent states and circuits, determination of classes of in distinguishable states
and simplification by implicant tables. Mealy and Moore machines, state assignment and memory
element input equation, Partitioning and state assignment. General pulse-mode circuits, clock input
counters, extended state tables.

**Asynchronous Mode Circuits**: Analysis of a fundamental mode circuits, Synthesis of flow tables,
minimization, transition tables, excitation maps and output maps, Cycles and Races, Race free assignments, Hazards in sequential circuits.
Introduction to A/D and D/A converters.

**Text/References:**

1. Digital Systems and Hardware and Firmware Algorithms: M.Ercegovac and T. Lang, Pearson.
2. Morris-Mano : Logic System and Design, McGraw Hill
3. Hill & Peterson: Switching Theory and Logic Design, John Wiley
4. J.F.Wakerly: Digital Design, Principle and Practices, Pearson.
5. Malvino leech: Digital Electronics

**CP-223 Data Structures (3-0-0) 3**

Introduction to Data structures.
Arrays: Representation – row-major, column-major, sparse matrix –implementation, addition, multiplication; polynomial – Representation, addition, evaluation and multiplication.
Strings: Representation, operations, string matching - Brute force or naïve, Robin-Karp, Knuth-Morris-
Pratt.
Linked List: Static and dynamic implementation, single, double, circular, multiple linked list.

Stack: Static and dynamic implementation, expression evaluation, prefix (polish), infix, postfix (inverse
polish) expressions, application, multiple stacks, recursion.
Queues: Static and dynamic implementation, applications, circular queue, multiple queue.
Tree: Binary tree, binary search tree, static and dynamic implementation, tree operations - insertion,
deletion and search, tree traversal, Binary heaps. Introduction to AVL trees and B trees.
Sorting: Insertion sort, selection sort, Bubble sort, quick sort, merge sort, heap-sort, radix sort (bucket
sort).
Searching: Linear and binary search, hashing.
Graph: Representation of graphs, BFS, DFS, topological sort.

**Text/References:**

1. Aho A.V., J.E. Hop croft, J.D. Ullman, Data Structures and algorithms, Addison Wesley.
2. Kruse R.L., Data Structure and Program Design, PHI.
3. Horowitz and Sahni: Data Structure in C++ , Glagotia
4. Ellis Horowitz, Sartaj Sahni, Fundamentals of Data Structures
5. Aaron M. Tenenbaum, Y. Langsam, Moshe J. Augenstein, Data Structures Using C
6. Niklaus Wirth, Algorithms + Data Structures = Programs (Prentice-Hall Series in Automatic Computation)
7. Sartaj Sahni, Data Structures, Algorithms, and Applications in C++
8. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++ (2nd Edition)

**CP-225 Probability and Statistics (3-0-0) 3**

**Probability Theorem**: Properties of probability, Conditional probability, Independence, Bayes theorem

**Discrete Distributions**: Probability distribution functions and cumulative distribution functions Mean and variance; moment-generating functions, Marginal and conditional probability distributions,
Some specific discrete distributions

**Continuous Distributions**: Probability density functions and cumulative distribution functions, Mean
and variance; moment generating functions, Marginal and conditional probability distributions, Some
specific continuous distributions

**Functions of Random Variables**: Distribution function technique, Transformation technique, Momentgenerating
function techniques

**Text/References:**

1. DeGroot, Morris H., and Mark J. Schervish. Probability and Statistics. 3rd ed. Boston, MA: Addison-Wesley, 2002. ISBN: 0201524880.
2. Feller, William. An Introduction to Probability Theory and Its Applications. 3rd ed., rev. printing. New York, NY: Wiley, 1968. ISBN: 0471257087.
3. Freund, W.J., Mathematical Statistics, 5th Ed., Prentice-Hall, Inc., Englewood Cliffs, N.J., 1994.
4. Hoel, P.G., Mathematical Statistics, 5th Ed., John Wiley & Sons, Inc., NewYork, 1984.
5. Hogg, R.V., & Craig, A.T., Introduction to Mathematical Statistics, 5th Ed.,Prentice-Hall, Inc., Englewood Cliffs, N.J., 1995.
6. Mood, A.M., Graybill, F.A., Boes, D.C., Introduction to the Theory of Statistics, 3rd Ed. McGraw
Hill, Inc., New York, 1974.

**CP-227 Abstract Algebra (3-0-0) 3**

**Number Systems**: Natural numbers. Counting. Cardinality of finite sets. Laws, Mathematical induction.
Prime numbers. Fundamental theorem of arithmetic. Well-ordering principle. Number bases. Modulo
arithmetic. Greatest Common Divisor, Euler's extended algorithm, Chinese Remainder Theorem,
Primality testing, Integers. Laws of arithmetic. Integer powers and logarithms. Recurrence relations.
Number sieves.

**Group Theory**: Groups, Semi groups and Monoids, Cyclic semi graphs and sub monoids, Subgroups
and cosets, Congruence relations on Semi groups, Factor groups and homomorphisms, Morphisms
Normal sub groups. Structure of cyclic groups, Permutation groups, dihedral groups, Sylow theorems,
abelian groups; solvable groups, Nilpotent groups; groups of small order, elementary applications in
coding theory.

**Rings**: Rings, Subrings, Morphism of rings, ideal and quotient rings, Euclidean domains, Commutative
rings; integral domains, noncommutative examples, Structure of Noncommutative Rings, Ideal Theory
of Commutative Rings

**Field Theory**: Integral domains and Fields, polynomial representation of binary number, Galois fields,
primitive roots, discrete logarithms, split search algorithm.

**Modules:** Sums and products; chain conditions, Composition series; tensor products.

**Text/ References:**

1. John Fraleigh. *First Course in Abstract Algebra*, Pearson Education.
2. Michael Artin. *Algebra*, Pearson Education.
3. John A. Beachy and William D. Blair. *Abstract Algebra*, Second Edition, Waveland Press.
4. John A. Beachy. Abstract Algebra II, Cambridge University Press, London Mathematical Society
Student Texts #47, 1999.

**CP-251 LSD Lab (0-0-3) 2**

The following proposed coverage are broad guiding areas lab. The instructor offering the course in
consultation with the theory offered can adopt further variations in tune with CP-221.

1. Truth table verification – NAND gate, NOR gate, OR gate, AND gate, NOT gate.
2. Verifying if NAND gate is a universal gate.
3. Constructing XOR gate using NOR gate only.
4. Realizing given truth table using SOP form.
5. Realizing given truth table using POS form.
6. Design of combinational circuits – half adder, full adder, multiplier.
7. Design of binary-gray encoder.
8. Design of parity generator and detector.
9. Design of one bit error detecting and correcting circuit.
10. Design of flip flops – RS, JK, D and T flip flops.
11. Design of sequential circuits – counters.

**Text/References:**

1. Digital Systems and Hardware and Firmware Algorithms: M.Ercegovac and T. Lang, Pearson.
2. Morris-Mano : Logic System and Design, Mc Graw Hill
3. Hill & Peterson: Switching Theory and Logic Design, John Wiley
4. J.F.Wakerly: Digital Design, Principle and Practices, Pearson.
5. Malvino leech: Digital Electronics

**CP-253 Data Structure Lab (0-0-3) 2**

The following proposed coverage are broad guiding areas lab. The instructor offering the course
in consultation with the theory offered can adopt further variations in tune with CP-223.

Programs in C or C++ for following:

1. Sorting programs: Bubble sort, Merge sort, Insertion sort, Selection sort, and Quick sort.
2. Searching programs: Linear Search, Binary Search.
3. Array implementation of Stack, Queue, Circular Queue, Linked List.
4. Implementation of Stack, Queue, Circular Queue, dynamic memory allocation.
5. Infix to postfix (prefix) conversion.
6. Program for expression evaluation.
7. Implementation of Binary tree. Program for Tree Traversals (preorder, inorder, postorder).
8. Program for graph traversal (BFS, DFS).
9. Program for minimum cost spanning tree, shortest path.

**Text/References:**

1. Aho A.V., J.E. Hop croft, J.D. Ullman, Data Structures and algorithms, Addison Wesley.
2. Kruse R.L., Data Structure and Program Design, PHI.
3. Horowitz and Sahni: Data Structure in C++ , Glagotia
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5. Aaron M. Tenenbaum, Y. Langsam, Moshe J. Augenstein, Data Structures Using C
6. Niklaus Wirth, Algorithms + Data Structures = Programs (Prentice-Hall Series in Automatic Computation)
7. Sartaj Sahni, Data Structures, Algorithms, and Applications in C++
8. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++ (2nd Edition)

**Open Elective I (X-X-X) 3/4**

Please refer to concerned Department.