RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Computer Science and Engg, III-Semester

Electronic Devices & Circuits

CSE (III Sem) Electronic Device & Circuits

Semiconductor devices, theory of P-N junction, temperature dependence and break down characteristics, junction capacitances. Zener diode, Varactor diode, PIN diode, LED, Photo diode, Transistors BJT, FET, MOSFET, types, working principal, characteristics, and region of operation, load line biasing method**.** Transistor as an amplifier, gain, bandwidth, frequency response, Type of amplifier.

Feedback amplifier, negative feedback, voltage-series, voltage shunt, current series and current shunt feedback, Sinusoidal oscillators, L-C (Hartley-Colpitts) oscillators, RC phase shift, Wien bridge, and Crystal oscillators. Power amplifiers, class A, class B, class A B, C amplifiers, their efficiency and power Dissipation.

Switching characteristics of diode and transistor turn ON, OFF time, reverse recovery time, transistor as switch, Multivibrators, Bistable, Monostable, Astable multivibarators. Clippers and clampers, Differential amplifier, calculation of differential, common mode gain and CMRR using hparameters**.**

Operational amplifier characteristics, slew rate, full power bandwidth, offset voltage, bias current, application ,inverting , non inverting amplifier , summer, differentiator, integrator, differential amplifier , instrumentation amplifier, log and antilog amplifier , voltage to current and current to voltage converters , comparators Schmitt trigger .

Introduction to IC, Advantages and limitations, IC classification, production process of monolithic IC, fabrication of components on monolithic IC, IC packing, general integrated circuit technology, photolithographic process, un polar IC's, IC symbols.

References:

1. Milliman Hallkias - Integrated Electronics; TMH Pub.
2. Gayakwad; OP-amp and linear Integrated Circuits; Pearson Education
3. Salivahanan; Electronic devices and circuits; TMH
4. Robert Boylestad & Nashetsky; Electronics Devices and circuit Theory; Pearson Ed.
5. Salivahanan; Linear Integrated Circuits; TMH
6. Miliman Grabel; Micro electronics, TMH

List of Experiments:

1. Diode and Transistor characteristics
2. Transistor Applications (Amplifier and switching)
3. OP-Amp and its Applications
4. 555 timer and its Applications

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL
Choice Based Credit System
Computer Science and Engg, III-Semester

Digital Circuit & Design

PREREQUISITE: Electronic Device & Circuits (Transistors, Capacitors, Inductors,), other Hardwares.
OBJECTIVES

To expose the students to perform binary arithmetic and conversion from one number system to another and learn different Boolean simplification techniques. We learn the design and analysis of combinational and sequential circuits.

Number systems & codes, Binary arithmetic, Boolean algebra and switching function. Minimization of switching function, Concept of prime implicant, Karnaugh map method, Quine McCluskey's method,Cases with don't care terms, Multiple output switching function.

Introduction to logic gates, Universal gate, Half adder,Half subtractor, Full adder, Full subtractor circuits, Series & parallel addition, BCD adders, Look-ahead carry generator.

Linear wave shaping circuits, Bistable, Monostable & Astable multivibrator, Schmitt Trigger circuits & Schmitt-Nand gates. Logic families:RTL, DTL, All types of TTL circuits, ECL, I2L, PMOS, NMOS, & CMOS logic, Gated flip- flops and gated multivibrator, Interfacing between TTL to MOS.

Decoders, Encoders, Multiplexers, Demultiplexers, Introduction to various semiconductor memories, & designing with ROM and PLA. Introduction to Shift Registers, Counters, Synchronous & Asynchronous counters, Designing of combinational circuits like code converters.

Introduction of Analog to Digital & Digital to Analog converters, sample & hold circuits and V-F converters.

OUTCOMES: Upon completion of the course, the students will be able to Perform Simplification of Boolean Functions using Theorems and Karnaugh Maps and Convert between digital codes using encoder/decoder .Student can analyze combinational circuits and sequential circuits .

References:

1.M. Mano; " Digital Logic & Computer Design"; Pearson
2.Malvino Leach; "Digital Principles & Applications";TMH
3.Millman & Taub; "Pulse Digital & Switching Waveforms";TMH
4. W.H Gothman; "Digital Electronics";PHI
5. R.P.Jain "Modern Digital Electronics" TMH

List of Experiments :

1.To study and test operation of all logic gates for various IC's)IC#7400, IC#7403, IC#7408, IC#7432, IC#7486)
2.Verification of DeMorgan's Theorem.
3.To construct half adder and full adder.
4.To construct half subtractor and full subtractor circuits.
5.Verification of versatility of NAND gate.
6. Verification of versatility of NOR gate.
7. Designing and verification of property of full adder.
8.Design a BCD to excess-3 code convertor.
9.Design a Multiplexer/Demultiplexer

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL
Choice Based Credit System
Computer Science and Engg, III-Semester
Data Structures-II

Objectives

Data structures play a central role in modern computer science. In addition, data structures are essential building blocks in obtaining efficient algorithms. The objective of the course is to teach students how to design, write, and analyze the performance of programs that handle structured data and perform more complex tasks, typical of larger software projects. Students should acquire skills in using generic principles for data representation & manipulation with a view for efficiency, maintainability, and code-reuse. Another goal of the course is to teach advance data structures concepts, which allow one to store collections of data with fast updates and queries.

Introduction –Common operations on data structures, Types of data structures, Data structures & Programming, Program Design, Complexities, Time Complexity, order of Growth, Asymptotic Notation.

Advanced Data Structures-Hash tables ,Heaps , Complexity , Analysis of Heap Operations , Application of Heap , AVL tress , Insertion & Deletion in AVL tree , Red Black Trees , Properties of Red Black trees ,Insertion & Deletion in Red Black tree .

Sorting –Need for sorting , Types of sorting algorithm-Stable sorting Algorithm, Internal & External sorting algorithm , Outline and offline algorithm ,Sorting Techniques-Insertion , Shell , Selection , Merge ,Quick sort, Radix sort ,bucket sort .

Augmenting Data structures – Augmenting a red black trees, Retrieving an element with a given rank , Determining the rank of element ,Data structure Maintenance ,An augmentation strategy ,Interval Trees.

File structures- Basic file operations, File organization –Sequential file organization, Indexed sequential file organization, Direct file organization. External merge sort, Multiway Merge sort, Tournament Tree ,Replacement Selection .

REFERENCES:

1. Horowitz and Sahani, “Fundamentals of data Structures”,University Press
2. Trembley and Sorenson , “Data Structures”, TMH Publications
3..A. M. Tenenbaum, “Data Structures using C & C++”, Pearson Pub
4. Venkatesan , Rose, “Data Structures” Wiley India Pvt.Ltd
5. Pai; Data structure and algorithm , TMH Publications
6. T.H.Coreman,”Introduction to algorithm”,PHI.

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Choice Based Credit System

Computer Science and Engg, III-Semester

Discrete Structures

Objective-This course introduces the applications of discrete mathematics in the field of computer science. It covers sets, logic, proving techniques, combinatorics, functions, relations, Graph theory and algebraic structures. These basic concepts of sets, logic functions and graph theory are applied to Boolean Algebra and logic networks while the advanced concepts of functions and algebraic structures are applied to finite state machines and coding theory.

Unit-I

Set Theory, Relation, Function, Theorem Proving Techniques : Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job-Scheduling problem Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction.

Unit-II

Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

Unit-III

Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers. Introduction to finite state machine Finite state machines as models of physical system equivalence machines, Finite state machines as language recognizers

Unit-IV

Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs.

Unit V

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices.

Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Multimonial Coefficients Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms , Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions , Generating functions , Solution by method of generating functions.**Outcome:-**After this completion student will be familiar with relational algebra,Functions and graph theory.

References:

1. C.L.Liu, "Elements of Discrete Mathematics" Tata Mc Graw-Hill Edition.
2. Trembley, J.P & Manohar; "Discrete Mathematical Structure with Application CS", McGraw Hill.
3. Kenneth H. Rosen, "Discrete Mathematics and its applications", McGraw Hill.
4. Bisht, "Discrete Mathematics",Oxford University Press
5. Biswal,"Discrete Mathematics & Graph Theory", PHI