

# JNTU-HYDERABAD

## B. TECH (R09) Computer Science & Engineering (2-1 Syllabus)

### Computer Science & Engineering

Regulation: R09  
Year: II Semester: I

Code	Subject	Internal	External	Total	Credits
53009	Electronic Devices & Circuits			25 75 100	4
53014	Probability and Statistics		25	75 100	3
53022	Mathematical Foundations of Computer Science		25	75 100	3
53023	Data Structures through C++		25	75 100	4
53024	Digital Logic Design		25	75 100	4
53025	Basic Electrical Engineering		25	75 100	3
53608	Electrical and Electronics Lab		25	50 75	2
53609	Data Structures Lab through C++		25	50 75	2

**ELECTRONIC DEVICES AND CIRCUITS****UNIT-I**

p-n Junction Diode: Qualitative Theory of p-n Junction. P-n Junction as a Diode, Diode Equation. Volt-Ampere Characteristics, Temperature dependence of V I Characteristics. Ideal versus Practical Resistance levels ( static and dynamic) Transition and diffusion capacitances. Diode Equivalent circuits, Load Line Analysis, Breakdown Mechanisms in semi conductor diodes. Zener diode characteristics.

**UNIT- II: Rectifiers and Filters :**

the p-n junction as a rectifier, half wave rectifiers, full wave rectifiers, bridge rectifiers harmonic components in a rectifier circuit. Inductor filters, capacitor filters, L SECTION filteres, d- section filters. composition of filters, voltage regulation using zener diode.

**UNIT- III: Bipolar Junction Transistor :**

the junction transistor, transistor current components. Transistor as an amplifier. Transistor construction. BJT operation, BJT symbol, common base, common emitter and common collector configuration, limits of operation , BJT specification.

**UNIT- IV: Transistor Biasing and Stabilization :**

Operating point, the DC and AC load lines. Need for biasing . fixed bias . collector feedback bias. Emitter feedback bias, collector-emitter feedback bias. Voltage divider bias. Bias stability. Stabilization factors. Stabilization against variations in  $V_{BE}$  and  $\beta$  . Bias compensation using diodes and transistors . thermal runaway, thermal stability.

**UNIT-V: Small Signal Low Frequency BJT Models**

BJT hybrid model, determination of h-parameters from transistor characteristics. Analysis of a transistor amplifier circuit using h-parameters. Comparison of CB, CE, and CC amplifiers, configurations.

**UNIT- VI: Field Effect Transistor**

The Junction field effect transistor (construction, principle of operation, symbol) pinch of voltage, voltage-ampere characteristics, the JFET small signal model, MOSFET construction, principle of operation, symbol) , MOSFET characteristics in enhancement and depletion modes.

**UNIT- VII: FET AMPLIFIERS :**

FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, Biasing FET, FET as Voltage Variable Resistor, Comparison of BJT, and FET., Uni junction Transistor.

## UNIT-VIII

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode ( with the help of Energy Band Diagram ) and Varactor Diode. Principle of Operation of Schottky Barrier Diode, SCR and Semiconductor Photo Diode.

### TEXT BOOKS :

1. Millman s Electronic Devices and Circuits J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 1998 . TMH
2. Electronic Devices and Circuits R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall,9th Edition,2006.
3. Introduction to electronic devices and circuits- robert t painter PE.

### REFERENCES :

1. Integrated electronics J.Millman and Christos c halkias 1991, 2008, TMH.
2. Electronic Devices and Circuits Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
3. Electronic Devices and Circuits Anil k maini , varsha agarwal , 2009 WIPL
4. Electronic Devices and Circuits s salivahana n suresh kumar, a vallavaraj 2008 TMH.

**PROBABILITY AND STATISTICS****UNIT-I**

Probability: Sample space and events    Probability    The axioms of probability    Some Elementary theorems - Conditional probability    Baye s theorem. , Random variables discrete and continuous.

**UNIT-II :**

distribution: Binomial and poison distributions Normal distribution    related properties. Sampling distributions Distribution - sampling distributions of means ( s known and unknown)

**UNIT-III :**

Test of Hypothesis I    point estimations    interval estimations Bayesian estimation. Large samples, null hypothesis- alternate hypothesis type I, & type II errors- critical region confidential interval for mean testing of single variance. Difference between the mean.

**UNIT-IV**

Test of Hypothesis II    confidential interval for the proportions. Tests of hypothesis for the proportions single and difference between the proportions.

**UNIT-V**

Small samples:Confidence interval for the t-distribution- tests of hypothesis    t distributions, F-distributions, distribution. Test of hypothesis-;

**UNIT-VI**

Correlation & regression: coefficient of correlation- regression coefficient- the lines of regression    the rank correlation.

**UNIT-VII**

Queuing Theory: Arrival theorem- Pure Birth and Death Process M/M/1 Model

**UNIT-VIII**

Stochastic Processes: Introduction to stochastic processes- markov process classification of states- examples of markov chains, stochastic matrix , limiting probabilities.

**Text Books:**

1. Probability & Statistics, D. K. Murugeson & P. Guru Swamy, Anuradha Publishers

2. Probability & Statistics for engineers by g.s.s.bhima rao, scitech publications.

**References:**

1. Probability & Statistics, T. K. V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.

2. Probability & Statistics, by William mendenhall & others cengage pub.

3. Higher engineering mathematics by b s grewal m khanna pub.

4. Higher engineering mathematics by jain and iyengar , narasa publications

5. A first course in probability & statistics by BLS Prakasa rao. Home scientific.

6. Probability & Statistics for Engineers, Miller and John E. Freund, Prentice Hall of India.

**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE****UNIT-I**

Mathematical Logic : Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.

**UNIT-II**

Predicates : Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

**UNIT-III**

Relations: Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram. Functions: Inverse Function Comports of functions, recursive Functions, Lattice and its Properties, .

**UNIT-IV**

Algebraic structures : Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups homomorphism, Isomorphism.

**UNIT-V**

Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion Exclusion. Pigeon hole principles and its application

**UNIT-VI**

Recurrence Relation : Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating funds. Characteristics roots solution of In homogeneous Recurrence Relation.

**UNIT-VII**

Graph Theory : Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs

**UNIT-VIII**

Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers

**TEXT BOOKS :**

1. Elements of DISCRETE MATHEMATICS-A computer oriented approach CL Liu, d p nohapatra, 3rd ed TMH
2. Discrete mathematics for computer scientists & mathematicians JL Mott, A Kandel, TP Baker PHI.

**REFERENCES :**

1. Discrete Mathematics with Applications, Thomas Koshy, Elsevier
2. Discrete Mathematical Structures, Bernand Kolman, Roberty C. Busby, Sharn Cutter Ross, Pearson Education/PHI.
3. Discrete Mathematical structures Theory and application-Malik & Sen
4. Discrete Mathematics for Computer science, Garry Haggard and others, Thomson.
5. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker Prentice Hall.
6. Logic and Discrete Mathematics, Grass Man & Trembley, Person Education.
7. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition – Ralph. P.Grimaldi.Pearson Education
8. Discrete Mathematical Structures with applications to computer science Trembly J.P. & Manohar .P, TMH
9. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition. TMH.

**Data Structures through C++****Unit I :**

C++ Class Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and deallocation (new and delete), exception handling.

**Unit II :**

Function Over Loading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O.

**Unit III :**

Algorithms, performance analysis- time complexity and space complexity. Review of basic data structures- The list ADT, Stack ADT, Queue ADT, Implementation using template classes in C++.

**Unit IV :**

Dictionaries, linear list representation, skip list representation, operations insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

**Unit V :**

Priority Queues Definition, ADT, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion, External Sorting- Model for external sorting, Multiway merge, Polyphase merge.

**Unit VI :**

Search Trees (Part1):-

Binary Search Trees, Definition, ADT, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations Insertion, Deletion and Searching

**Unit VII :**

Search trees (prt II) : Trees definitions, B-Trees, B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees



Graphs: Basic terminology, representations of graphs, graph search methods DFS, BFS.

**Unit VIII :**

Text Processing : Pattern matching algorithms-Brute force, the Boyer Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

**TEXT BOOKS :**

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press ( India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

**REFERENCES :**

1. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
2. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

**DIGITAL LOGIC DESIGN****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 map method, Four-variable map, Five-Variable map, product of sums simplification 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 : Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduciton of state and Flow Tables, Race-Free state Assignment Hazards, Design Example.

**TEXT BOOKS :**

1. DIGITAL DESIGN Third Edition , M.Morris Mano, Pearson Education/PHI.
2. FUNDAMENTALS OF LOGIC DESIGN, Roth, 5th Edition,Thomson.

**REFERENCES :**

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design , 5TH Edition, M. Rafiquzzaman John Wiley

**BASIC ELECTRICAL ENGINEERING****UNIT - I**

Introduction to Electrical Engineering : Essence of electricity, Conductors, semiconductors and insulators (elementary treatment only); Electric field; electric current, potential and potential difference, electromotive force, electric power, ohm's law, basic circuit components, electromagnetism related laws,

Magnetic field due to electric current flow, force on a current carrying conductor placed in a magnetic field, Faraday's laws of electromagnetic induction. Types of induced EMFs, Kirchhoff's laws. Simple problems.

**UNIT-II**

Network Analysis : Basic definitions, types of elements, types of sources, resistive networks, inductive networks, capacitive networks, series parallel circuits, star delta and delta star transformation, Network theorems- Superposition, Thevenin's, Maximum power transfer theorems and simple problems.

**UNIT-III**

Alternating Quantities : Principle of ac voltages, waveforms and basic definitions, relationship between frequency, speed and number of poles, root mean square 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 circuits, single phase parallel circuits, single phase series parallel circuits, power in ac circuits.

**UNIT-IV**

Transformers : Principles of operation, Constructional Details, Ideal Transformer and Practical Transformer, Losses, Transformer Test, Efficiency and Regulation Calculations (All the above topics are only elementary treatment and simple problems).

**UNIT-V**

D.C. generators: Principle of operation of dc machines, types of DC GENERATORS., e.m.f equation in a dc machine

**UNIT-VI**

D.C. Motors : Principle of operation of dc motors, types of DC Motors. Losses and torque equation, losses and efficiency calculation in D.C generator.

**UNIT-VII**

A.C Machines : Three phase induction motor, principle of operation, slip and rotor frequency, torque (simple problems).

### **UNIT VIII**

Basic Instruments : Introduction, classification of instruments, operating principles, essential features of measuring instruments, Moving coil permanent magnet (PMMC) instruments, Moving Iron of Ammeters

and Voltmeters (elementary Treatment only)

### **TEXT BOOKS :**

1. Basic Electrical Engineering - By M.S.Naidu and S. Kamakshiah TMH.
2. Basic Electrical Engineering By T.K.Nagasarkar and M.S. Sukhija Oxford University Press.
3. Electrical and Electronic Technology by hughes Pearson Education.

### **REFERENCES :**

1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagr ath PHI.
2. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.
3. Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin Pearson.

**ELECTRICAL AND ELECTRONICS LAB****PART A**

1. Serial and Parallel Resonance Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs time constant and steady state error determination.
3. Two port network parameters Z-Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.
7. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
8. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).
9. Brake test on DC shunt motor. Determination of performance Characteristics.
10. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
11. Brake test on 3-phase Induction motor (performance characteristics).
12. Regulation of alternator by synchronous impedance method

**PART B**

1. Identification, Specifications and Testing of R, L, C Components (colour codes), Potentiometers, Switches (SPDT, DPDT and DIP), Coils, Gang Condensers, Relays, Bread Boards. Identification and Specifications of active devices, Diodes, BJTs, Lowpower JFETs, MOSFETs, LEDs, LCDs, SCR, UJT, Linear and Digital ICs.
2. PN Junction Diode Characteristics (Forward bias, Reverse bias)
3. Zener Diode Characteristics

4. Transistor CE Characteristics (Input and Output)
5. Rectifier without Filters (Full wave & Half wave)
6. Rectifier with Filters (Full wave & half wave)
7. SCR Characteristics
8. FET Characteristics
9. CE and CC Amplifier
10. Feedback Amplifier (Voltage Series/Current series)
11. RC Phase Shift Oscillator
12. Hartely/Colpitts Oscillator

Branch: CSE

Subject Code: 53609

Regulation: R09

Year: II Semester: I

**DATA STRUCTURES LAB THROUGH C++**

Objectives:

To make the student learn a object oriented way of solving problems.

To make the student write ADTS for all data structures.

Recommended Systems/Software Requirements:

Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space

C++ compiler and STL Recommended

Week1- C++ programs to implement the following using an array.

a) Stack ADT b) Queue ADT

Week2- Write C++ programs to implement the following using a singly linked list.

a) Stack ADT b) Queue ADT

Week3- Write C++ programs to implement the deque (double ended queue) ADT using a doubly linked list and an array.

Week 4-Write a C++ program to perform the following operations:

- a) Insert an element into a binary search tree.
- b) Delete an element from a binary search tree.
- c) Search for a key element in a binary search tree.

Week5-.Write C++ programs that use non-recursive functions to traverse the given binary tree in

a) Preorder b) inorder and c) postorder.

Week6-.Write C++ programs for the implementation of bfs and dfs for a given graph.

Week7- Write C++ programs for implementing the following sorting methods:

a) Merge sort b) Heap sort



Week8-.Write a C++ program to perform the following operations

a) Insertion into a B-tree b) Deletion from a B-tree

Week9-.Write a C++ program to perform the following operations

a) Insertion into an AVL-tree b) Deletion from an AVL-tree

Week10-Write a C++ program to implement Kruskal s algorithm to generate a minimum cost spanning tree.

Week11-Write a C++ program to implement Prim s algorithm to generate a minimum cost spanning tree.

Week12-.Write a C++ program to implement all the functions of a dictionary (ADT) using hashing.

(Note: Use Class Templates In the above Programs)

**TEXT BOOKS :**

1. DATA structures a pseudo code approach with c++ , Indian edition, R.F.Gilberg and B.A.Forouzan Cengage Learning.
2. Programming Priniciples and Practice using C++, B.Stroustrup, Addition-Wiesly (Pearson Education)
3. Data Structures and Algorithms in C++, Third Edition, Adam Drozdek, Thomson.
4. Data Structures using C++, D.S. Malik, Thomson