UIT-RGPV (Autonomous) Bhopal

Subject code- CS-301 **Subject : Discrete Structures**

Semester : III

For credits & marks refer your scheme

Course 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.

COURSE CONTENT:

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.

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. Lipschutz; Discrete mathematics (Schaum); TMH
5. Deo, Narsingh, “Graph Theory With application to Engineering and Computer.Science.”, PHI.

UIT-RGPV (Autonomous) Bhopal

Subject code- CS-302 **Subject: Digital Circuit & Design**

Semester : III

For credits & marks refer your scheme

Course Objective- To expose the students to perform binary arithmetic and conversion from one number system to another. To learn different Boolean simplification techniques. To learn the design and analysis of combinational and sequential circuits. To understand the design of registers and counters. To discuss the basic concepts of PLDs .To learn the design and analysis of asynchronous sequential circuits

COURSE CONTENT:

Unit I
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.

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

Unit III
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.

Unit IV
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.

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

References:

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

List of Experiments (Expandable):
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.

UIT-RGPV (Autonomous) Bhopal

Subject code- CS-303 **Subject : Data structure**

Semester : III

For credits & marks refer your scheme

Course Objective- 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.

COURSE CONTENT:

Unit-I

Introduction: Basic Terminology, Data types and its classification, Algorithm complexity notations like big Oh, θ, Ω. Array Definition, Representation and Analysis of Arrays, Single and Multidimensional Arrays, Address calculation, Array as Parameters, Ordered List and operations, Sparse Matrices, Storage pools, Garbage collection. Recursion-definition and processes, simulating recursion, Backtracking, Recursive algorithms, Tail recursion, Removal of recursion. Tower of Hanoi Problem.

UNIT II

Stack, Array Implementation of stack, Linked Representation of Stack, Application of stack: Conversion of Infix to Prefix and Postfix Expressions and Expression evaluation, Queue, Array and linked implementation of queues, Circular queues, D-queues and Priority Queues. Linked list, Implementation of Singly Linked List, Two-way Header List, Doubly linked list, Linked List in Array. Generalized linked list, Application: Garbage collection and compaction, Polynomial Arithmetic.

UNIT III

Trees: Basic terminology, Binary Trees, , algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Binary Search Tree (BST), AVL Trees, B-trees. Application: Algebraic Expression, Huffman coding Algorithm.

UNIT IV

Internal and External sorting, Insertion Sort, Bubble Sort, selection sort Quick Sort, Merge Sort, Heap Sort, Radix sort, Searching & Hashing: Sequential search, binary search, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. Symbol Table, Static tree table, Dynamic Tree table.

Unit V

Graphs: Introduction, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

Reference:

1. R. Kruse et al, “Data Structures and Program Design in C”, Pearson Education Asia, Delhi-2002
2. ISRD Group; Data structures using C; TMH
3. Lipschutz; Data structure (Schaum); TMH
4. Horowitz and Sahani, “Fundamentals of data Structures”, Galgotia Publication Pvt. Ltd., N Delhi.
5. A. M. Tenenbaum, “Data Structures using C & C++”, Prentice-Hall of India Pvt. Ltd., New Delhi.
6. Data Structures Trembley and Sorenson, TMH Publications
7. Pai; Data structure and algorithm; TMH
8. Introduction to Algorithm- Corman, AWL

UIT-RGPV (Autonomous) Bhopal

Subject code- CS-304 **Subject : Computer System Organization**

Semester : III

For credits & marks refer your scheme

Course Objective- Students to be familiarize the basic principles of computer architecture, Design and Multi Processing, Types of data transfer, Concept of semi conductor memories which is useful for research work in field Computer System

COURSE CONTENT:

Unit I

Computer Basics and CPU: Von Newman model, various subsystems, CPU, Memory, I/O, System Bus, CPU and Memory registers, Program Counter, Accumulator, Instruction register, Micro operations, Register Transfer Language, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formats and addressing modes of basic computer. 8085 microprocessor organization

Unit-II

Control Unit Organization: Hardwired control unit, Micro and nano programmed control unit, Control Memory, Address Sequencing, Micro Instruction formats, Micro program sequencer, Microprogramming, Arithmetic and Logic Unit: Arithmetic Processor, Addition, subtraction, multiplication and division, Floating point and decimal arithmetic and arithmetic units, design of arithmetic unit.

Unit-III

Input Output Organization: Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor, 8085 I/O structure, 8085 instruction set and basic programming. Data transfer – Serial / parallel, synchronous /asynchronous, simplex/half duplex and full duplex.

Unit-IV

Memory organization: Memory Maps, Memory Hierarchy, Cache Memory - Organization and mappings. Associative memory, Virtual memory, Memory Management Hardware.

Unit V

Multiprocessors: Pipeline and Vector processing, Instruction and arithmetic pipelines, Vector and array processors, Interconnection structure and inter-processor communication.

References:

1. Morris Mano: Computer System Architecture, PHI.
2. Tanenbaum: Structured Computer Organization, Pearson Education
3. J P Hayes, Computer Architecture and Organisations, Mc- Graw Hills, New Delhi
4. Gaonkar: Microprocessor Architecture, Programming, Applications with 8085; Penram Int.
5. William Stallings: Computer Organization and Architecture, PHI
6. ISRD group; Computer orgOrganization; TMH
7. Carter; Computer Architecture (Schaum); TMH
8. Carl Hamacher: Computer Organization, TMH

UIT-RGPV (Autonomous) Bhopal

Subject code- CS-305 **Subject : Electronic Device & Circuits**
Semester: III

For credits & marks refer your scheme

Course Objective- Student will be familiarize with basic concepts of diode, transistors, amplifiers, oscillators etc. Students will be able to learn the basic ideas about power supplies, SMPS, UPS and electronic devices.

COURSE CONTENT:

Unit I
Semiconductor device, 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, h- parameters equivalent, type of amplifier.

Unit II
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.

Unit III
Switching characteristics of diode and transistor, turn ON, OFF time, reverse recovery time, transistor as switch, Multivibrators, Bistable, Monostable, Astable multivibarators. Cllipers and clampers, Differential amplifier, calculation of differential, common mode gain and CMRR using hparameters, Darlington pair, Boot strapping technique. Cascade and cascode amplifier.

Unit IV
Operational amplifier characteristics, slew rate, full power bandwidth, offset voltage, bias current, application ,inverting , non inverting amplifier , summer , averager , differentiator, integrator, differential amplifier , instrumentation amplifier , log and antilog amplifier , voltage to current and current to voltage converters , comparators Schmitt trigger , active filters, 555 timer and its application.

Unit V
Regulated power supplies. Series and shunt regulators, current limiting circuits, Introduction to IC voltage regulators, fixed and adjustable switching regulators, SMPS, UPS

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. Salivahanan; Linear Integrated Circuits; TMH-
5. Miliman Grabel; Micro electronics , TMH
6. RobertBoylestad & Nashetsky; Electronics Devices and circuit Theory; Pearson Ed.

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

UIT-RGPV (Autonomous) Bhopal

Subject code- CS-306 **Subject: Programming Lab –I (Java Technologies)**
Semester: III

For credits & marks refer your scheme

Course Objective- To introduce and understand students to programming concepts and techniques using the Java language and programming environment, class, objects , also learn about lifetime, scope and the initialization mechanism of variables and improve the ability general problem solving abilities in programming. Be able to use the Java SDK environment to create, debug and run simple Java program.

COURSE CONTENT:

UNIT-I
Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods,Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

UNIT–II
Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector. Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

UNIT–III
Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI,Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

UNIT–IV
Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

UNIT–V
Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

References:
1. E. Balaguruswamy, “Programming In Java”; TMH Publications
2. The Complete Reference: Herbert Schildt, TMH
3. Deitel & Deitel, ”JAVA, How to Program”; PHI, Pearson.
4. Merlin Hughes, et al; Java Network Programming , Manning Publications/Prentice Hall
5. Cay Horstmann, Big JAVA, Wiley India.

List of Programs(Expandable):
1. Installation of J2SDK
2. Write a program to show Scope of Variables

3. Write a program to show Concept of CLASS in JAVA
4. Write a program to show Type Casting in JAVA
5. Write a program to show How Exception Handling is in JAVA
6. Write a Program to show Inheritance
7. Write a program to show Polymorphism
8. Write a program to show Access Specifiers (Public, Private, Protected) in JAVA
9. Write a program to show use and Advantages of CONTRUCTOR
10. Write a program to show Interfacing between two classes
11. Write a program to add a Class to a Package
12. Write a program to show Life Cycle of a Thread
13. Write a program to demonstrate AWT.
14. Write a program to hide a Class
15. Write a Program to show Data Base Connectivity Using JAVA
16. Write a Program to show “HELLO JAVA” in Explorer using Applet
17. Write a Program to show Connectivity using JDBC
18. Write a program to demonstrate multithreading using Java.
19. Write a program to demonstrate applet life cycle.
20. Write a program to demonstrate concept of servlet.

UIT-RGPV (Autonomous) Bhopal

Subject code- CS-307 **Subject : Computer Engineering Workshop**
Semester: III

For credits & marks refer your scheme

Course Objective- Student will be familiarize with basic concepts of diode, Resistors, transistors, Transformers etc. Students will be able to learn the basic ideas about PCB, Personal Computer Assembling etc.

COURSE CONTENT:

UNIT - I
Basic components: - Type of component, Active and Passive, A.C. and D.C. Resistors: Types of resistors, color code. Capacitors: Type of capacitors, color code. Inductor: inductance and its type, concept of a coil. Diode: Introduction working and types. Transistors: Introduction and its type**.**

UNIT-II
Transformer: Introduction, working and its type. Function Generator: Introduction and its type. SMPS: Introduction, working and its type. LED: Introduction, working and its type. Voltage Regulator: Introduction, working and its type. Battery: Introduction, working and its type. IFT: Introduction, working and its type. Relay: Introduction, working and its type.

UNIT – III
Testing & Measurement Tools: Introduction, Working and uses of Multimeter, Voltmeter, Ammeters, Wattmeter and CRO.

UNIT – IV
Printed Circuit Board: Introduction, Manufacturing Process, PCB Type, Designing, Etching Component Assembly, Soldering.

UNIT – V
Personal Computer Assembling: Assemble All Computer parts like Motherboard, RAM, Hard Disk, SMPS, Cable, Buses, Keyboard, Mouse**.**

References:
1. Electronic Device and Circuit,Jacob Millman, Christos C. Halkias, McGraw-Hill
2. Hardware bible By : Winn L Rosch, Techmedia publications.
3. Modern All about printers By: Manohar Lotia, Pradeep Nair, Bijal Lotia BPB publications.
4. The complete PC Upgrade and maintenance guide, Mark Minasi BPB Publication

List of Experiments (Expandable):
1. Testing of NPN and PNP Transistor using Multimetre
2. Testing of Ceramic and Electrolytic Capacitor using Multimetre
3. Testing of Inductor using Multimetre.
4. Testing of Values Voltages at different points on PCB using Multimetre.
5. Testing of Current at different points on PCB using Multimetre.
6. Testing of SMPS using Multimetre. Testing of Step Up and Step down Transformers using Multimetre.
7. Testing of IFT(Intermediate Frequency Transformer) using Multimetre
8. Testing of Resistance using Multimetre and Reading of Resistance using Colour Coding Table.
9. Assemble Mono Stable, Astable, and Bistable multivibrator(Clocked and Unclocked) using PCB.

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