BE III Semester **COMPUTER SCIENCE & Engg.**							
COURSE CONTENTS (UEC SCHEME)							
CS-3001	**Data Structures**	**L**	**T**	**P**	**C**	**Max. Marks**	**Min. Marks**
Duration	5 Hours	2	1	2	4	70	22

Course Description

Study of advanced programming topics focused on logical structures of data. Data Structure Operations. Topics include linked lists, stacks, trees, queues, graphs and analysis of efficiency. Also covers searching, sorting and hashing techniques. Linked Lists; Type of lists; Operations and Applications; Stacks and Queues; Operations and Applications; Trees, Search trees and Heaps; Multiway Trees and Graphs; Searching and Hashing.

Syllabus:
UNIT-I: LINKED LISTS
Introduction To Data Structures, Pointers, Operations, Linked List definition, Single Linked Lists, Circular Linked List, Doubly Linked List, Circular Doubly Linked List, Application of Linked Lists.
UNIT-II: STACKS AND QUEUES
Stacks: Stack operations, Stack Linked List, Implementation, Stack applications.
Queues: Queue operations, Queue Linked List design, Queue applications.
UNIT-III: TREES, SEARCH TREES AND HEAPS
Trees: Tree concepts, Binary Trees. Binary Search Trees (BST): Basic concepts, BST operations, BST applications. AVL Search Trees: Basic concepts, AVL Tree implementations. Heaps: Basic concepts, Heap implementation, Heap applications.
UNIT-IV: MULTIWAY TREES AND GRAPHS
Multiway Trees: B-Trees, Simplified B-Trees, B-Tree variations. Graphs: Basic concepts, Operations, Graph storage structures, Graph algorithms - Create graph, Insert vertex, Delete vertex, Retrieve vertex, Depth-first traversal, Breadth-first traversal.
UNIT-V: SORTING AND HASHING
Internal Sorting: Quick Sort, Shell Sort, Merge Sort, Heap Sort. External Sorting: Introduction, External storage device and sorting, Balanced Merge. Hashing: Introduction, Hash Table structure, Hash functions, Linear Open Addressing, Chaining, Applications.

TEXT BOOKS:
1. Richard Gileberg and Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with C, Cengage Learning, Second Edition, 2007.
2. G.A.V. Pai, "Data Structures and Algorithms", Tata McGraw Hill, Second Edition, 2009.

REFERENCE BOOKS:
1. Debasis Samanta, Classic Data Structures, PHI Learning, Second Edition, 2009.
2. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, Data Structures Using C, Pearson Education, 2005.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Principles of Data Structures.
- Linear and Non-linear Data Structures.
- Sorting and hashing techniques.

CO2. Analyze and Identify suitable data structure for computational problem solving

CO3. Design solutions for complex engineering problems using linear and non-linear data structures.

CO4. Develop solutions for Complex computational problems by conducting explorative analysis.

CO5. Apply appropriate data structure to provide solutions for real time problems by using the C Language.

CO6. Apply contextual knowledge of data structures to design applications for societal applications like payroll systems, web applications, banking and financial systems.

Lab experiments:

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COURSE CONTENTS (UEC SCHEME)						
CS-3002	**Digital systems**	**L**	**T**	**P**	**C**	**Max. Marks**	**Min. Marks**
Duration	3 Hours	2	1	2	4	70	22

Course objective:
Students will try to learn:
1. To understand number representation and conversion between different representation in digital electronic circuits.
2. To analyze logic processes and implement logical operations using combinational logic circuits.
3. To understand characteristics of memory and their classification.
4. To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines.
5. To understand concept of Programmable Devices, PLA, PAL.

Syllabus:
Unit 1: Review of number systems and number base conversions. Binary codes, Boolean algebra, Boolean functions, Logic gates. Simplification of Boolean functions, Karnaugh map methods, SOP-POS simplification, NAND-NOR implementation.

Unit 2: Combinational Logic: Half adder, Half Subtractor, Full adder, Full Subtractor, look-ahead carry generator, BCD adder, Series and parallel addition, Multiplexer – de-multiplexer, encoder- decoder, arithmetic circuits, ALU

Unit 3 : Sequential logic: flip flops, D,T, S-R, J-K Master- Slave, racing condition, Edge & Level triggered circuits, Shift registers, Asynchronous and synchronous counters, their types and state diagrams. Semiconductor memories, Introduction to digital ICs 2716, 2732 etc. & their address decoding. Modern trends in semiconductor memories such as DRAM, FLASH RAM etc. Designing with ROM and PLA.

Unit 4: Introduction to A/D & D/A convertors & their types, sample and hold circuits, Voltage to Frequency & Frequency to Voltage conversion. Multivabrator :Bistable, Monostable, Astable, Schmitt trigger, IC 555 & Its applications. TTL, PMOS, CMOS and NMOS logic. Interfacing between TTL to MOS.

Unit 5 : Introduction to Digital Communication: Nyquist sampling theorem, time division multiplexing, PCM, quantization error, introduction to BPSK & BFSK modulation schemes. Shannon's theorem for channel capacity.

Course outcome:
After successful completion of the course student will be able to
        1. Develop a digital logic and apply it to solve real life problems.
        2. Analyze, design and implement combinational logic circuits.
        3. Classify different semiconductor memories.
        4. Analyze, design and implement sequential logic circuits.

Reference books:
        1. Morris Mano, Digital Circuits & Logic Design, PHI
        2. Gothman, Digital Electronics, PHI
        3. Tocci, Digital Electronics, PHI
        4. Mavino& Leach, Digital Principles & Applications, PHI
        5. Taub and schilling, Digital Integrated electronics.
        6. Simon Haykin, Introductionto Analog& Digital Communication, Wiley.
        7. Lathi B.P., Modern analog& digital communication , Oxford University.

List of Experiments:
1   To study & verify different types of logic gates.
2   To verify the De-Morgan's theorem and Boolean rules.
3   To study & verify universal logic gates.
4   To design the logic circuit of Even and Odd Parity Generator and Checker.
5   To study & design logic circuit for Half Adder and Full Adder.
6   To study & design logic circuit for Half Subtractor and Full Subtractor.
7   To study & verify the different types of Flip-Flop.
8   To study & verify the MUX and DE-MUX.
9   To study & verify the different Multivibrator.
10   To study & verify the Full Adder using 4x1 and 8x1 multiplexer.
11   To study & verify IC 555 Timer.

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COURSE CONTENTS (UEC SCHEME)							
CS-3003	**Discrete Structure**	**L**	**T**	**P**	**C**	**Max. Marks**	**Min. Marks**
Duration	4 Hours	3	1	0	4	70	22

Course Description

To identify the basic properties of Logic, Relation and Function, graphs and trees to model simple applications and to get familiar and understand the fundamental notions in discrete mathematics. Distinguish between the notion of discrete and continuous mathematical structures.

Syllabus:
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.

TEXT BOOKS:

- C.L.Liu And D.P.Mohapatra, " Elements Of Discrete Mathematics: A Computer Oriented Approach", Mcgraw Hill, Third Edition, 2012.

- Kenneth H. Rosen, "Discrete Mathematics And Its Applications" Mcgraw Hill, Seventh Edition, 2012 (Indian Adaptation By Kamala Krithivasan, Iit Madras).

REFERENCE:

- R. Balakrishnan and K. Ranganathan, "A Text Book Of Graph Theory", Springer

- Thomas Koshy, "Discrete Mathematics with Applications", Elsevier, 2009.

- Gary Haggard, John Schlipf, and Sue Whitesides, "Discrete Mathematics for Computer Science", Cengage Learning Publisher, 2005.

- B. Bollobás, "Modern Graph Theory", Springer, New York 1998

Course Outcome (CO):

CO1: Understand sets, relations, functions and discrete mathematical structures

CO2: Apply Propositional logic and first order logic to solve problems

CO3: Formulate and solve tree and graph problems

CO4: Formulate and Count discrete event occurrences and solve recurrence relations

BE III Semester **COMPUTER SCIENCE & Engg.**							
COURSE CONTENTS (UEC SCHEME)							
CS-3004	**Objected Oriented Programming Using JAVA**	**L**	**T**	**P**	**C**	**Max. Marks**	**Min. Marks**
Duration	5 Hours	2	1	2	4	70	22

Course Description
Java is a platform-independent object-oriented programming language used to create stand-alone applications and applets for the World Wide Web. This course gives the student a basic understanding of the Java language and its role in the Object Oriented World. The student creates simple applications and applets.

Course Objectives:
This course aims to :
- Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods, constructor etc.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
- Understand the principles of inheritance, packages and interfaces.

Syllabus:
Unit I:
Introduction to Object Oriented Programming:
Object Oriented Concepts, Merits of Object Oriented Technology. Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, Behaviour, Identity and messages. Concepts of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods.

Unit II:
Introduction to Java classes and objects: Java features: Java syntax, dada types, dada type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

Unite III:
Inheritance and Polymorphism: Class relationships: Inheritance and its types, merits and Demerits. Association inheritance, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

Unite IV:
Exception Handling and Multithreading: Exception: Need for exceptions, Checked Unchecked exceptions, creating exceptions. Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle.

Unite V:

Java I/O, Applets and Event Handling: Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling.

Books Recommended:

[1]   Cay S.Horstmann, *Core JAVA Vol-1,* Pearson Education.
[2]   Harbert Schildt, *The complete Reference,* Tata McGrow Hill
[3]   Scott W Amber, *The Object Primer,* Cambridge
[4]   Timothy, Budd, *Object Oriented Programming,* Pearson Education.
[5]   Kathy Sierra, *Bert Bates, Head First Java, 2nd* Edition, Oreilly

Course Outcomes :
After the completion of this course, students will be able to:
After the completion of this course, students will be able to:
- **CO1:** Understand basic concepts of object oriented programming.
- **CO2 :** Identify classes, objects, members of a class and relationships among them needed for a specific problem
- **CO3 :** Demonstrate the concepts of polymorphism and inheritance
- **CO4:** Understand various error handling techniques using exception handling.
- **CO5:** Apply the knowledge gained for their project work as well as to develop some GUI applications.

Lab experiments:
1. Write a program to show Concept of CLASS in JAVA.

2. Write a program to show Type Casting in JAVA

3. Write a program show the use of constructor with it's Overloading.

4. Write a program to demonstrate use of sub class and access modifiers.

5. Write a program to implement Inheritance & Polymorphism concept and demonstrate the use of Method overloading and overriding.

6. Write a program to implement multiple inheritances using interface in java.

7. Write a program to implement Abstract Class

8. Write a program to implement concept of packages:

   i.   Same package - No subclasses

   ii. Same package -   Subclasses

   iii. Different package - No subclasses

   iv. Different package   - Subclasses

9. Write a program to show How Exception Handling is in JAVA

10. Write a program to show "HELLO JAVA " in Explorer using Applet

11. Write a program to demonstrate multithreading using Java.

Course Outcomes:

- **CO1:** Improve their programming skills.
- **CO2:** Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
- **CO3 :** Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
- **CO4:** Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.
- **CO5:** Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.

BE IV Semester **COMPUTER SCIENCE & Engg.**							
COURSE CONTENTS (UEC SCHEME)							
CS-3005	**Web Design Workshop**	**L**	**T**	**P**	**C**	**Max. Marks**	**Min. Marks**
Duration	4 Hours	0	0	4	2	100	35

Course description and objectives:

On completion of this course, the student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers.

Syllabus:

Unit I

Introduction to HTML : HTML Common tags- Block Level and Inline Elements, Lists, Tables, Images, Forms, Frames; Cascading Style sheets, CSS Properties; Java Script: Introduction to Javascript, Objects in Javascript, Dynamic HTML with Javascript

Unit II

JDBC: Data Base, Database Schema, A Brief Overview Of The JDBC Process, JDBC Driver Types, JDBC Packages, Database Connection, Associating The JDBC-ODBC Bridge With Database, Creating, Inserting, Updating And Deleting Data In Database Tables, Result Set, Metadata.

Unit III

Web Servers and Servlets: Tomcat web server, Introduction to Servlets: Servlets, the Advantage of Servlets over "Traditional" CGI, Basic Servlet Structure, Simple Servlet Generating Plain Text, Compiling and Installing the Servlet, Invoking the Servlet, Lifecycle of a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Context Parameters, Handling Http Request & Responses, Using Cookies-Session Tracking, Servlet with JDBC.

Unit IV

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing, JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Declaring Variables and Methods , Sharing Data Between JSP pages, Users Passing Control and Data between Pages, JSP application design with JDBC, JSP Application Design with MVC.

Unit V

Introduction to PHP: Basics of PHP, Functions, Error Handling, Interaction between PHP and MySQL, Database using Forms,Using PHP to manipulate and Retrieve Data in MySQL.

TEXT BOOKS:

1. Jon Duckett "Beginning Web Programming" WROX.

2. Marty Hall and Larry Brown "Core Servlets and Java Server pages Vol. 1: Core

Technologies", Pearson.

REFERENCE BOOKS:

1. DanWoods and Gautam Guliani,"Open Source for the Enterprise: Managing Risks,

Reaping Rewards", O'Reilly, Shroff Publishers and Distributors, 2005.

2. Sebesta,"Programming world wide web" Pearson.

3. Dietel and Nieto,"Internet and World Wide Web – How to program",PHI/Pearson

Education Asia.

4. Murach,"Murach's beginning JAVA JDK 5", SPD

5. Wang,"An Introduction to web Design and Programming",Thomson

Course Outcomes:

1. Students are able to develop a dynamic webpage by the use of javascript and DHTML.
2. Students will be able to write a well formed / valid XML document.
3. Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
4. Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it in the database.
5. Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.

Laboratory Experiments

Sr.No	Name of Experiment	Remarks
1	Design web pages for your college containing a description of the courses, departments, faculties, library etc, use href, list tags	
2	Create your class timetable using table tag. Create user Student feedback form (use textbox, text area , checkbox, radiobutton, select box etc.)	
3	Write html code to develop a web page having two frames that divide the webpage into two equal rows and then divide the row into equal columns fill each frame with a different background color.	
4	Create your resume using HTML tags also experiment with colors, text , link , size and also other tags you studied.	
	CSS	
5	Design a web page of your home town with an attractive background color, text color, an Image, font etc. (use internal CSS). Use Inline CSS to format your resume that you created.	
6	Use External CSS to format your class timetable as you created. Use External, Internal, and Inline CSS to format college web page that you created.	
	JavaScript	
7	Develop a JavaScript to display today's date. Develop simple calculator for addition, subtraction, multiplication and division operation using JavaScript	
8	Create HTML Page with JavaScript which takes Integer number as input and tells whether the number is ODD or EVEN.	
9	Create HTML Page that contains form with fields Name, Email, Mobile No , Gender , Favorite Color and a button now write a JavaScript code to combine	

	and display the information in the textbox when the button is clicked.	
10	Implement Validation in above Feedback Form. Use regular expression for validation in Feedback Form. Using ajax retrieve data from a TXT file and display it.	

	XML	
11	Create XML file to store student information like Enrollment Number, Name , Mobile Number , Email Id. Create XSL file to convert above XML file into XHTML file.	
12	Create DTD for above XML File. Create XML Schema for above	

	PHP	
13	Write a php program to display today's date in dd-mm-yyyy format. Write a php program to check if number is prime or not. Write a php program to print first 10 Fibonacci Numbers. Create HTML page that contain textbox, submit / reset button. Write php program to display this information and also store into text file.	
14	Write a php script to read data from txt file and display it in html table (the file contains info in format Name: Password: Email)	
15	Write a PHP Script for login authentication. Design an html form which takes username and password from user and validate against stored username and password in file.	
16	Write PHP Script for storing and retrieving user information from MySql table. 1. Design an HTML page which takes Name, Address, Email and Mobile No. From user (register.php) 2. Store this data in Mysql database / text file. 3. Next page display all user in html table using PHP (display.php)	
17	Using ajax fetch information from a database with AJAX.	
18	Create a whole Website which contains above topics in Website.	