Minutes of Board of Studies Meeting
Date: 08.05.2020   **Time:** 11.00 am   **Mode**: Virtual
Zoom: Meeting ID: 931 3417 4161
Password: 484805

Minutes of the BOS Meeting -2020 held on 08-05-2020

Agenda:

1. Review of 2015 and 2019 curriculum.

2. Updating the course contents

3. Approval of Problem solving Techniques Lab, Code Optimization and Debugging-I, Green Computing, Cyber Forensics and Virtualization Techniques courses.

The Minutes of Meeting

The commencement of the meeting was inaugurated by Prof.Dr.T.Sasikala, Convener, Board of Studies. The board of members reviewed the 2015 and 2019 curriculum and decisions were made to incorporate the following changes in the curriculum.

- The contents of the courses "*Database Management System*" and "*Programming in Java*" have been changed based on the feedback received from students and faculty members.

- Based on the feedback received from faculty members, the course on *"Programming in C and C++*" has been moved from Semester 2 to Semester 1. In conjunction, the course on "*Python Programming*" is moved from Semester 1 to Semester 2.

- In order to improvise the content of the course, *"Programming in C and C++"*, the problem-solving concepts were introduced.

- The contents of the course *"Python Programming"* was also revised based on the feedback received from faculty and students.

- In continuance with *"Programming in C and C++"*, course, to practice the concepts learned, *"Problem solving Techniques Lab"* course, is introduced in Semester 1, and based on the comments received from the industrial experts and board members.

- Based on the recent technological advancements, it is essential to incorporate the innovative courses into the curriculum. With regard to this, suggestions were received from the industrial experts. Based on the suggestions received, the new courses namely "*Green Computing*", "*Cyber Forensics* "and "*Virtualization Techniques*" courses were introduced. The course contents of all the new courses were reviewed by the board members and approved.

- Further, to improvise the coding skill of the students, and to equip the students with skill-based learning, suggestions were given by the board members and industrial experts to include a lab course. In this regard, the *"Code Optimization and Debugging-I"* course has been included in Semester 3.

- The external members suggested to keep the basic concepts in the curriculum undisturbed. In addition, suggestions were given to incorporate functional programming, by bringing industrial experts to add additional insights to the students.
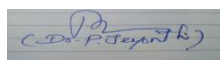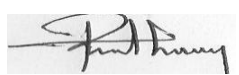
Convener: Dr.T.Sasikala, Dean, School of Computing

External Members:

Academic Expert

- Mr. Somasundaram, Vice President, Maveric Systems, Chennai.

- Dr.T.G.Sambanthan, Professor & Head, Department of Computer Science & Engineering NITTTR, Chennai.

- Mr.SingaraveluEkambaram, Sr.Vice President, Cognizant Technology Solutions, Chennai.

Internal Members:

- Dr.R.Subashini, Prof. and Head, IT

- Dr.P.Jeyanthi, Associate Professor, IT

- Dr.Maria Anu ,Associate Professor, IT

- Dr.S.Revathy, Associate Professor, IT

Note: <mark>Removed Contents are marked in Yellow color</mark> and Added Contents are marked in red color

SCS1306	DATABASE MANAGEMENT SYSTEM	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT 1   INTRODUCTION TO DATABASES   **9 Hrs.**
Databases and Databases users - Database system concepts and architecture - Data modeling using Entity Relationship (ER) Model. **Relational Model -** The Relational Data Model and Relational Database Constraints - The Relational Algebra and Relational Calculus.

UNIT 2   DATABASE DESIGN   **9 Hrs.**
Overview of the QBE Language - Overview of the Hierarchical Data Model - Overview of the Network Data Model - SQL-99: Schema Definition, Constraints, Queries, and Views- Functional Dependencies and Normalization for Relational Databases.

UNIT 3   QUERY PROCESSING   **9Hrs.**
Algorithms for Query Processing and Optimization - Introduction to Transaction Processing Concepts and Theory - Concurrency control techniques.

UNIT 4   RECOVERY AND SECURITY   **9Hrs.**
Database Recovery Techniques - Database Security - Distributed databases and Client- Server Architecture

UNIT 5   OBJECT DATABASE   **9Hrs.**
Concepts for Object Database - Enhanced Data Models for Advanced Application Emerging Database Technologies and Application
                                                                                            Max. 45 Hours

COURSE OUTCOMES
On completion of the course, student will be able to
CO1   : Construct ER model for a given application..
CO2   : Apply normalization on Relational Databases
CO3   : Demonstrate query optimization and concurrent transaction processing
CO4   : Analyse recovery techniques, security mechanism, fragmentation and load balancing of   databases.
CO5   : Design database using Object Oriented techniques...
CO6   : Create database for a specified application

TEXT / REFERENCE BOOKS
1. Elmasrl & Navathe - Fundamentals of Database Systems - 3rd Edition, 2nd Reprint, Addison Wesley, 2000

2. Abraham Silberschatz, Henry. F. Korth and S. Sudharshan "Database System Concepts", 4th Edition, 2002.

3. C. J. Date, "Introduction to database systems", Addison Wesley, 7th Edition, 2001.

4. Jan L. Harrington, "Object oriented database design", Harcourt India private limited

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100   **Exam Duration : 3 Hrs.**
PART A : 10 questions of 2 marks each- No choice   20 Marks
PART B : 2 questions from each unit of internal choice, each carrying 16 marks   80 Marks

SCSA1301	DATABASE MANAGEMENT SYSTEMS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES
➢ To understand terms related to database design and management.
➢ To gain knowledge in relational model and relational database management system.
➢ To implement relational databases using SQL and My SQL.
➢ To understand database security and performance issues.
➢ To understand the basics of Data warehousing and Data mining.

UNIT 1-INTRODUCTION TO DATABASES   9 Hrs.
Databases and database users – Database system concepts and architecture – Data modeling using entity Relationship(ER) model – Enhanced ER model- Relational Model - The Relational Data Model and Relational Database Constraints - The Relational Algebra and Relational Calculus.

UNIT 2-DATABASE DESIGN   9 Hrs.
Overview of the Hierarchical Data Model - Overview of the Network Data Model – Relational database design: Mapping ER Model to Relational Model - Commercial query languages: QBE – Functional dependency – Normalization.

UNIT 3-QUERY PROCESSING   9 Hrs.
SQL Queries -Embedded SQL -My SQL: Basics, Queries in MySQL and Algorithms for Query Processing and Optimization
- Introduction to Transaction Processing Concepts and Theory - Concurrency control techniques.

UNIT 4-RECOVERY AND SECURITY   9 Hrs.
Database Recovery Techniques - Database Security –Debate on the distributed databases and Client- Server Architecture with reference to Indian Railway Reservation System.

UNIT 5-OBJECT DATABASE AND CURRENT TRENDS   9 Hrs.
Concepts for Object Database - Emerging Database Technologies and Application - Introduction to Data warehousing & Data mining –Applications of Data mining.

Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Implement SQL to a broad range of query and data update problems.
CO2 - Articulate socio-economic applications of distributed databases and use database recovery mechanisms.
CO3 - Familiar with data warehousing and data mining applications.
CO4 - Apply Normalization techniques to normalize and improve the database design.

TEXT / REFERENCE BOOKS
1. Elmasri&Navathe, "Fundamentals of Database Systems", 6th Edition, Addison Wesley, 2011.
2. Abraham Silberschatz, Henry.F.Korth and S.Sudharshan, "Database System Concepts", 4th Edition, 2002.
3. Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques", 3rd Edition, Elsevier, 2012.
4. Jan L. Harrington, "Object oriented database design", Harcourt India private limited 2000.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   **Exam Duration: 3 Hrs.**
PART A: 10 Questions carrying 2 marks each – No choice   **20 Marks**
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks   **80 Marks**

SIT4201	PROGRAMMING IN JAVA (50 Theory + 50 Laboratory)	L	T	P	Credits	Total Marks
		2	0	4	4	100

The course covers both theoretical and practical aspects. Marks split-up for the subject is 50% Theory and 50% Practical. Award of marks for Theory section is based on the Continuous Internal Assessments and for the Laboratory section practical examination will be conducted as per the regular University norms.

The following topics are to be covered for effective coverage of the course objective:

Class Fundamentals, Method Overriding, Inheritance, Packages, Exception Handling, Multithreading, Wrapper Classes, Input and Output Stream Classes, Byte and Character Stream Classes, Utility Packages, Applets, Swings, Database Connectivity, Regular Expressions, Networking, Java Beans

Max. 60 Hours

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 : Comprehend OOP's concepts, Java programming constructs, and Class Library with examples.
CO2 : Develop programs with Exception Handling & Multithreading Concepts.
CO3 : Implement Java Wrapper Classes and Stream Classes.
CO4 : Develop applications using Java Classes for Utility and Networking.
CO5 : Develop applications using Applet & Swings.
CO6 : Create Real time application using JDBC Connectivity.

TEXT / REFERENCE BOOKS
1. Herbert Schildt, "Java the Complete Reference", 9th Edition, McGraw Hill Education, 2014
2. http://docs.oracle.com/javase/tutorial/

SITA1301	PROGRAMMING IN JAVA	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

➢ To introduce object oriented concepts in Java.
➢ To understand Packages, Interfaces and Multithreading Concepts.
➢ To understand lang, io packages.
➢ To understand the concepts involved internet application development.
➢ To understand the internet application design using swing controls.

UNIT 1-INTRODUCTION TO JAVA   9 Hrs.

Classes and Objects – Class Fundamentals – Declaring Objects – Methods – Constructors – Garbage Collection. Inheritance – Basics – Using Super – Method Overriding – Abstract Classes – Using final with inheritance. String Handling – String class – String buffer class.

UNIT 2-PACKAGES, INTERFACES AND THREADS   9 Hrs.

Introduction to Packages – User Defined Packages - Importing packages – Access protection – Interfaces – Exception Handling - Exception Types – Using try, catch, throw, throws and finally –Multithreading – JavaThreadModel – Main thread – Creating multiple thread – Thread priorities – Synchronization.

UNIT 3-LANG AND IO PACKAGES   9 Hrs.

Java. lang package - Wrapper Classes– Simple type wrappers – Using clone() and the Cloneable Interface -IO Package - Introduction – Input Stream and Output Stream classes - Data Output Stream and Data Input Stream classes –FileInput Stream – File Output Stream. - Reader and Writer Classes – File Reader and File Writer

UNIT 4-APPLET PROGRAMMING AND EVENT HANDLING   9 Hrs.

Applet Class – Applet basics – HTML APPLET tag – Passing parameters to applets -Delegation Event Model – Handling Mouse and Keyboard Events – Adapter Classes.

UNIT 5-SWINGS AND DATABASE CONNECTIVITY   9 Hrs.

Introduction-J Applet Class-J Label Control - J Text Field Control –J Button Control –J Checkbox Control-J Radio Button Control – J Combo Box Control – J tapped Pane Control-J ScrollPane Control – J Table. Introduction –Establishing Connection – Creation of Data Tables – Entering Data into the Tables- Table Updating .

                                                                      Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Develop application programs using java object oriented concepts. CO2 -
Implement the interface, package and multithread concepts.
CO3 - Implement various built in packages and its applications. CO4 -
Develop web based applications using applet programming. CO5 -
Implement Swing concepts in real time applications.
CO6 - Design the internet applications frontend and connect with backend using database connectivity.

TEXT / REFERENCE BOOKS

1. Herbert Schildt ,"The Complete Reference JAVA2", Fifth Edition, Tata Mcgraw Hill, 2017.
2. Bruce Eckel , "Thinking in Java", Pearson Education, Fourth Edition 2006.
3. Core Java Volume-I Fundamentals, 9th Edition, Cay Horstman and Grazy Cornell, Prentice Hall, 2013.
4. https://docs.oracle.com/javase/tutorial/.
5. https://www.tutorialspoint.com/java/.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 Questions carrying 2 marks each – No choice   **20 Marks**
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks   **80 Marks**

SCSA1202	PROGRAMMING WITH C AND C++	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

➢ To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ program.
➢ To demonstrate a thorough understanding of modular programming by designing programs which require the use of programmer-defined functions.
➢ To impart the knowledge about pointers which is the backbone of effective memory handling.
➢ To demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
➢ To analyze a problem and construct a C++ program that solves it.

UNIT 1-BASICS OF C PROGRAMMING   9 Hrs.
Introduction to C: Features of C - Structure of C program-Data Types-'C' Tokens-Input/output statements-Control Statement, Functions: – Types of Functions –Recursion.

UNIT 2-ARRAYS, STRINGS AND STRUCTURES   9 Hrs.
Arrays : Single and Multidimensional Arrays-– Array as Function Arguments, Strings: String Handling Functions, Structure: Nested Structures – Array of Structures – Structure as Function Argument–Function that Returns Structure, Union.

UNIT 3-POINTERS AND FILE PROCESSING   9 Hrs.
Pointers: Introduction, Arrays Using Pointers – Structures Using Pointers – Functions Using Pointer, Dynamic Memory Allocation, Storage Classes, File Handling in 'C'.

UNIT 4-OBJECT ORIETED PROGRAMMING CONCEPTS   9 Hrs.
Introduction-Procedure vs. object oriented programming-Concepts: Classes and Objects-Operator and Function Overloading-Inheritance-Polymorphism and Virtual Functions.

UNIT 5-TEMPLATES AND EXCEPTION HANDLING   9 Hrs
Function Templates and Class Templates – Name spaces – Standard Template Library - Casting – Exception Handling – case study.

                                                                     Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Develop simple applications in C using basic constructs.
CO2 - Design and Implement applications using arrays and strings.
CO3 - Develop and Implement applications using memory allocation and File concepts. CO4 -
Use proper class protection to provide security.
CO5 - Describe the reusability of code through Inheritance.
CO6 - Demonstrate the use of virtual functions to implement polymorphism.

TEXT / REFERENCE BOOKS

1. Deitel and Deitel, C how to Program, 7th Eition, Pearson Education, 2013.
2. Brian W.Kernighan and Dennis M.Ritchie, The C Programming Language, Pearson Education, 2015.
3. Yashavant Kanetkar, Understanding Pointers in C, 4th Revised and Updated Edition, Bbp Publications, 2008.
4. E Balagurusamy, Object Oriented Programming with C++, 3rd edition, Tata McGraw Hill, 2006.
5. Bhave, Object Oriented Programming with C++, Pearson Education, 2004.
6. John R Hubbard, "Programming with C++", Schaums Outline Series, McGraw Hill, 2nd edition, 2009.
7. BjarneStroustrup, Programming: Principles and Practice using C++, 1st Edition, Addison Wesley Publications, 2008.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100   **Exam Duration: 3 Hrs.**

PART A: 10 Questions carrying 2 marks each – No choice   **20 Marks**
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks   **80 Marks**

SCSA1104	PROBLEM SOLVING TECHNIQUES WITH C AND C++	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To learn the fundamentals of PST and methodologies which are essential for building good C/C++ programs.
- To demonstrate a thorough understanding of modular programming by designing programs which require the use of programmer-defined functions.
- To impart the knowledge about pointers which is the backbone of effective memory handling.
- To demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.

UNIT 1 INTRODUCTION TO COMPUTER PROBLEM SOLVING   9 Hrs.

Algorithms - Building blocks of algorithms (statements, control flow, functions) -Notation (pseudo code, flow chart) - Algorithmic problem solving for socio economic conditions in global perspectives - Simple strategies for developing algorithms (iteration, recursion) - Efficiency of algorithms.

UNIT 2 BASICS OF C PROGRAMMING   9 Hrs.

Introduction to C: Features of C - Structure of C program-Data Types-'C' Tokens-Input/output statements-Control Statement, Functions: – Types of Functions –Recursion.

Algorithms: Reversing the digits of a number - Generation of Fibonacci sequence- Factorial Computation.

UNIT 3   ARRAYS, STRINGS AND STRUCTURES   9 Hrs.

Arrays: Single and Multidimensional Arrays-– Array as Function Arguments, Strings: String Handling Functions, Structure: Nested Structures – Array of Structures – Structure as Function Argument– Function that Returns Structure, Union.

Algorithms: Sum of array elements- Removal of duplicates from an array-Finding the Kth smallest element.

UNIT 4   POINTERS AND FILE PROCESSING   9 Hrs.

Pointers: Introduction, Arrays Using Pointers – Structures Using Pointers – Functions Using Pointer, Dynamic Memory Allocation, Storage Classes, File Handling in 'C'.

Algorithms: Swap elements using Call by Reference – Sorting Arrays using pointers- Finding sum of array elements using Dynamic Memory Allocation.

UNIT 5 OBJECT ORIENTED PROGRAMMING CONCEPTS   9 Hrs.

Introduction-Procedure vs. object-oriented programming-Concepts: Classes and Objects-Operator & Function Overloading-Inheritance-Polymorphism and Virtual Functions.

Max.45 Hrs.

COURSE OUTCOMES

On completion of the course the student will be able to

CO1: Develop solutions for the given problem.
CO2: Design and Implement applications using arrays and strings.
CO3: Develop and Implement applications using memory allocation and File concepts.
CO4: Use proper class protection to provide security.
CO5: Describe the reusability of code through Inheritance.
CO6: Demonstrate the use of virtual functions to implement polymorphism.

TEXT / REFERENCE BOOKS

1. Dromey.R.G, "How to Solve it by Computer", Prentice-Hall of India, 8th Indian Reprint, 2008.
2. Aho.A.V.,Hopcroft.J.E and Ullman.J.D, "The Design and Analysis of Computer Algorithms", Pearson education, 2004.Deitel and Deitel, C how to Program, 7th Eition, Pearson Education, 2013.
3. Brian W.Kernighan and Dennis M.Ritchie, The C Programming Language, Pearson Education, 2015.
4. Bhave, Object Oriented Programming with C++, Pearson Education, 2004.
5. John R Hubbard, "Programming with C++", Schaums Outline Series, McGraw Hill, 2nd edition, 2009.
6. Bjarne Stroustrup, Programming: Principles and Practice using C++, 1st Edition, Addison Wesley Publications, 2008.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100   **Exam Duration : 3 Hrs.**

PART A : 10 Questions of 2 marks each-No choice   **20 Marks**

PART B : 2 Questions from each unit with internal choice, each carrying 16 marks   **80 Marks**

Minutes of Board of Studies Meeting

Date: 14.12.2020   **Time:** 11.00 am   **Mode:Virtual**

Minutes of the BOS Meeting -2020 held on 14-12-2020.

Agenda:

1. Review of 2015 and 2019 curriculum.
2. Updating the course contents of Existing Courses and Introduction of new courses

The Minutes of Meeting

The commencement of the meeting was inaugurated by Prof.Dr.T.Sasikala, Convener, Board of Studies. The board of members reviewed the 2015 and 2019 curriculum and decisions were made to incorporate the following changes in the curriculum.

- Contents of the following courses have been changed based on the feedback given by students and faculty members and students.

    1.Data Structures
    2.Data Structures lab
    3.Data Communication and Computer Networks
    4.Design and Analysis of algorithms
    5.Networking Lab

- The following new courses have been introduced based on the suggestions given by Board of Studies External members and the stakeholders - Alumni and Employer.

    1. *SCSA1204-Python programming*
    2. *SAIC4003-Society 5.0*
    3. *SCSA2402-Code Optimization and Debugging-II*

- In 2019 curriculum, Industry 4.0 is replaced with Society 5.0

Convener: Dr.T.Sasikala, Dean School of Computing

External Members:

Academic Expert
- Dr.T.G.Sambanthan, Professor & Head, Department of Computer Science & Engineering NITTTR, Chennai.

- Mr.SingaraveluEkambaram, Sr.Vice President, Cognizant Technology Solutions, Chennai.

- Mr. Somasundaram, Vice President, Maveric Systems, Chennai.

Internal Members:

- Dr.R.Subashini, Prof. and Head, IT

- Dr.P.Jeyanthi, Associate Professor, IT

- Dr.Maria Anu ,Associate Professor, IT

- Dr.S.Revathy, Associate Professor, IT

		L	T	P	Credits	Total Marks
SCS1103	**DATA STRUCTURES**	3	0	0	3	100

UNIT 1 INTRODUCTION   **9 Hrs.**

Introduction to algorithms - Recursion - Definition - Design Methodology and Implementation of recursive algorithms - Linear and binary recursion - recursive algorithms for factorial function - Fibonacci sequence - Tower of Hanoi - Tail recursion – Data Structures - Need - classification - operations - Array - characteristics - types - storage representations.

UNIT 2 SEARCHING AND SORTING TECHNIQUES   **9 Hrs.**

Basic concepts - List Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort - Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

UNIT 3 STACKS   **9 Hrs.**

Basic Stack Operations - Representation of a Stack using Arrays - Algorithm for Stack Operations - Stack Applications: Reversing list - Factorial Calculation - Infix to postfix Transformation - Evaluating Arithmetic Expressions.

UNIT 4 QUEUES   **9 Hrs.**

Basic Queue Operations - Representation of a Queue using array - Implementation of Queue Operations using Stack - Applications of Queues - Round robin Algorithm - Enqueue - Dequeue - Circular Queues - Priority Queues.

UNIT 5 LINKED LISTS   **9 Hrs.**

Introduction - Single linked list - Representation of a linked list in memory - Operations on a singly linked list - Merging two singly linked lists into one list - Reversing a singly linked list - Applications of singly linked list to represent polynomial expressions and sparse matrix manipulation - Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list - Circular Doubly Linked List.

Max. 45 Hours

COURSE OUTCOMES

On completion of the course, student will be able to

CO1   :   Solve problems using recursive algorithms.
CO2   :   Develop different searching and sorting algorithms.
CO3   :   Implement stack operations.
CO4   :   Solve problems using queues.
CO5   :   Create different types of Linked List and perform various operations.
CO6   :   Decide the appropriate data structure for a specified problem.

TEXT / REFERENCE BOOKS

1. Jean-Paul Tremblay, Paul G. Sorenson,'An Introduction to Data Structures with Application',, TMH, 2n d Edition.
2. Naps, Thomas L., and Bhagat Singh, "Introduction to Data Structure with Pascal", West Publishing Co., 1986.
3. Richard F, Gilberg, Forouzan, "Data Structures", Cengage, 2nd Edition.

END SEMESTER EXAM QUESTION PAPER PATTERN:

Max. Marks: 100	**Exam Duration: 3 hrs**
PART A: 2 Questions from each unit, each carrying 2 marks	20 Marks
PART B: 2 Questions from each unit with internal choice, each carrying 16 marks	80 Marks

SCSA1203	DATA STRUCTURES	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To impart the basic concepts of data structures and algorithms.
- To be familiar with writing recursive methods.
- To understand concepts about searching and sorting techniques.
- To implement basic concepts about stacks.
- To apply the concepts of queues and its types.

UNIT 1   INTRODUCTION TO ALGORITHMS   9 Hrs.
Introduction Data Structures - Need - classification - operations –Abstract data types (ADT)- Array - characteristics - types - storage representations. Array Order Reversal-Array Counting or Histogram-Finding the maximum Number in a Set, Recursion- Towers of Hanoi-Fibonacci series-Factorial.

UNIT 2   LINKED LISTS   9 Hrs.
Introduction - Singly linked list - Representation of a linked list in memory - Operations on a singly linked list - Merging two singly linked lists into one list - Reversing a singly linked list - Applications of singly linked list to represent polynomial - Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list - Circular Doubly Linked List

UNIT 3   STACKS   9 Hrs.
Basic Stack Operations - Representation of a Stack using Arrays - Algorithm for Stack Operations - Stack Applications: Reversing list - Factorial Calculation - Infix to postfix Transformation - Evaluating Arithmetic Expressions.

UNIT 4   QUEUES   9 Hrs.
Basic Queue Operations - Representation of a Queue using array - Applications of Queues - Round robin Algorithm - Enqueue - Dequeue - Circular Queues - Priority Queues.

UNIT 5   SEARCHING AND SORTING TECHNIQUES   9 Hrs.
Basic concepts - List Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort - Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

                                                                                                                Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the concept of recursive algorithms.
CO2 - Demonstrate the different types of data structures.
CO3 - Able to understand the operations on linear data structures.
 CO4 - Summarize searching and sorting techniques.
CO5 - Choose appropriate data structure as applied to specified problem definition.
CO6 - Understand and implement the applications of linear data structures.

TEXT / REFERENCE BOOKS
1. Jean-Paul Tremblay, Paul G. Sorenson,'An Introduction to Data Structures with Application', TMH, 2017.
2. Richard F, Gilberg, Forouzan, "Data Structures", Cengage, 2004, 2nd Edition.
3. Larry R. Nyhoff, ADTs, Data Structures, and Problem Solving with C++, Prentice Hall Edition, 2004.
4. Thomas H. Cormen, Charles E. Leiserson, "Introduction to Algorithms", 3rd Edition, 2010.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN
Max. Marks: 100   Exam Duration: 3 Hrs.
PART A: 10 Questions carrying 2 marks each – No choice   20 Marks
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks   80 Marks

SCS4102	DATA STRUCTURES LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

SUGGESTED LIST OF EXPERIMENTS
1. Program to insert and delete an element from an array.
2. Program to sort the elements using insertion sort.
3. Program to sort the elements using quick sort.
4. Program to sort the elements using merge sort.
5. Program to implement operations on a Singly linked list.
6. Program to implement operations on a doubly linked list.
7. Program to implement a Stack using an array.
8. Program to implement a Stack using a Linked list.
9. Program to implement Queue using an array.
10. Program to implement Queue using a Linked list.
11. Program to convert an infix expression to postfix expression.
12. Program to implement display elements of a queue according to their priority.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 : Solve various problems using Array Concept.
CO2 : Identify appropriate sorting algorithm for the given context.
CO3 : Solve Problems using Stack Data Structures.
CO4 : Solve real world problems, using Queue Data Structures.
CO5 : Develop applications using Linked lists.
CO6 : Apply the appropriate Data Structure for the given application.

SCSA2201	DATA STRUCTURES LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- To implement linear and non-linear data structures.
- To understand the different operations of search trees.
- To implement graph traversal algorithms.
- To get familiarized to sorting algorithms.
- To implement linear search and binary Search.

SUGGESTED LIST OF EXPERIMENTS

- Program to insert and delete an element in an array.
- Program to implement operations on a Singly linked list.
- Program to implement operations on a doubly linked list.
- Program to sort the elements using insertion sort.
- Program to sort the elements using quick sort.
- Program to sort the elements using merge sort.
- Program to implement a Stack using an array and Linked list.
- Program to implement Queue using an array and Linked list.
- Program to implement Circular Queue.
- Program to convert an infix expression to postfix expression.
- Program to implement display elements of a queue according to their priority.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Remembering the concept of data structures through ADT including List, Stack and Queues.
CO2 - Understand basic concepts about stacks, queues, lists, trees and graphs.
CO3 - Able to apply and implement various tree traversal algorithms and ensure their correctness.
CO4 - Ability to analyze algorithms and develop algorithms through step by step approach in solving problems with the help of fundamental data structures.
CO5 - Compare and contrast Array based and Link based applications of typical data structures such As Stacks and Queues.
CO6 - Design applications and justify use of specific linear data structures for various applications.

SCS1314	DATA COMMUNICATION	L	T	P	Credits	Total Marks
	AND COMPUTER NETWORKS	3	0	0	3	100

UNIT 1   DATA COMMUNICATION   9 Hrs.

Introduction to data communication - Network protocols & standards - Line configuration - Topology - Transmission mode - Categories of networks - OSI model - Layers of OSI model - TCP/IP Model - Transmission media- Guided media - Unguided media.

UNIT 2   DATALINK LAYER   9 Hrs.

Link layer services - Framing - Flow Control - Error control- Medium Access Control - Ethernet CSMA/CD - Token Ring - FDDI - Token Passing- Wireless LAN - CSMA/CA

UNIT 3   NETWORK LAYER   9 Hrs

Circuit Switching - Packet Switching - Routing - Distance Vector Routing - Link State Routing - Addressing- Subnetting - IPV4- IPV6- ARP - RARP - ICMP - IGMP - DHCP.

UNIT 4   TRANSPORT LAYER   9 Hrs.

TCP- UDP - Connection Management- Flow Control - Retransmission - Congestion Control - Detection and Avoidance.

UNIT 5   APPLICATION LAYER   9 Hrs.

Networking Devices - Repeaters - Switches - Bridges - Routers - Gateways- Domain Name System - FTP - WWW and HTTP - SNMP - SMTP - POP3 - IMAP - MIME.

Max. 45 Hours

COURSE OUTCOMES

On completion of the course, student will be able to:

CO1:   Understand and explain the concept of Data Communication and networks, layered architecture   and their applications.

CO2:   Evaluate data communication link considering elementary concepts of data link layer protocols for error detection and correction.

CO3:   Apply various network layer techniques for designing subnets and supernets and analyse packet flow on basis of routing protocols.

CO4:   Analyze and Set up protocol designing issues for Communication networks.

CO5:   Estimate the congestion control mechanism to improve quality of service of networking application

CO6:   Understand and design application layer protocols and internet applications such as network security, Email and DNS,

TEXT / REFERENCE BOOKS

1. Behrouz A. Fourouzan, "Data Communication and Networking", McGraw-Hill Education India Pvt. Ltd - New Delhi.

2. William Stallings, Data and Computer Communications (8th ed.), Pearson Education, 2007.

3. P.C. Gupta, Data Communications and Computer Networks, Prentice-Hall of India, 2006.

4. Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson.

5. L. L. Peterson and B. S. Davie, Computer Networks: A Systems Approach (3rd ed.), Morgan Kaufmann, 2003.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks : 100   Exam Duration : 3 Hrs.

PART A : 10 questions of 2 marks each- No choice   20 Marks

PART B : 2 questions from each unit of internal choice, each carrying 16 marks   80 Marks

SITA1401	DATA COMMUNICATION AND COMPUTER NETWORKS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES
- To understand the network architecture and protocols supported for connecting devices in a network.
- To gain the knowledge of framing in data link layer.
- To learn the functions of network layer and the routing strategies with their associated protocols.
- To introduce the protocols used for end to end packet delivery in transport layer.
- To understand the application layer protocols.

UNIT 1   DATA COMMUNICATION   9 Hrs.
Introduction to data communication - Network protocols & standards - Line configuration - Topology -Transmission mode - Categories of networks - OSI model - Layers of OSI model - TCP/IP Model – Transmission media - Guided media - Unguided media- Switching-Circuit Switching - Packet Switching.

 UNIT 2 DATALINK LAYER   9 Hrs.
Error detection and correction– Line Discipline - Flow Control - Error control- Medium Access Control – Ethernet - CSMA/CD - Wireless LAN - CSMA/CA – IEEE 802.11, Bluetooth.

UNIT 3   NETWORK LAYER   9 Hrs.
Routing - Distance Vector Routing - Link State Routing - Addressing-Subnetting - IPV4- IPV6- ARP - RARP - ICMP - IGMP - DHCP.- Networking Devices - Repeaters - Switches - Bridges - Routers – Gateways.

 UNIT 4 TRANSPORT LAYER   9 Hrs.
TCP- UDP - Connection Management - Flow Control - Retransmission - Congestion Control – Leaky bucket algorithm - Detection and Avoidance.

 UNIT 5 APPLICATION LAYER   9 Hrs.
Message Handling System(MHS) – FTAM – Virtual Terminal (VT) – Domain Name System - FTP - WWW and HTTP - SNMP - SMTP – POP3 - IMAP – MIME -TELNET
                                                                                   Max. 45 Hrs.

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 - Describe the architecture of a computer network and explain how each device in a network communicates with each other.
CO2 - Explain packet collision in the link layer and how they are corrected.
CO3 - Design a routing protocol in a network and demonstrate how data packet will reach to the intended destination. CO4 -
Implementation of flow control mechanism to regulate the traffic in a network.
CO5 - Describe IP addressing and explain its functions.
CO6 - Recognize various application layer protocols and its functions.

 TEXT / REFERENCE BOOKS
1. Behrouz A. Fourouzan, "Data Communication and Networking", Fifth Edition, McGraw-Hill Education India Pvt. Ltd - New Delhi., 2013.
2. William Stallings, Data and Computer Communications (8th ed.), Pearson Education, 2007.
3. P.C. Gupta, Data Communications and Computer Networks, Prentice-Hall of India, 2006.
4. Andrew S. Tanenbaum, "Computer Networks", Fifth Edition, Pearson, 2011.
5. L. L. Peterson and B. S. Davie, Computer Networks: A Systems Approach (3rd ed.), Morgan Kaufmann, 2003.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

 Max. Marks: 100   Exam Duration: 3 Hrs.
PART A: 10 Questions carrying 2 marks each – No choice   20 Marks
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks 80 Marks

		L	T	P	Credits	Total Marks
SCS1206	**DESIGN AND ANALYSIS OF ALGORITHM**	3	0	0	3	100

UNIT 1 INTRODUCTION 9 Hrs.
Fundamentals of Algorithmic Problem Solving - Time Complexity - Space complexity with examples - Growth of Functions - Asymptotic Notations: Big Oh, Little Oh, Omega, Theta - Properties - Complexity Analysis Examples - Performance measurement - Instance Size, Test Data, Experiment setup.

UNIT 2 MATHEMATICAL FOUNDATIONS 9 Hrs.
Solving Recurrence Equations - Substitution Method - Recursion Tree Method - Master Method - Best Case - Worst Case - Average Case Analysis - Sorting in Linear Time - Lower bounds for Sorting - Counting Sort - Radix Sort - Bucket Sort

UNIT 3 DESIGN OF ALGORITHMS - BRUTE FORCE AND DIVIDE-AND-CONQUER 9 Hrs.
Brute Force - Travelling Salesman Problem - Knapsack Problem - Assignment Problem - Closest Pair and Convex Hull Problems - Divide and Conquer Approach - Binary Search - Quick Sort - Merge Sort - Strassen's Matrix Multiplication.

UNIT 4 DESIGN OF ALGORITHMS - DYNAMIC PROGRAMMING AND GREEDY APPROACH 9 Hrs.
Dynamic Programming - Floyd Warshall Algorithm - Optimal Binary Search Algorithms - Greedy Approach - Huffman Code - Kruskal's Algorithm - Prim's Algorithm - Dijkstra's Algorithm

UNIT 5 DESIGN OF ALGORITHMS - BACKTRACKING AND BRANCH AND BOUND 9 Hrs.
Backtracking - 8 Queens - Hamiltonian Circuit Problem - Branch and Bound - Assignment Problem - Knapsack Problem - Travelling Salesman Problem - NP Complete Problems - Clique Problem - Vertex Cover Problem

Max. 45 Hours

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 : Analyze the efficiency of an algorithm based on time and space complexity.
CO2 : Apply mathematical principles for recursive analysis.
CO3 : Construct algorithms based on brute force and divide and conquer techniques and its real time applications.
CO4 : Design Solutions using dynamic and greedy approaches for real world problems.
CO5 : Design a solution by using Branch and Bound and backtracking techniques.
CO6 : Develop a solution for any given problem by choosing appropriate algorithm.

TEXT / REFERENCE BOOKS
1. Sartaj Sahni, "Data Structures, Algorithms, and Applications in C++", McGraw Hill, 2n d Edition, 2005.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
3. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.
4. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
5. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.
6. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100 Exam Duration: 3 Hrs.
PART A: 2 Questions from each unit, each carrying 2 marks 20 Marks
PART B: 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

SCSA1403	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

➢ To analyze the performance of algorithms under various scenarios.
➢ To learn mathematical background for algorithm analysis & solving the recurrence equations.
➢ To learn various algorithm design techniques.
➢ To understand and apply the algorithms.

UNIT 1-INTRODUCTION   9 Hrs.

Fundamentals of Algorithmic Problem Solving - Time Complexity - Space complexity with examples - Growth of Functions - Asymptotic Notations: Need, Types - Big Oh, Little Oh, Omega, Theta - Properties - Complexity Analysis Examples - Performance measurement - Instance Size, Test Data, Experimental setup.

UNIT 2-MATHEMATICAL FOUNDATIONS   9 Hrs.

Solving Recurrence Equations - Substitution Method - Recursion Tree Method - Master Method - Best Case - Worst Case - Average Case Analysis - Sorting in Linear Time - Lower bounds for Sorting: - Counting Sort - Radix Sort - Bucket Sort.

UNIT 3-BRUTE FORCE AND DIVIDE-AND-CONQUER   9 Hrs.

Brute Force:- Travelling Salesman Problem - Knapsack Problem - Assignment Problem - Closest Pair and Convex Hull Problems - Divide and Conquer Approach:- Binary Search - Quick Sort - Merge Sort - Strassen's Matrix Multiplication.

UNIT 4-GREEDY APPROACH AND DYNAMIC PROGRAMMING   9 Hrs.

Greedy Approach:- Optimal Merge Patterns- Huffman Code - Job Sequencing problem- -- Tree Vertex Splitting Dynamic Programming:– Dice Throw-- Optimal Binary Search Algorithms.

UNIT 5-BACKTRACKING AND BRANCH AND BOUND   9 Hrs.

Backtracking:- 8 Queens - Hamiltonian Circuit Problem - Branch and Bound - Assignment Problem - Knapsack Problem:- Travelling Salesman Problem - NP Complete Problems - Clique Problem - Vertex Cover Problem .

Max. 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1 - Determine the suitable algorithmic design technique for a given problem. CO2 -
Identify the limitations of algorithms in problem solving.
CO3 - Analyze the efficiency of the algorithm based on time and space complexity.
CO4 - Implement asymptotic notations to analyze worst-case and average case running times of algorithms.
CO5 - Interpret the fundamental needs of algorithms in problem solving.
CO6 - Describe the various algorithmic techniques and its real time applications.

TEXT / REFERENCE BOOKS

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms David E. Goldberg, "Genetic Algorithm In Search Optimization And Machine Learning" Pearson Education India, 2013.
3. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2012.
4. Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second Edition, Universities Press, 2007.

END SEMESTER EXAMINATION QUESTION PAPER
PATTERN

Max. Marks:100   **Exam Duration: 3 Hrs.**

PART A: 10 Question of 2 marks each – No choice   **20 Marks**
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks   **80 Marks**

SCS4304	NETWORKING LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Creation of Date Server, and also print the client's address on the Server.
2. Creation of UDP Server
3. Creation of Chat Program
4. Calculation of Checksum for packet data and file.
5. Program to implement HTTP Protocol
6. Creation of Mail Client
7. Creation of Web Server
8. Creation of TELNET Protocol
9. Implement FTP using TCP
10. WiFi Simulation
11. WiTotal Simulation
12. Router Configuration

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 : Comprehend the different aspects of client-server networks and User Datagram Protocol (UDP) server models.
CO2 : Make use of HTTP protocol over the internet and examine the formation, transmission in the web servers..
CO3 : Develop a web server with the open source software
CO4 : Implement File Transfer Protocol to communicate with remote server.
CO5 : Design access points for a location using wi-fi Simulation.
CO6 : Create and configure Router to communicate one network to another network.

SITA2401	NETWORKING LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES

- ➢ To understand how to implement socket programming.
- ➢ To be familiar with simulation tools.
- ➢ To understand how to create applications using TCP and UDP.
- ➢ To gain Knowledge on various networking protocols.

SUGGESTED LIST OF EXPERIMENTS

1. Study of Socket Programming and Client – Server model.
2. Creation of Date Server, and also print the client's address on the Server.
3. Applications using TCP Sockets like.
   a. Echo client and echo server b. Chat c. File Transfer
4. Applications using TCP and UDP Sockets like.
   a. DNS b. SNMP c. File Transfer
5. Calculation of Checksum for packet data and file.
6. Program to implement HTTP Protocol.
7. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
8. Simulating PING and TRACEROUTE commands.
9. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
10. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
    i. Link State routing ii. Flooding iii. Distance vector
11. WiFi Simulation.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Analyze the performance of the protocols in different layers. CO2 -
Implement various protocols.

CO3 - Design with simulation tools.

CO4 - Analyze various routing algorithms. CO5 -
Construct Wi-Fi model.

CO6 - Understand socket programming.