



Structure of Computer Science/Information Technology (IT) Syllabus

Semester	Paper	Subject	Hrs.	Credits	IA	ES	Total
FIRST YEAR							
SEMESTER I	I	Computer Fundamentals and Photoshop	4	3	25	75	100
		Photo Shop Lab	2	2	50	0	50
SEMESTER II	II	Programming in C	4	3	25	75	100
		Programming in C Lab	2	2	50	0	50
SECOND YEAR							
SEMESTER III	III	Object Oriented Programming Using Java	4	3	25	75	100
		Object Oriented Programming Using Java Lab	2	2	50	0	50
SEMESTER IV	IV	Data Structures	4	3	25	75	100
		Data Structures using Java Lab	2	2	0	50	50
THIRD YEAR							
SEMESTER V	V	DBMS	3	3	25	75	100
		DBMS Lab	2	2	50	0	50
	VI	Software Engineering	3	3	25	75	100
		Software Engineering Lab	2	2	50	0	50
SEMESTER VI	VII	Web Technologies	3	3	25	75	100
		Web Technologies Lab	2	2	0	50	50
	VIII Cluster Elective - I Or Cluster Elective – II	Elective-I(cluster A)					
		1. Foundations of Data Science	3	3	25	75	100
		Foundations of Data Science Lab (through R)	2	2	0	50	50
		2. Big Data Technology	3	3	25	75	100
		Big Data Technology Lab (Hadoop)	2	2	0	50	50
		3. Computing for Data Analytics	3	3	25	75	100
		Computing for Data Analytics Lab using R	2	2	0	50	50
			Elective-II(cluster B)				
			1. Distributed Systems	3	3	25	75
		Distributed Systems Lab	2	2	0	50	50
		2. Cloud Computing	3	3	25	75	100
		Coud Computing Lab	2	2	0	50	50
		3. Cryptography and Network Security	3	3	25	75	100
		Cryptography and Network Security Lab	2	2	0	50	50
Note: II,IV,VI Semester practicals will be conducted by the University							



Structure of Computer Science/Information Technology (IT) Syllabus

I YEAR 1 SEMESTER

Computer Fundamentals & Photoshop

Course Outcome

To explore basic knowledge on computers and Photoshop's beauty from the practical to the painterly artistic and to understand how Photoshop will help you create your own successful images.

UNIT-I:

Introduction to computers, characteristics and limitations of computer, Block diagram of computer, types of computers, uses of computers, computer generations. Number systems :binary, hexa and octal numbering system.

UNIT-II:

Input and output devices: Keyboard and mouse, inputting data in other ways, Types of Software: system software, Application software, commercial, open source, domain and free ware software, Memories: primary, secondary and cache memory. Windows basics: desktop, start menu, icons.

Unit –III

Introduction to Adobe Photoshop, Getting started with Photoshop, creating and saving a document in Photoshop, page layout and back ground, Photoshop program window-title bar, menu bar, option bar, image window, image title bar, status bar, ruler, palettes, tool box, screen modes, saving files, reverting files, closing files.

Unit –IV

Images: working with images, image size and resolution, image editing, colour modes and adjustments, Zooming & Panning an Image,, , Rulers, Guides & Grids- Cropping & Straightening an Image, image backgrounds ,making selections.

Working with tool box: working with pen tool, save and load selection-working with erasers-working with text and brushes-Colour manipulations: colour modes- Levels – Curves - Seeing Colour accurately - Patch tool – Cropping-Reading your palettes - Dust and scratches- Advanced Retouching- smoothing skin

Unit-V

Filters: The filter menu, Working with filters- Editing your photo shoot, presentation –how to create adds, artistic filter, blur filter, brush store filter, distort filters, noise filters, pixel ate filters, light effects, difference clouds, sharpen filters, printing.



Structure of Computer Science/Information Technology (IT) Syllabus

Reference Books:

1. Fundamentals of Computers by Reema Thareja from Oxford University Press
2. Adobe Photoshop Class Room in a Book by Adobe Creative Team.
3. Photoshop: Beginner's Guide for Photoshop - Digital Photography, Photo Editing, Color Grading & Graphic...19 February 2016 by David Maxwell

Student Activity:

1. **Design a poster for technical paper presentation.**
2. **Create a digital scrap book.**

Photo Shop Lab

1. Create your Visiting card
2. Create Cover page for any text book
3. Create a Paper add for advertising of any commercial agency
4. Design a Passport photo
5. Create a Pamphlet for any program to be conducted by an organization
6. Create Broacher for you college
7. Create Titles for any forthcoming film
8. Custom shapes creation
9. Create a Web template for your college
10. Convert color photo to black and white photo
11. Enhance and reduce the given Image size
12. Background changes
13. Design Box package cover
14. Design Texture and patterns
15. Filter effects & Eraser effects



Structure of Computer Science/Information Technology (IT) Syllabus

I YEAR II SEMESTER

Paper-II : PROGRAMMING IN C

Course Objectives

1. Learn how to solve common types of computing problems.
2. Learn data types and control structures of C
3. Learn to map problems to programming features of C.
4. Learn to write good portable C programs.

Course Outcomes

Upon successful completion of the course, a student will be able to:

1. Appreciate and understand the working of a digital computer
2. Analyze a given problem and develop an algorithm to solve the problem
3. Improve upon a solution to a problem
4. Use the 'C' language constructs in the right way
5. Design, develop and test programs written in 'C'

UNIT I

Introduction to Algorithms and Programming Languages: Algorithm – Key features of Algorithms, Flow Charts.

Introduction to C: Introduction – Structure of C Program – Writing the first C Program – File used in C Program – Compiling and Executing C Programs – Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C- Operators in C- Programming Examples – Type Conversion and Type Casting

UNIT II

Decision Control and Looping Statements: Introduction to Decision Control Statements – Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement

UNIT III

Arrays: Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array, Operations on Array: One dimensional array, Two dimensional Arrays, Multidimensional Arrays.

Strings: Introduction, Characters, String handling functions.

Functions: Introduction – using functions – Function declaration/ prototype – Function definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions.

UNIT IV

Pointers: Understanding Computer Memory – Introduction to Pointers – declaring Pointer Variables - - Passing Arguments to Functions using Pointer – Pointer and Arrays – Passing Array to Function.

Structure, Union, and Enumerated Data Types: Introduction – Nested Structures – Arrays of Structures – Structures and Functions – Unions – Enumerated Data Types



Structure of Computer Science/Information Technology (IT) Syllabus

UNIT V

Files: Introduction to Files – Using Files in C – Reading Data from Files – Writing Data from Files – Detecting the End-of-file – Error Handling during File Operations – Accepting Command Line Arguments.

REFERENCE BOOKS

1. Introduction to C programming by REEMA THAREJA from OXFORD UNIVERSITY PRESS
2. E Balagurusamy: —COMPUTING FUNDAMENTALS & C PROGRAMMING – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.
3. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.
4. Henry Mullish & Huubert L.Cooper: The Spirit of C An Introduction to modern Programming, Jaico Pub. House,1996.

Student Activity:

1. Write a program for preparing the attendance particulars of students of your college at the end of semester according to following guidelines
 - a. Above 75 % promoted
 - b. Above 65% condoned
 - c. Below 65% detained
2. Write a program for creating timetable or your class taking work load of faculty into consideration.



Structure of Computer Science/Information Technology (IT) Syllabus

PROGRAMMING IN C LAB

1. Find out the given number is perfect number or not using c program.
2. Write a C program to check whether the given number is Armstrong or not.
3. Write a C program to find the sum of individual digits of a positive integer.
4. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to print the Fibonacci series
5. Write a C program to generate the first n terms of the Fibonacci sequence.
6. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7. Write a C program to find both the largest and smallest number in a list of integers.
8. Write a C program that uses functions to perform the following:
 - a. Addition of Two Matrices
 - b. Multiplication of Two Matrices
9. Write a program to perform various string operations
10. Write C program that implements searching of given item in a given list
11. Write a C program to sort a given list of integers in ascending order



Structure of Computer Science/Information Technology (IT) Syllabus

II YEAR III SEMESTER

Paper-III : OBJECT ORIENTED PROGRAMMING USING JAVA

Course Objectives

As the business environment becomes more sophisticated, the software development (software engineering is about managing complexity) is becoming increasingly complex. As of the best programming paradigm which helps to eliminate complexity of large projects, Object Oriented Programming (OOP) has become the predominant technique for writing software in the past decade. Many other important software development techniques are based upon the fundamental ideas captured by object-oriented programming.

Course Outcomes

At the end of this course student will:

1. Understand the concept and underlying principles of Object-Oriented Programming
2. Understand how object-oriented concepts are incorporated into the Java programming language
3. Develop problem-solving and programming skills using OOP concept
4. Understand the benefits of a well structured program
5. Develop the ability to solve real-world problems through software development in high-level programming language like Java
6. Develop efficient Java applets and applications using OOP concept
7. Become familiar with the fundamentals and acquire programming skills in the Java language.

UNIT – I

FUNDAMENTALS OF OBJECT – ORIENTED PROGRAMMING: Object Oriented paradigm –Basic concepts of Object Oriented Programming – Benefits of OOP –Applications of OOP.

Overview of Java Language: Simple Java Program – Java Program Structure – Java Tokens- Java Statements – Implementing a Java Program – Java Virtual Machine – Command Line Arguments.

Constants, Variables and Data types: Constants – Variables – Data types – Declaration of Variables-Giving Values to variables- Scope of Variables-Symbolic Constants-Type Casting.



Structure of Computer Science/Information Technology (IT) Syllabus

UNIT – II

Operators and Expressions: Arithmetic Operators – Relational Operators- Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operators – Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Operators – Operator Precedence and Associativity.

Decision Making and Branching: Decision Making with If statement – Simple If Statement-If else Statement-Nesting If Else Statement- the Else If Ladder-The switch Statement – The ?: operator.

Decision Making and Looping: The while statement – The do statement – The for statement – Jumps in Loops, labelled loops.

UNIT – III

Class, Objects and Methods: Defining a Class – Fields Declaration – Methods Declaration – Creating Objects – Accessing class members – Constructors – Methods Overloading – Static Members – Nesting of Methods, Inheritance – Overriding Methods – Final Variables and Methods – Final Classes – Abstract Methods and Classes – Visibility Control.

Arrays, Strings and Vectors: One-dimensional Arrays-creating an Array – Two dimensional Arrays – Strings – Vectors – Wrapper Classes – Enumerated Types.

UNIT – IV

Interfaces: Multiple Inheritance - Defining Interfaces – Extending Interfaces – Implementing Interfaces – Accessing Interface Variables.

Packages: Java API packages – Using system Packages – Naming Conventions – Creating Packages – Accessing a Package – Using a Package – Adding a Class to a Package – Hiding Classes – Static Import.

Multithreaded Programming: Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread –Using Thread Methods –Thread Exceptions – Thread Priority – Synchronization.

UNIT - V

Managing Errors and Exceptions: Types of Errors – Exceptions – Syntax of Exception Handling Code – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions – Using Exceptions for debugging.

Applet Programming: How Applets differ from Applications – Preparing to write Applets – Building Applet Code – Applet Life Cycle – Creating an executable Applet – Designing a WebPage – Applet Tag – Adding Applet to HTML file – Running the Applet – More about Applet Tag – Passing parameters to Applets – Aligning the display – More about HTML tags – Displaying Numerical Values – Getting Input from the user.



Structure of Computer Science/Information Technology (IT) Syllabus

Reference Books:

1. E.Balagurusamy, Programming with JAVA, A primer, 3e, TATA McGraw-Hill Company.
2. John R. Hubbard, Programming with Java, Second Edition, Schaum's outline Series, TATA McGraw-Hill Company.
3. Deitel & Deitel. Java TM: How to Program, PHI (2007)
4. Java Programming: From Problem Analysis to Program Design- D.S Mallik
5. Object Oriented Programming Through Java by P. Radha Krishna, Universities Press (2008)

Student Activity:

1. Create a front end using JAVA for the student database created
2. Learn the difference between ODBC and JDBC



Structure of Computer Science/Information Technology (IT) Syllabus

OBJECT ORIENTED PROGRAMMING USING JAVA LAB

1. Write a program to perform various String Operations
2. Write a program on class and object in java
3. Write a program to illustrate Function Overloading & Function Overriding methods in Java
4. Write a program to illustrate the implementation of abstract class
5. Write a program to implement Exception handling
6. Write a program to create packages in Java
7. Write a program on interface in java
8. Write a program to Write Applets to draw the various polygons
9. Write a program which illustrates the implementation of multiple Inheritance using interfaces in Java



Structure of Computer Science/Information Technology (IT) Syllabus

II YEAR IV SEMESTER

Paper-IV: DATA STRUCTURES

Course Objectives

To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms..

Course Outcomes

After completing this course satisfactorily, a student will be able to:

1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
2. Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs.
3. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
4. Demonstrate different methods for traversing trees
5. Compare alternative implementations of data structures with respect to performance
6. Compare and contrast the benefits of dynamic and static data structures implementations
7. Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack .
8. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.

UNIT I

Concept of Abstract Data Types (ADTs)- Data Types, Data Structures, Storage Structures, Primitive and Non-primitive Data Structures, Linear and Non-linear Data Structures.

Linear Lists – ADT, Array and Linked representations, Pointers.

Linked Lists: Single Linked List, Double Linked List, Circular Linked List , applications

UNIT II

Stacks: Definition, ADT, Array and Linked representations, Implementations and Applications

Queues: Definition, ADT, Array and Linked representations, Circular Queues, Dequeues, Priority Queues, Implementations and Applications.



Structure of Computer Science/Information Technology (IT) Syllabus

UNIT III

Trees: Binary Tree, Definition, Properties, ADT, Array and Linked representations, Implementations and Applications. Binary Search Trees (BST) – Definition, ADT, Operations and Implementations, BST Applications. Introduction to Threaded Binary Trees, Heap trees.

UNIT IV

Graphs – Graph and its Representation, Graph Traversals, Connected Components, Basic Searching Techniques, Minimal Spanning Trees

UNIT- V

Sorting and Searching: Selection, Insertion, Bubble, Merge, Quick, Heap sort, Sequential and Binary Searching.

REFERENCE BOOKS

1. D S Malik, Data Structures Using C++, Thomson, India Edition 2006.
2. Sahni S, Data Structures, Algorithms and Applications in C++, McGraw-Hill, 2002.
3. SamantaD, Classic Data Structures, Prentice-Hall of India, 2001.
4. Heilman G I,. Data Structures and Algorithms with Object-Oriented Programming, Tata McGraw-Hill. 2002. (Chapters I and 14).
5. Tremblay P, and Sorenson P G, Introduction to Data Structures with Applications, Tata McGraw-Hill,

Student activity:

1. **Create a visible stack using C-graphics**
2. **Create a visible Queue using C-graphics**



Structure of Computer Science/Information Technology (IT) Syllabus

DATA STRUCTURES USING JAVA LAB

1. Write a Program to implement the Linked List operations
2. Write a Program to implement the Stack operations using an array.
3. Write Programs to implement the Queue operations using an array.
4. Write Programs to implement the Stack operations using a singly linked list.
5. Write Programs to implement the Queue operations using a singly linked list.
6. Write a program for arithmetic expression evaluation
7. Write a program to implement Double Ended Queue using a doubly linked list.
8. Write a program to search an item in a given list using Linear Search and Binary Search
9. Write a program for Quick Sort
10. Write a program for Merge Sort
11. Write a program on Binary Search Tree operations(insertion, deletion and traversals)
12. Write a program for Graph traversals



Structure of Computer Science/Information Technology (IT) Syllabus

III YEAR V SEMESTER

Paper-V: Data Base Management System

Course Objective:

Design & develop database for large volumes & varieties of data with optimized data processing techniques.

Course Outcomes

On completing the subject, students will be able to:

1. Design and model of data in database.
2. Store, Retrieve data in database.

UNIT I

Overview of Database Management System: Introduction, Data and information, Database, Database management System, Objectives of DBMS, Evaluation of Database management System, Classification of Database Management System, file-based system, Drawbacks of file-Based System, advantages of DBMS, Data models, Database Architecture.

UNIT II

Relational Model: Introduction, CODD's Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra.

UNIT III

Entity-Relationship Model: Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, IS A relationship and attribute inheritance, multiple inheritance, advantages of ER modelling.

UNIT IV

Structured Query Language: Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Table Truncation, Imposition of Constraints, Join Operation, Set Operations, View, Sub Query, Embedded SQL,

UNIT V

PL/SQL: Introduction, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Cursors, Steps to create a Cursors, Procedure, Function, Exceptions Handling.



Structure of Computer Science/Information Technology (IT) Syllabus

Text Book:

1. Fundamentals of Relational Database Management Systems by S. Sumathi, S. Esakkirajan, Springer Publications

Reference Books

1. “Database System Concepts” by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill, 2010,
2. “Database Management Systems” by Raghu Ramakrishnan, McGrawhill, 2002.
3. “An Introduction to Database Systems” by Bipin Desai.
4. “Principles of Database Systems” by J. D. Ullman.
5. “Fundamentals of Database Systems” by R. Elmasri and S. Navathe.

Student Activity:

1. **Create your college database for placement purpose.**
2. **Create faculty database of your college with their academic performance scores**

III YEAR V SEMESTER

DATABASE MANAGEMENT SYSTEMS LAB

1. Draw ER diagrams for train services in a railway station
2. Draw ER diagram for hospital administration
3. Creation of college database and establish relationships between tables
4. Write a view to extract details from two or more tables
5. Write a stored procedure to process students results
6. Write a program to demonstrate a function
7. Write a program to demonstrate Joins
8. Write a program to demonstrate of Aggregate functions
9. Creation of Reports based on different queries
10. Write a program to generate employee pay slip using PL/SQL.



Structure of Computer Science/Information Technology (IT) Syllabus

III YEAR V SEMESTER

Paper VI : Software Engineering

Course Objectives

The Objective of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

Course outcomes

1. Ability to gather and specify requirements of the software projects.
2. Ability to analyze software requirements with existing tools
3. Able to differentiate different testing methodologies
4. Able to understand and apply the basic project management practices in real life projects
5. Ability to work in a team as well as independently on software projects

UNIT I

INTRODUCTION: Software Engineering Process paradigms - Project management - Process and Project Metrics – software estimation - Empirical estimation models - Planning - Risk analysis.

UNIT II

REQUIREMENTS ANALYSIS: Requirement Engineering Processes – Feasibility Study – Software Requirement Analysis – Analysis Concepts and Principles – Analysis Process – Analysis Model.

UNIT III

SOFTWARE DESIGN: Software design - Abstraction - Modularity - Software Architecture - Effective modular design - Cohesion and Coupling - Architectural design and Procedural design - Data flow oriented design.

UNIT IV

USER INTERFACE DESIGN AND REAL TIME SYSTEMS: User interface design - Human computer interaction - Human - Computer Interface design - Interface design - Interface standards.

UNIT V

SOFTWARE QUALITY AND TESTING: Software Quality Assurance - Software Reliability - Software testing - Path testing – Control Structures testing - Black Box testing - Integration, Validation and system testing.



Structure of Computer Science/Information Technology (IT) Syllabus

Text Books:

1. K.K. Aggarwal and Yogesh Singh,” Software Engineering”, New Age International, 01 Jan-2005.
2. Roger Pressman S., “Software Engineering: A Practitioner's Approach”, 5th Edition, McGraw Hill, 2010.

REFERENCE BOOKS:

1. Sommerville, “Software Engineering”, Eighth Edition, Pearson Education, 2007 .
2. Pfleeger, “Software Engineering-Theory & Practice”, 3rd Edition, Pearson Education, 2009.
3. Carlo Ghazi, Mehdi Jazayari, Dino Mandrioli, “Fundamentals of Software Engineering”, Pearson Education, 2003.

Student Activity:

1. **Visit any financial organization nearby and prepare requirement analysis report**
2. **Visit any industrial organization and prepare risk chart.**

**III YEAR V SEMESTER
Software Engineering Lab**

1. Studying various phases of Water-Fall Model.
2. Prepare SRS for Banking or On line book store domain problem
3. Using COCOMO model estimate effort for Banking or on line book store domain problem.
4. Calculate effort using FP oriented estimation model
5. Analyze the Risk related to the project and prepare RMMM plan.
6. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
7. Draw E-R diagram, DFD, CFD and STD for the project.
8. Design of the test cases.
9. Steps for requirement engineering process.



Structure of Computer Science/Information Technology (IT) Syllabus

III YEAR VI SEMESTER

Paper-VII : Web Technologies

Course Objective

- To provide knowledge on web architecture, web services, client side and server side scripting technologies to focus on the development of web-based information systems and web services.
- To provide skills to design interactive and dynamic web sites.

Course Outcome

1. To understand the web architecture and web services.
2. To practice latest web technologies and tools by conducting experiments.
3. To design interactive web pages using HTML and Style sheets.
4. To study the framework and building blocks of .NET Integrated Development Environment.
5. To provide solutions by identifying and formulating IT related problems.

Unit I

HTML: Basic HTML, Document body, Text, Hyper links, adding more formatting, Lists, Tables using images. **More HTML:** Multimedia objects, Frames, Forms towards interactive, HTML document heading detail.

Unit II

Cascading Style Sheets: Introduction, using Styles, simple examples, your own styles, properties and values in styles, style sheet, formatting blocks of information, layers.

Unit III

Introduction to JavaScript: What is DHTML, JavaScript, basics, variables, string manipulations, mathematical functions, statements, operators, arrays, functions. **Objects in JavaScript:** Data and objects in JavaScript, regular expressions, exception handling.

Unit IV

DHTML with JavaScript: Data validation, opening a new window, messages and confirmations, the status bar, different frames, rollover buttons, moving images.

Unit V

XML: defining data for web applications, basic XML, document type definition, presenting XML, document object model. Web Services.



Structure of Computer Science/Information Technology (IT) Syllabus

References:

1. Harvey M. Deitel and Paul J. Deitel, “**Internet & World Wide Web How to Program**”, 4/e, Pearson Education.
2. Uttam Kumar Roy, Web Technologies from Oxford University Press
3. Jason Cranford Teague “**Visual Quick Start Guide CSS, DHTML & AJAX**”, 4e, “Pearson Education.
4. Tom Nerino Doli smith “**JavaScript & AJAX for the web**” Pearson Education 2007.
5. Joshua Elchorn “**Understanding AJAX**” Prentice Hall 2006.
6. Hal Fulton “**The Ruby Way**”, 2e, Pearson Education 2007.
7. David A. Black “**Ruby for rails**” Dreamtech Press 2006.
8. Bill Dudney, Johathan lehr, Bill Willies, Lery Mattingly “**Mastering Java Server Faces**” Wiely India 2006.

Student Activities:

1. **Prepare a web site for your college**
2. **Prepare your personal website**

Paper- VII : Web Technologies Lab

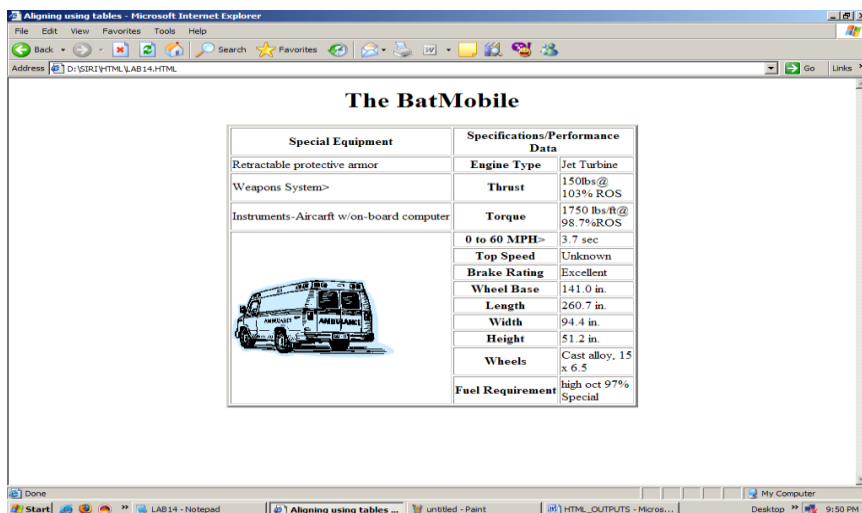
1. Write a HTML program illustrating text formatting.
2. Illustrate font variations in your HTML code.
3. Prepare a sample code to illustrate links between different sections of the page.
4. Create a simple HTML program to illustrate three types of lists.
5. Embed a real player in your web page.
6. Embed a calendar object in your web page.
7. Create an applet that accepts two numbers and perform all the arithmetic operations on them.
8. Create nested table to store your curriculum.
9. Create a form that accepts the information from the subscriber of a mailing system.



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B.Sc. Computer Science/Information Technology (IT) Syllabus Under CBCS

Structure of Computer Science/Information Technology (IT) Syllabus

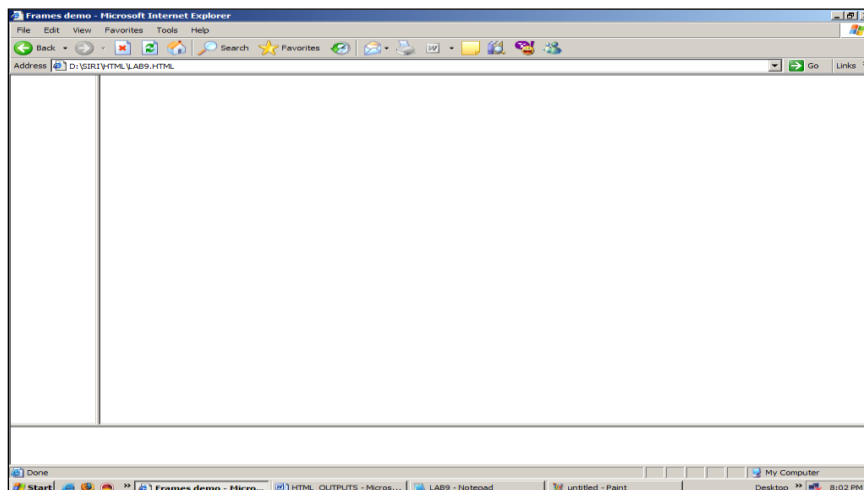
10. Design the page as follows:



11. Using "table" tag, align the images as follows:



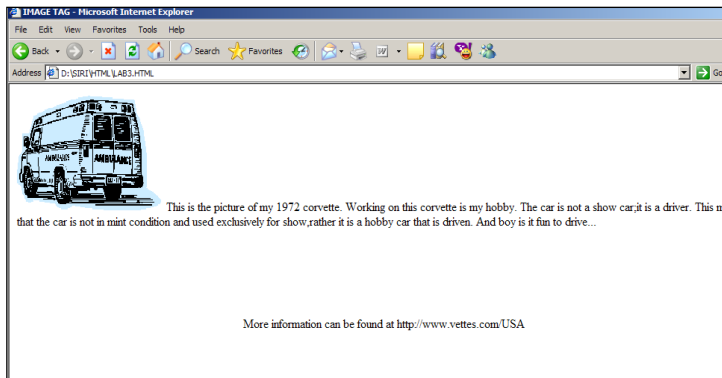
12. Divide the web page as follows:





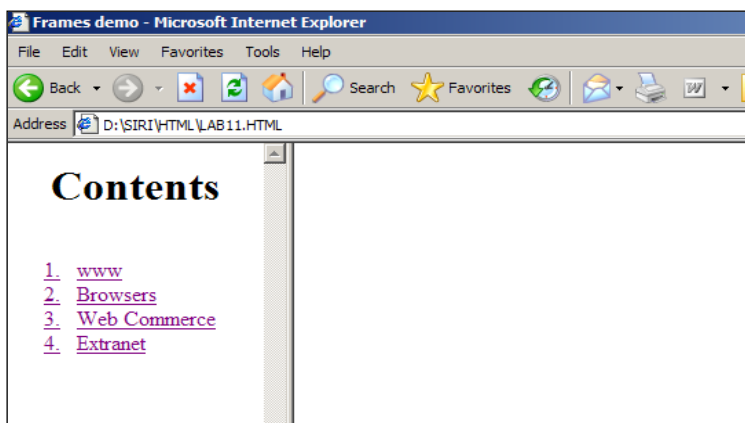
Structure of Computer Science/Information Technology (IT) Syllabus

13. Design the page as follows:



14. Illustrate the horizontal rulers in your page.

15. Create a help file as follows:



16. Create a form using form tags (assume the form and fields).
17. Create a webpage containing your biodata (assume the form and fields).
18. Write a HTML program including style sheets.
19. Write a HTML program to include audio or video into webpage.
20. Write a HTML program to layers of information in web page.
21. Create a static webpage.



Structure of Computer Science/Information Technology (IT) Syllabus

III YEAR VI SEMESTER

Cluster Elective VIIIA

Paper-VIII–A1 : Foundations of Data Science

Course Objectives

Modern scientific, engineering, and business applications are increasingly dependent on data, existing traditional data analysis technologies were not designed for the complexity of the modern world. Data Science has emerged as a new, exciting, and fast-paced discipline that explores novel statistical, algorithmic, and implementation challenges that emerge in processing, storing, and extracting knowledge from Big Data.

Course Outcomes

1. Able to apply fundamental algorithmic ideas to process data.
2. Learn to apply hypotheses and data into actionable predictions.
3. Document and transfer the results and effectively communicate the findings using visualization techniques.

UNIT I

INTRODUCTION TO DATA SCIENCE :Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – introduction to NoSQL.

UNIT II

MODELING METHODS :Choosing and evaluating models – mapping problems to machine learning, evaluating clustering models, validating models – cluster analysis – K-means algorithm.

UNIT III

INTRODUCTION TO R Language: Reading and getting data into R – ordered and unordered factors – arrays and matrices – lists and data frames.



Structure of Computer Science/Information Technology (IT) Syllabus

UNIT IV

MAP REDUCE: Introduction – distributed file system – algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce – Hadoop - Understanding the Map Reduce architecture.

UNIT V

DELIVERING RESULTS :Documentation and deployment – producing effective presentations– Introduction to graphical analysis – plot() function – displaying multivariate data.

Reference Books

- 1.Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.
- 2.Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014.
- 3.Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc., 2012.
- 4.W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.
- 5.Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014.
- 6.Nathan Yau, “Visualize This: The FlowingData Guide to Design, Visualization, and Statistics”, Wiley, 2011.
- 7.Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.

Student Activity:

1. **Collect data from any real time system and create clusters using any clustering algorithm**
2. **Read the student exam data in R perform statistical analysis on data and print results.**



Structure of Computer Science/Information Technology (IT) Syllabus

Paper-VIII- A1 Foundations of Data Science Lab

Objectives :

- R is a well-developed, simple and effective programming language which includes conditionals, loops, user defined recursive functions and input and output facilities.
- R has an effective data handling and storage facility,
- R provides a suite of operators for calculations on arrays, lists, vectors and matrices.
- R provides a large, coherent and integrated collection of tools for data analysis.

Outcomes:

- 1) At end student will learn to handle the data through R.
- 2) Student will familiar with loading and unloading of packages.

I. Installing R and R studio

II. Basic Operations in r

1. Arithmetic Operations
2. Comments and spacing
3. Logical Operators - <, <=, >, >=, =, !=, &&, 1

III.

1. Getting data into R, Basic data manipulation
2. Vectors, Matrices, operation on vectors and matrices.

IV.

1. Basic Plotting
2. Quantitative data
3. Frequency plots
4. Box plots
5. Scatter plot
6. 6. Categorical data
7. Bar charts
8. Pie charts

V. Loops and functions

1. if, if else, while, for break, next, repeat.

Basic functions- Print(), exp(), Log(), sqrt(), abs(), sin(), Cos(), tan(), factorial(), rand().



Structure of Computer Science/Information Technology (IT) Syllabus

Paper-VIII-A2 : BIG DATA TECHNOLOGY

Course Objective

The Objective of this course is to provide practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic and advanced methods to big data technology and tools, including MapReduce and Hadoop and its ecosystem.

Course Outcome

1. Learn tips and tricks for Big Data use cases and solutions.
2. Learn to build and maintain reliable, scalable, distributed systems with Apache Hadoop.
3. Able to apply Hadoop ecosystem components.

UNIT I

INTRODUCTION TO BIG DATA: Introduction – distributed file system – Big Data and its importance, Four V's in big data, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

UNIT II

INTRODUCTION HADOOP : Big Data – Apache Hadoop & Hadoop Eco-System – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

UNIT- III

HADOOP ARCHITECTURE: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode.



Structure of Computer Science/Information Technology (IT) Syllabus

UNIT-IV

Hadoop Map Reduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

UNIT-V

HIVE AND HIVEQL, HBASE:-Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries.

Reference Books

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide” , O Reilly 2012.
4. Vignesh Prajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.
5. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.
6. Jy Liebowitz, “Big Data and Business analytics”,CRC press, 2013.

Student Activity:

1. Collect real time data and justify how it has become Big Data
2. Reduce the dimensionality of a big data using your own map reducer



Structure of Computer Science/Information Technology (IT) Syllabus

Paper-VIII-A2 : BIG DATA TECHNOLOGY LAB

Objectives:

- Understand what Hadoop is
- Understand what Big Data is
- Learn about other open source software related to Hadoop

Outcomes:

- i) Get help on the various Hadoop commands
 - ii) Observe a Map-Reduce job in action
1. Implement the following Data Structures in Java
 - a) Linked Lists
 - b) Stacks
 - c) Queues
 - d) Set
 - e) Map
 2. (i) Perform setting up and Installing Hadoop in its three operating modes: Standalone
Pseudo distributed
Fully distributed
(ii) Use the web based tools to monitor your Hadoop setup.
 3. Implement the following file management tasks in Hadoop.

Adding files and directories
Retrieving files
Deleting files



Structure of Computer Science/Information Technology (IT) Syllabus

Paper-VIII-A3 : COMPUTING FOR DATA ANALYTICS

Course Objectives

The objective of this course is to teach fundamental concepts and tools needed to understand the emerging role of business analytics in Organizations.

Course Outcomes

1. Learn the Big Data in Technology Perspective.
2. Understanding of the statistical procedures most often used by practicing engineers
3. Understand Forecasting methods and apply for business applications.

UNIT – I

DATA ANALYTICS LIFE CYCLE: Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists - Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.

UNIT – II

STATISTICS Sampling Techniques : Data classification, Tabulation, Frequency and Graphic representation - Measures of central value - Arithmetic mean, Geometric mean, Harmonic mean, Mode, Median, Quartiles, Deciles, Percentile.

UNIT – III

PROBABILITY AND HYPOTHESIS TESTING: Random variable, distributions, two dimensional R.V, joint probability function, marginal density function. Random vectors - Some special probability distribution - Binomial, Poison, Geometric, uniform, exponential, normal, gamma and Erlang. Multivariate normal distribution.

UNIT – IV

PREDICTIVE ANALYTICS: Predictive modeling and Analysis - Regression Analysis, Multicollinearity , Correlation analysis, Rank correlation coefficient, Multiple correlation, Least square, Curve fitting and good ness of fit.



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UNIT – V

TIME SERIES FORECASTING AND DESIGN OF EXPERIMENTS :Forecasting Models for Time series : MA, SES, TS with trend, season - Design of Experiments, one way classification, two way classification, ANOVA, Latin square, Factorial Design.

Reference Books

1. Chris Eaton, Dirk Deroos, Tom Deutsch et al., “Understanding Big Data”, McGrawHill, 2012.
2. Alberto Cordoba , “Understanding the Predictive Analytics Lifecycle”, Wiley, 2014.
3. Eric Siegel, Thomas H. Davenport , “Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die”, Wiley, 2013.
4. James R Evans, “Business Analytics – Methods, Models and Decisions”, Pearson 2013.
5. R. N. Prasad, Seema Acharya, “Fundamentals of Business Analytics”, Wiley, 2015.
6. S M Ross, “Introduction to Probability and Statistics for Engineers and Scientists”, Academic Foundation, 2011.
7. David Hand, Heiki Mannila, Padhria Smyth, “Principles of Data Mining”, PHI 2013.
8. Spyros Makridakis, Steven C Wheelwright, Rob J Hyndman, “Forecasting methods and applications”, Wiley 2013(Reprint).

Student Activity:

1. **Collect temperatures of previous months and prepare a logic to estimate the temperature of next one week**
2. **Collect real time data and apply statistical techniques to classify it.**



Structure of Computer Science/Information Technology (IT) Syllabus

Paper-VIII –A3: COMPUTING FOR DATA ANALYTICS (R or SPSS) Lab

Objectives :

Understanding and application of statistics through applied data analysis. The statistical software R is a widely used and stable software that is free.

Outcomes: At end student will familiar with the following.

1. Measures of Centrality:-

- a) Mean
- b) Median
- c) Quantiles

Measures of relation (between two variables):-

- a) Covariance, S_{xy}
- b) Correlation, r

2. Discrete distributions:

- a) Mean and Variance
- b) Binomial distribution
- c) Hyper geometric distribution
- d) poison distribution

Continuous distribution

- a) Uniform distribution
- b) Normal distribution
- c) Exponential distribution

3. Covariance and correlation

4. Simple Linear regression

- a) Linear regression and least square
- b) Parameter estimates and estimators
- c) Variance of estimators.



Structure of Computer Science/Information Technology (IT) Syllabus

**III YEAR VI SEMESTER
(Cluster 2) Paper-VIII : Elective –B-1**

Distributed Systems

Course Objectives

- To expose the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.
- To discuss multiple levels of distributed algorithms, distributed file systems, distributed databases, security and protection.

Course Outcomes

- Create models for distributed systems.
- Apply different techniques learned in the distributed system.

UNIT I

Introduction to Distributed Computing Systems, System Models, and Issues in Designing a Distributed Operating System, Examples of distributed systems.

UNIT II

Features of Message Passing System, Synchronization and Buffering, Introduction to RPC and its models, Transparency of RPC, Implementation Mechanism, Stub Generation and RPC Messages, Server Management.

UNIT III

Introduction, Design and implementation of DSM system, Granularity and Consistency Model, Advantages of DSM, Clock Synchronization, Event Ordering, Mutual exclusion, Deadlock.

UNIT IV

Task Assignment Approach, Load Balancing Approach, Load Sharing Approach, Process Migration and Threads.

UNIT V

File Models, File Accessing Models, File Sharing Semantics, File Caching Schemes, File Replication, Atomic Transactions, Access control.

Reference Books

- 1.Pradeep. K. Sinha: “ Distributed Operating Systems: Concepts and Design ” , PHI, 2007.
- 2 .George Coulouris, Jean Dollimore, Tim Kindberg: “ Distributed Systems” , Concept and Design, 3rd Edition, Pearson Education, 2005.



Structure of Computer Science/Information Technology (IT) Syllabus

Student Activity

1. Implementation of Distributed Mutual Exclusion Algorithm.
2. Create a Distributed Simulation Environment.

Distributed Systems Lab

Objective:

It covers all the aspects of distributed system. It introduce its readers to basic concepts of middleware, states of art middleware technology

Outcomes:

1. Students will get the concepts of Inter-process communication
2. Students will get the concepts of Distributed Mutual Exclusion and Distributed Deadlock Detection algorithm.
1. To study client server based program using RPC.
2. To study Client server based program using RMI.
3. To study Implementation of Clock Synchronization (Logical/Physical)
4. To study Implementation of Election algorithm.
5. To study Implementation of Mutual Exclusion algorithms.
6. To write program multi-threaded client/server processes.
7. To write program to demonstrate process/code migration.



Structure of Computer Science/Information Technology (IT) Syllabus

III YEAR VI SEMESTER
(Cluster 2) Paper-VIII : Elective –B-2

Cloud Computing

Course Objectives:

The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

Course Outcomes

1. Compare the strengths and limitations of cloud computing
2. Identify the architecture, infrastructure and delivery models of cloud computing
3. Apply suitable virtualization concept.
4. Choose the appropriate cloud player , Programming Models and approach.
5. Address the core issues of cloud computing such as security, privacy and interoperability
6. Design Cloud Services and Set a private cloud

UNIT I

Introduction & Concepts: Introduction to cloud computing: introduction, characteristics of cloud computing, cloud models, cloud services examples, cloud-based services & applications.

Cloud Concepts & Technologies: Virtualization, Load Balancing, Scalability & Elasticity, Deployment, Replication, Monitoring, Software Defined Networking, Networking Function Virtualization, Map Reduce, Identity And Access Management, Service Level Agreements, Billing.

UNIT II

Cloud Services & Platforms: Compute Services, Storage Services, Database Services, Applications Services, Content Delivery Services, Analytics Services, Deployment & Management Services, Identity & Access Management Services, Open Source Private Cloud Software.

UNIT III

Cloud Application Design: Introduction, Design Considerations for Cloud Applications, Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.

UNIT IV



Structure of Computer Science/Information Technology (IT) Syllabus

Python Basics: Introduction, Installing Python, Python Data Types & Data Structures, Control flow, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes
163.

UNIT V

Python for Cloud: Python for Amazon Web Services, Python for Google Cloud Platform, Python for Windows Azure.

TEXT BOOK:

1. Cloud Computing A Hands On Approach By Arshdeep Bahga And Vijay Madisetti
From University Press.

Reference Books

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter TATA McGraw- Hill , New Delhi - 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
3. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
4. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press
5. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christenvecctiola, S Tammarai selvi, TMH

Student Activity:

1. Prepare the list of companies providing cloud services category wise.
2. Create a private cloud using local server

Cloud Computing Lab

Outcomes: Learner will be able to...

1. Appreciate cloud architecture
2. Create and run virtual machines on open source OS
3. implement Infrastructure , storage as a Service.

Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate.

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
 2. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
 3. Install a C compiler in the virtual machine and execute a sample program.
 4. Show the virtual machine migration based on the certain condition from one node to the other.
 5. Find procedure to install storage controller and interact with it.
1. Introduction to cloud computing.



Structure of Computer Science/Information Technology (IT) Syllabus

2. Creating a Warehouse Application in Sales Force.com.
3. Creating an Application in Sales Force.com using Apex programming Language.
4. Implementation of SOAP web services in C#/ JAVA Applications.
5. Implementation of Para- Virtualization using VM ware's workstation/ Oracle's Virtual Box and Guest O.S.
6. Case study: PAAS (Face book, Google App Engine)
7. Case Study: Amazon web services.



Structure of Computer Science/Information Technology (IT) Syllabus

III YEAR VI SEMESTER
(Cluster 2) Paper-VIII : Elective –B-3

Cryptography and Network Security

Course Objectives:

The student will learn about the different security issues in different environments. This will also helps us to learn different sciences in providing security like cryptography and steganography.

Course Outcomes

1. Compare the strengths and limitations of different security mechanisms
2. Address the core issues of security and transmission of information.
3. Develop simple and new algorithms.

UNIT 1:

Introduction: Attacks, services and mechanisms, security attacks, security services, a model for internet work security.

Classical techniques: Conventional encryption model, steganography, classical encryption techniques

Modern techniques: Simplified DES, block cipher principles, data encryption standard, strength of DES, differential and linear crypt analysis, block cipher design principles and modes of operations.

UNIT 2:

Conventional encryption: Placement of encryption function, traffic confidentiality, key distribution, random number generation.

Public key cryptography: Principles, RSA algorithm, key management, Diffie-Hellman key exchange, elliptic curve cryptography.

UNIT 3:

Message authentication and hash functions: Authentication requirements and functions, Message Authentication, Hash functions, security of hash functions and MACs.

UNIT 4:

Hash and MAC algorithms: MD file, message digest algorithm, secure hash algorithm

Digital signatures and authentication protocols: Digital signatures, authentication protocols, digital signature standards

UNIT 5:

Authentication applications: Kerberos, X.509 directory authentication service.

Electronic mail security: Pretty good privacy, S/MIME.

Text Books:



Structure of Computer Science/Information Technology (IT) Syllabus

2. Cryptography and Network Security: Principles and Practice – William Stallings, Pearson Education.

3. Network Security Essentials (Applications and Standards) by William Stallings, Pearson Education.

Reference Books:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech Press)

2. Network Security – Private Communication in a Public World by Charlie kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.

3. Introduction to Cryptography, Buchmann, Springer.

Cryptography and Network Security Lab

Use C/C++ language and execute the following concepts in security:

1. Develop a program for Hill cipher algorithm..
2. Develop a program for Simplified DES.
3. Develop a program for RSA algorithm.
4. Develop a program for Diffie-Hellmen key exchange.
5. Develop programs for message authenticators with different techniques.