

MANNAR THIRUMALAINAICKER COLLEGE
(Autonomous)



DEPARTMENT OF COMPUTER SCIENCE

Program Specific Outcome

- PSO1** To excel in problem solving and programming skills in the various computing fields of IT industries
- PSO2** To promote students capability to set up their own enterprise in various sectors of Computer applications.
- PSO3** To prepare the students to pursue higher studies in computing or related disciplines and to work in the fields of teaching and research.

Choice Based Credit System - Curriculum Pattern

Part	Title	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total Hours	Total Credits	No. of Papers	Total Marks
I	Tamil	6(3)	6(3)	6(3)	6(3)	-	-	24	12	4	400
II	English	6(3)	6(3)	6(3)	6(3)	-	-	24	12	4	400
III	Core Subject	6(5) 6(5)	5(5) 5(5)	5(5) 5(5)	5(4) 5(4)	6(5) 6(5) 6(4) 6(4)	6(5) 6(5) 5(4)	83	70	15	1500
	Allied Courses	4(4)	4(4)	4(4)	4(4)	-	-	16	16	4	400
	Optional Courses Elective	-	-	-		4(3) (Any one from The list)	4(3) 5(3) (Any two From The list)	13	9	3	300
IV	Non Major Elective	-	-	2(2)	2(2)	-	-	4	4	2	200
	Skill Based	-	2(2)	2(2)	2(2)	2(2)	2(2) 2(2)	12	12	6	600
	Environmental Studies	2(2)	-	-	-	-	-	2	2	1	100
	Value Education	-	2(2)	-	-	-	-	2	2	1	100
V	Extension Activity	-		-	0(1)	-			1	1	100
Total hours (per week)		30 (22)	30 (24)	30 (24)	30 (23)	30 (23)	30 (24)				
Total								180	140	41	4100

SEMESTER – I

Subject Code	Title of the Paper	No. Of Papers	Hours / week	Credits	Maximum Marks		
					Internal	External	Total
15UTAG11	Part I: Tamil Subject Tamil – I : ,f;fhyf;ftpjAk; rpWfijAk;	1	6	3	25	75	100
15UENG11	Part II: English Subject English – I : Language Through Literature –I	1	6	3	25	75	100
15UCSC11	Part III: Core Subject Programming in C	1	6	5	25	75	100
15UCSCP1	Programming in C - Lab	1	6	5	40	60	100
15UCSA11	Part III: Allied Subject Discrete Mathematics	1	4	4	25	75	100
15UEVG11	Part IV: Mandatory Subject Environmental Studies	1	2	2	25	75	100
	Total	6	30	22	165	435	600

SEMESTER – II

Subject Code	Title of the Paper	No. Of Papers	Hours / week	Credits	Maximum Marks		Total
					Internal	External	
15UTAG21	Part I: Tamil Subject Tamil – II: ,ilf;fhy ,yf;fpaKk; GjpdKk;	1	6	3	25	75	100
15UENG21	Part II: English Subject English – II: Language Through Literature –II	1	6	3	25	75	100
15UCSC21	Part III: Core Subject Data Structures And C++ Programming	1	5	5	25	75	100
15UCSCP2	Data Structures And C++ Programming - Lab	1	5	5	40	60	100
15UCSA21	Part III: Allied Subject Operations Research	1	4	4	25	75	100
15UVLG21	Part IV: Mandatory Subject Value Education	1	2	2	25	75	100
15UCSSP1	Part IV : Skill Subject PC Software - Lab	1	2	2	40	60	100
	Total	7	30	24	205	495	700

SEMESTER – III

Subject code	Title of the Paper	No. Of Papers	Hours / week	Credits	Maximum Marks		
					Internal	External	Total
15UTAG31	Part I: Tamil Subject Tamil – III: fhg;gpa ,yf;fpaKk; ehlfKk;	1	6	3	25	75	100
15UENG31	Part II: English Subject English – III: Language Through Literature –III	1	6	3	25	75	100
15UCSC31 15UCSCP3	Part III: Core Subject Programming in Java Programming in Java - Lab	1 1	5 5	5 5	25 40	75 60	100 100
15UCSA31	Part III: Allied Subject Numerical Methods	1	4	4	25	75	100
15UCSS31	Part IV : Skill Subject Digital Principles	1	2	2	25	75	100
15UELN31	Part IV: Non Major Elective Microprocessor	1	2	2	25	75	100
	Total	7	30	24	190	510	700

SEMESTER – IV

Subject code	Title of the Paper	No. Of Papers	Hours / week	Credits	Maximum Marks		
					Internal	External	Total
15UTAG4 1	Part I: Tamil Subject Tamil – IV: r;q;f ,yf;fpaKk; ciueilAk;	1	6	3	25	75	100
15UENG4 1	Part II: English Subject English – IV: Language Through Literature –IV	1	6	3	25	75	100
15UCSC41 15UCSCP4	Part III: Core Subject Web Technology Web Designing-Lab	1 1	5 5	4 4	25 40	75 60	100 100
15UCSA41	Part III: Allied Subject Numerical Aptitude	1	4	4	25	75	100
15UCSSP2	Part IV : Skill Subject PHP - Lab	1	2	2	40	60	100
15UELN41	Part IV: Non Major Elective Mobile Communication	1	2	2	25	75	100
15UEAG4 0 To 15UEAG4 9	Part V : Extension Activity	1	0	1	25	75	100
	Total	8	30	23	230	570	800

SEMESTER – V

Subject code	Title of the Paper	No. Of Papers	Hours / week	Credits	Maximum Marks		
					Internal	External	Total
	Part III: Core Subject						
15UCSC51	Computer Networks	1	6	5	25	75	100
15UCSC52	Operating System	1	6	5	25	75	100
15UCSC53	Relational DataBase Management System	1	6	4	25	75	100
15UCSCP5	Relational DataBase Management System - Lab	1	6	4	40	60	100
	Elective Subject						
15UCSE51	Data Mining	1	4	3	25	75	100
15UCSE52	System Software						
15UCSE53	Embedded System						
15UCSE54	Cryptography and Network Security						
15UCSSP3	Part IV : Skill Subject Linux Lab	1	2	2	40	60	100
	Total	6	30	23	180	420	600

SEMESTER – VI

Subject code	Title of the Paper	No. Of Papers	Hours / week	Credits	Maximum Marks		Total
					Internal	External	
15UCSC62	Software Engineering	1	6	5	25	75	100
15UCSCP6	.Net – Lab	1	5	4	40	60	100
	Elective Subject						
15UCSE61	Cloud Computing	1	4	3	25	75	100
15UCSE62	Mobile Computing						
15UCSE63	E - Commerce						
15UCSE64	Neural Networks						
15UCSPR1	Project and Viva Voce	1	5	3	25	75	100
	Part IV : Skill Subject						
15UCSS61	Computer Graphics	1	2	2	25	75	100
15UCSSP4	Computer Graphics -Lab	1	2	2	40	60	100
	Total	7	30	24	205	495	700

PROGRAMMING IN C

Class : B.Sc. (Computer Science)	Part III	: Core
Semester : I	Hours	:06
Sub Code: 15UCSC11	Credits	:05

Course Outcomes:

- CO1** To develop programming skills using the fundamentals and basics of C language.
- CO2** To impart the knowledge about pointers this is the backbone of effective memory handling.
- CO3** To study the advantages of user defined data type this provides flexibility for application development.

Unit -I:

Overview of C and Data types :History of C – importance of C – character set – C tokens – keywords and identifiers – constants – variables – data types – declaration of variables – constants- defining symbolic constants – operators – managing input and output operations: Reading and writing Character.

Unit -II:

Decision Making and Branching: Introduction – simple if – else...If – nested if – ladder if – switch statement – conditional operators – goto statements – while statement – do. While statement – for statement.

Unit-III:

Arrays and Strings: Introduction – one dimensional array – multi dimensional array – declaring and initializing string variables – reading and writing strings-String handling Functions.

Unit -IV:

Function and Structures: Introduction to functions – user defined functions – defining a function – function calls – function declaration – category of functions – arguments and functions – recursion –**Introduction to Structure and Unions** – defining and declaring a structure variables – accessing structure members – arrays of structures – structures and functions–unions–size of structures –bit fields.

Unit -V:

Pointers and File Management: Introduction to pointers – understanding pointers – Accessing the address of a variable - declaring and initializing of pointer variables- Introduction to file – defining and opening a file – closing a file – input/output operations on files- error handling during I / O operations- Random access to files- Command line arguments.

Text Book :

1. E.Balagurusamy, **Programming in ANSI C**, Tata McGraw Hill Education Private Limited, Sixth Edition, New Delhi, 2012.
 - Unit I – Chapter 1– Section : 1.1, 1.2,
Chapter 2 – Section : 2.1 to 2.8, 2.11, 2.12
Chapter 3 – Section : 3.1-3.9
Chapter 4 – Section : 4.1- 4.5
 - Unit II – Chapter 5 – Section : 5.1 -5.9

	Chapter 6 – Section : 6.1-6.4
Unit III :	Chapter 7 – Section : 7.1 -7.7
	Chapter 8 – Section : 8.1-8.4 ,8.8
Unit IV :	Chapter 9 – Section : 9.1, 9.2, 9.5, 9.7, 9.13, 9.16
	Chapter 10 – Section: 10.1 - 10.4, 10.8, 10.11-10.14
Unit V :	Chapter11 – Section : 11.1 -11.5
	Chapter 12- Section :12.1-12.7

Reference Books :

1. Byron Gottfried, **Programming with C**, McGraw Hill Education (India) Private Limited, New Delhi, Third Edition, 2014.
2. Yashavant Kanetkar, **Let Us C**, BPB Publications, New Delhi, Tenth Edition, 2010.

PROGRAMMING IN C - LAB

Class : B.Sc. (Computer Science)
Semester : I
Sub Code : 15UCSCP1

Part III : Core
Hours : 06
Credits : 05

Course Outcomes:

- CO1** The purpose of this course is to introduce to students to the field of programming using C language.
- CO2** The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C language.
- CO3** Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.

Arrays:

1. Arrange -n numbers in ascending and descending order.
2. Arrange -N strings in alphabetical order.
3. Palindrome checking.
4. Matrix addition/ subtraction/multiplication.

Function and structure:

1. Calculate the factorial value by recursion.
2. Reverse a string by recursion.
3. Mark list processing- array of structures.
4. EB bill calculation – array of structures.

Files:

1. Create a data file to store N numbers and separate odd and even numbers.
2. Create a data file to store characters and separate vowel and non-vowels.

DISCRETE MATHEMATICS

Class : B.Sc.(Computer Science)
Semester : I
Sub Code : 15UCSA11

Part III : Allied
Hours : 04
Credits :04

Course Outcomes:

- CO1** Express a logic sentence in terms of predicates, quantifiers, and logical connectives.
- CO2** Apply the operations of sets and use Venn diagrams to solve applied problems. Solve problems using the principle of inclusion-exclusion.
- CO3** Apply the operations of sets and use Venn diagrams to solve applied problems. Perform basic matrix operations including sums, products, and transpose and perform 0-1 matrix operations.

Unit - I :

Set theory & Relations – Introduction – Sets – Venn - Euler diagrams – Operations on Sets – Properties of Set Operations – Verification of basic laws of algebra – Principle of Duality, Relations – Operation on relations – Equivalence relation – Closure and Warshall's Algorithm.

Unit - II :

Functions & Mathematical induction- Functions and operators – One to One functions – Special type of functions – Invertible functions – Composition of functions, Mathematical induction.-Techniques of proofs .

Unit - III :

Logic – Introduction – Connectives – Truth table – Tautology implication and equivalence of formulae.

Unit- IV:

Matrix Algebra – Introduction – Operations – Inverse of a square matrix – Elementary operations and Rank of matrix – Solution of Simultaneous linear equations – Eigen values & Eigen vectors.

Unit - V :

Graph Theory – Introduction – Definitions and examples – Degrees – Subgraphs- Trees: Introduction – Characterisation of Trees – Centre of a Tree – Some Applications : Introduction – Connector problem – Shortest path problem.

Text Book :

1. M.Venkatraman, N.Sridharan and N.Chandrasekaran, **Discrete Mathematics**, The National Publishing Company, Chennai, Reprint, 2006.
2. S.Arumugam, S.Ramachandran, **Invitation to Graph Theory**, Scitech Publications India Pvt Ltd, Chennai, Reprint 2006.
Unit I : Book 1: Chapter 1 – Sections : 1,2.
Unit II : Book 1: Chapter 3 – Sections : 3,4.
Unit III : Book 1: Chapter 9 – Sections : 9.1,9.2,9.3,9.6,9.7,9.8.

- Unit IV : Book 1: Chapter 6 (Except 6.4).
Unit V : Book 2: Chapter 2– Sections 2.0 to 2.3.
Book 2: Chapter 6– Sections 6.0 to 6.2.
Book 2: Chapter 11– Sections 11.0 to 11.2.

Reference Books :

1. Seymour Lipchutz, **Discrete Mathematics**, Marc Lipson (Schaum's Outline Series), Tata McGraw Hill Education Private Limited, New Delhi, Second Edition, 2003.
2. Dr S Arumugam and Issac, **Modern Algebra**, SciTech Publishers, Hyderabad, 2003 (for Units 1,2,4).
3. T.Veerarajan, **Discrete Mathematics with Graph Theory and Combinations**, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2007.

DATA STRUCTURES AND C++ PROGRAMMING

Class	: B.Sc.(Computer Science)	Part III	: Core
Semester	: II	Hours	: 05
Sub Code	: 15UCSC21	Credits	: 05

Course Outcomes:

- CO1** To learn how C++ supports Object oriented principles such as abstraction, Polymorphism etc.
- CO2** To understand the linear and non linear data structures available in solving problems.
- CO3** Using the data structures and algorithms in real time applications.

Unit-I :

Basic concepts of object oriented programming –benefits of oops –application of oop-structure of c++ programming –basic data type-derived data type-user defined data type, operators in c++, control statements ,inline function overloading-specifying a class-define member function –nesting of member function-array of object-friend function-constructor-parameterized constructor-copy constructor-destructor.

Unit -II :

Defining operator overloading- overloading unary operator-overloading binary operator-rules for operator overloading-inheritance-single inheritance-multilevel inheritance-multiple inheritance-hierarchical inheritance-virtual base class- polymorphism-pointer-pointer to object-this pointer-virtual function-pure virtual function.

Unit -III :

Arrays-introduction-linear array-representation of linear array in memory-traversing linear array-sorting-linear search-binary search-multidimensional array-pointers- records-representation of records in memory-matrices –sparse matrices.

Unit -IV:

Linked list –introduction –representation of linked list in memory-traversing a linked list-searching a linked list-memory allocation-insertion and deletion in a linked list – implementation of stack using array and linked representation-an application of stack-recursion-queues-linked representation of queues.

Unit -V :

Trees –introduction –binary trees-types of binary trees-representation of binary trees- binary tree traversals-binary search trees-searching and inserting in binary search trees.

Text Books:

1. E. Balagurusamy, **Object Oriented Programming with C++**, McGraw Hill Education (India) Private Limited, New Delhi, Sixth Edition, 2014.

Unit I : Chapter 1 – Sections : 1.5,1.6,1.8
Chapter 2 – Section : 2.6
Chapter 3 – Sections : 3.5,3.6,3.7,3.13,3.24
Chapter 4 – Sections : 4.6,4.7
Chapter 5 – Sections : 5.3,5.4,5.7,5.15
Chapter 6 – Sections : 6.2,6.3,6.7

Unit II : Chapter 7 – Sections : 7.2,7.3,7.4,7.7
Chapter 8 – Sections : 8.3,8.6,8.7,8.9
Chapter 9 – Sections : 9.1,9.2,9.3,9.4,9.6,9.7

2. Seymour Lipschultz, **Data Structure**, Tata McGraw-Hill Education Private Limited, New Delhi, Twentieth Reprint, 2011.

Unit III : Chapter 4 : (Full)

Unit IV : Chapter 5 – Sections : 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8
Chapter 6 – Sections : 6.2,6.3,6.4,6.6,6.7,6.10,6.11

Unit V : Chapter 7 – Sections : 7.1,7.2,7.3,7.4,7.7,7.8

Reference Books

1. D.Ravichandran, **Programming with C++**, Tata McGraw Hill Education (India) Private Limited, New Delhi, Sixth Reprint, 2005 .
2. A. Chitra, PTRajan, **Data Structure**, Tata McGraw-Hill Education (India)) Private Limited, New Delhi, Fifth Reprint, 2011 .

DATA STRUCTURES AND C++ PROGRAMMING - LAB

Class	:B.Sc.(Computer Science)	Paper III	: Core
Semester	: II	Hours	: 05
Sub Code	:15UCSCP2	Credits	: 05

Course Outcomes:

- CO1** This course analyzes the asymptotic performance of algorithms.
- CO2** Write rigorous correctness proofs for algorithms.
- CO3** Demonstrate a familiarity with major algorithms and data structures.

Aim and Objective:

This course introduces programming concepts and helps students to develop programming skill in ' C++ ' Language.

1. To perform area calculation using function overloading (min 3 functions)
2. To perform string manipulation(three different types)using functionoverloading
3. To swap two values between two class object using friend functions.
- 4 To find minimum of two numbers between two class objects using friend function.
5. To overload unary minus operator which changes sign of given vector(3 elements)
6. To overload binary + operator which adds two complex numbers.
7. To process electricity billing using single inheritance
8. To process students mark list using multiple inheritance.
9. To process family details using hierarchical inheritance.
10. To process Multilevel inheritance.
11. To search an element using Linear Search and Binary Search.
12. To perform stack operations using Array.
13. To perform queue operations using Array.
14. To perform stack operations using Linked List.
15. To perform queue operations using Linked List.
16. To sort N numbers using Bubble Sort.
17. To sort N numbers using Quick Sort.
18. To manipulate single linked list.
19. To develop a Binary Search Tree.
20. To perform tree traversals.

OPERATIONS RESEARCH

Class	: B.Sc.(Computer Science)	Paper III	: Allied
Semester	:II	Hours	:04
Sub. Code	:15UCSA21	Credits	:04

Course Outcomes:

- CO1** Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change.
- CO2** Solve specialized linear programming problems like the transportation and assignment problems.
- CO3** Understand how to model and solve problems using dynamic programming

Unit-I:

Development of OR – Definition of OR – Modeling – Characteristics & Phases – tools- Techniques & Methods – Scope of OR.

Unit-II:

Linear Programming –formulation of the LPP – Mathematical Formulation of LPP – Solution of LPP – Graphical Method.

Unit- III:

The Simplex Method – Computational Procedure – Artificial Variable Techniques - The Big M Technique.

Unit -IV:

Transportation Problems – Transportation Model – Determining the starting solution of Transportation Model, North – West Corner Rule, Least– Cost Method and Vogel's Approximation Method – Determining the optimum solution of Transportation Problems.

Unit -V:

Assignment Problems -Introduction- Mathematical formulation of Assignment Problems – Solution to Assignment Problems.

Text Books:

1. KantiSwarup, P.C.Gupta, Manmohan, **Operations Research**, Sultan Chand & Sons , New Delhi, Reprint 2011.
2. Dr. S. Arumugam, **Topics in Operations Research**, New Gamma Publishers Pvt. Ltd, Palayamkottai, Tirunelveli, 2010.

- Unit I : Book 1: Chapter 1(Full).
- Unit II : Book 2: Chapter 3 – Sections: 3.1 – 3.4
- Unit III : Book 2: Chapter 3 – Sections: 3.5, 3.6
- Unit IV : Book 2: Chapter 4 – Sections: 4.1 –4.2
- Unit V : Book 2: Chapter 5 – Sections: 5.1 – 5.2

Reference Books:

1. Rathindra P. Sen, **Operations Research Algorithms and Applications**, PHI, EEE, New Delhi, 2010.
2. R. PanneerSelvam, **Operations Research**, PHI, New Delhi, Second Edition, 2010.
3. Nita H. Shah, Ravi M. Gor and HardikSoni, **Operations Research**, PHI, EEE, New Delhi, 2010.

PC SOFTWARE – LAB

Course : B.Sc.(Computer Science)
Semester : II
Sub Code : 15UCSSP1

Part IV : Skill Based
Hours : 02
Credits : 02

Course Outcomes:

- CO1** To become productive by acquiring a basic understanding of Microsoft Word, Microsoft Excel, Microsoft Access and Microsoft PowerPoint and learn to share data between these applications.
- CO2** To familiarize the students in preparation of documents and presentations with office automation tools.
- CO3** Provide hands-on use of Microsoft Office 2013 applications Word, Excel, Access and PowerPoint. Completion of the assignments will result in MS Office applications knowledge and skills.

MS – Word

1. Preparing a Leave Letter.
2. Designing your Bio-Data
3. Create the Time Table.
4. Create Mail Merge.
5. Advertisement Designing.

MS – Excel

1. To find Mean and Median.
2. Perform Student's Mark statement.
3. Display Score boards using Pie Charts.
4. Display Sales Analysis using Bar Charts.

MS – Access

1. Create an Employee table.
2. Create a Stock Table and insert 10 records.
3. Create Student Mark list.

MS – PowerPoint

1. Slide show presentation for your Bio data.
2. Displaying College details.
3. Displaying Advertisement Presentation.

PROGRAMMING IN JAVA

Class	: B.Sc. (Computer Science)	Part III	: Core
Semester	: III	Hours	: 05
Sub Code	: 15UCSC31	Credits	: 05

Course Outcomes:

- CO1** To develop programming skills using the fundamentals and basics of JAVA language.
- CO2** To impart the knowledge about OOPS this is the backbone of JAVA language.
- CO3** To study the advantages of user defined data type which provides flexibility for application development.

UNIT - I

Java Evolution: Java Features – How Java Differs From C and C++ - Java and Internet – Java and World Wide Web – Web Browsers – Hardware and Software Requirements – Java Support Systems – Java Environment. **Overview of Java Language**– Simple Java Programs – Java Program Structure – Java Tokens – Java Statements – Implementing A Java Program – Java Virtual Machine – Command Line Arguments – Constants and Variables – Giving Values to Variables – Scope of Variables – Symbolic Constants – Type Casting.

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 – Type Conversions in Expressions – Operator Precedence and Associativity-Mathematical Functions. **Decision Making And Branching:** Decision Making With If Statement – Simple If Statement – If-Else Statement – Nesting of If-Else Statement – The Else If Ladder Statement – The Switch Statement – The ?: Operator
Looping Statement: The While Statement – Do Statement – For Statement – Jumps In Loops. **Class Object And Methods:** Defining A Class – Fields Declaration – Methods Declaration – Creating Objects – Accessing Class Members – Methods Overloading – Static Members – Nesting of Methods – Inheritance: Extending a Class – Overriding Methods – Final Variables and Methods – Final Classes – Finalizer Methods – Abstract Methods and Classes – Methods With VarArgs– Visibility Control.

UNIT - III

Arrays, Strings and Vectors: One Dimensional Array – Creating An Array - Two Dimensional Arrays – Strings – Vectors – Wrapper Classes – Enumerated Types. **Interface:** Defining Interfaces-Extending Interfaces– Implementing Interfaces – Accessing Interface Variables.

Packages: Java API Packages -Using System Package – Naming Conventions – Creating Packages– Accessing A Package – Using A Package – Adding a Class To a Package – Hiding Classes – Static Import.

UNIT - IV

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 – Implementing The Runnable Interface. **Managing Errors And Exception:** 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 Applet Differ From Applications – Preparing To Write Applets – Building Applet Code – Applet Life Cycle – Creating And Executable Applet – Designing a Web Page – Applet Tag – Adding Applet To HTML File– Running The Applet.

UNIT - V

Graphics Programming: Graphics Class – Lines and Rectangles – Circles and Ellipses – Drawing Arcs – Drawing Polygons – Line Graphs – Using Control Loops In Applets – Drawing Bar Charts. **Managing Input and Output In Java:** Concept of Streams – Stream Classes – Byte Stream Classes – Character Stream Classes – Using Streams – Other Useful I/O Classes – Using The File Class – Input/Output Exceptions – Creation Of Files – Reading/Writing Characters - Reading / Writing Bytes – Random Access Files – Interactive Input and Output.

Text Book:

1. E.Balagurusamy, **Programming with Java**, Tata McGraw Hill Private Limited, Fourth Edition, New Delhi, 2013.

Unit I:	Chapters	2 - Section 2.2 -2.9.
	Chapters	3 - Section 3.2, 3.5 to 3.7, 3.9 -3.11.
	Chapters	4 - Section 4.2 , 4.3, 4.6 -4.9.
Unit II:	Chapters	5 - Section 5.2 - 5.15.
	Chapters	6 - Section 6.2 - 6.8.
	Chapters	7 - Section 7.2 - 7.5.
	Chapters	8 - Section 8.2 - 8.6,8.8 – 8.18.
Unit III:	Chapters	9 - Section 9.2 - 9.8.
	Chapters	10 - Section 10.2 - 10.5.
	Chapters	11 - Section 11.2 - 11.10.
Unit IV:	Chapters	12 - Section 12.2 - 12.10
	Chapters	13 - Section 13.2 - 13.8.
	Chapters	14 - Section 14.2 - 14.10.
Unit V:	Chapters	15 - Section 15.2 – 15.9 .
	Chapters	16 - Section 16.2 – 16.12,16.15,16.16

Reference Books:

1. P.Radha Krishna, **Object Oriented Programming with Java**, University Press India Private Limited, Third Edition, Hyderabad, 2008.
2. Debasish Jana, **Java Object Oriented Programming Paradigm**, Prentice Hall of India Private Limited, Third Edition, New Delhi, 2008.
3. C.Xavier, **Programming with Java**, Scitech Publication India Private Limited, Third Edition, Chennai, 2004.

PROGRAMMING IN JAVA LAB

Class	: B.Sc. (Computer Science)	Part III	: Core
Semester	: III	Hours	: 05
Sub Code	: 15UCSCP3	Credits	: 05

Course Outcomes:

CO1 To build software development skills using java programming for real world applications.

CO2 To implement frontend and backend of an application.

CO3 To implement classical problems using java programming.

1. To sort the numbers using Bubble Sort method.
2. To find average and sum of N numbers using Command line arguments.
3. To find harmonic series using While loop.
4. To define a class, define instance methods for setting and retrieving values of instance variables and instantiate it objects.
5. To perform Matrix multiplication in two dimensional array.
6. String class and its method.
7. String Buffer and its method.
8. To find volume calculation using Method Overloading.
9. To implement inheritance and demonstrate use of Method Overriding.
10. EB bill calculation using Single Inheritance.
11. Student mark list using Multi-level Inheritance.
12. To find employee payroll using Interface.
13. To handle Exception with multiple catch blocks.
14. To implement the concept Exception handling using predefined exceptions.
15. To implement the concept Exception handling by creating user-defined exceptions.
16. To implement the concept of Thread by extending Thread class.
17. Perform Arithmetic Operation using Package.
18. Drawing a picture using Applet.
19. Drawing Bar chart using Applet.
20. Write a java program reading / writing using a random access file.

NUMERICAL METHODS

Class : B.Sc. (Computer Science)
Semester : III
Sub Code :15UCSA31

Part III : Allied
Hours : 04
Credits : 04

Course Outcomes:

- CO1** To provide the student with numerical methods of solving the non-linear equations, interpolation, differentiation, and integration.
- CO2** To improve the student's skills in numerical methods by using the numerical analysis software and computer facilities.
- CO3** Be familiar with calculation and interpretation of errors in numerical methods

UNIT- I

Errors in Numerical Computation – Iteration method – Bisection method – Regulafalsi method – Newton Raphson method.

UNIT - II

Simultaneous Equations: Gauss Elimination Method – Gauss Jordan Elimination Method – Gauss Seidal Iteration Method – Inverse of a Matrix.

UNIT - III

Interpolation: Newton's Interpolation formulae – Central Difference Interpolation formulae(Gauss forward and backward formulae only) – Lagrange's Interpolation formula – Inverse Interpolation.

UNIT - IV

Numerical Differentiation: Newton's forward, backward difference formulae – Numerical integration: Trapezoidal rule – Simpson's one-third rule – Simpson's three-eighth rule.

UNIT - V

Numerical Solutions of Differential Equation: Taylor's Series Method – Euler's Method – Runge – kutta methods.

Textbook:

1. S.Arumugamand A.ThangaPandi Isaac, A. SomaSundaram, **Numerical Methods**, Scitech Publication, Third Edition, 2007.

Unit I: Chapters 3 – Section 3.1 – 3.5.
Unit II: Chapters 4 – Section 4.1, 4.3, 4.4, 4.8.
Unit III: Chapters 7 – Section 7.1, 7.2, 7.3, 7.6.
Unit IV: Chapters 8 – Section 8.1, 8.2, 8.5.
Unit V: Chapters 10 – Section 10.1, 10.3, 10.4.

Reference Books:

1. T.Veerarajan and T.Ramachandran, **Numerical Methods**, Tata McGraw Hill, Second Edition, New Delhi, 2006.
2. S.S.Sastry, **Introduction Method of Numerical Analysis**, Prentice Hall India Private Limited, Fourth Edition, New Delhi, 2008.

DIGITAL PRINCIPLES

Class : B.Sc. (Computer Science)
Semester : III
Sub Code : 15UCSS31

Part IV : Skill based
Hours : 02
Credits : 02

Course Outcomes:

- CO1** To develop background knowledge as well as core expertise in Digital principles and digital system design.
- CO2** To learn the Boolean functions and circuit simplification using K-Map.
- CO3** To be trained on combinational circuits and sequential circuits.

UNIT - I

Number systems and codes: Binary Number System– Binary to decimal conversion – Decimal to binary conversion – Octal numbers – Hexadecimal numbers – The ASCII code – The Excess-3 code – The Gray code. **Digital Logic:**Basic gates-NOT, OR, AND- Universal logic gates–NOR, NAND-AND, OR invert gates- Positive and negative logic.

UNIT - II

Arithmetic circuits: Binary Addition – Binary Subtraction – Unsigned Binary Numbers – Sign Magnitude Numbers – 2's complement Representation – 2's complement Arithmetic – Arithmetic Building Blocks.

UNIT - III

Combinational Logical Circuits: Boolean Laws and Theorems-Sum of Products Method-Truth table to Karnaugh map-Pairs, Quads and Octets-Karnaugh Map Simplifications-Don't care conditions-Product of sums method- Product of sums simplification.

UNIT- IV

Data Processing Circuits:Multiplexers-Demultiplexers-Decoders-1-of -16 Decoder- BCD – to-Decimal decoders-Seven-Segment decoders- Encoders-Parity Generation and Checkers.

UNIT - V

Flip-Flops: RS FLIP FLOPs – Gated FLIP-FLOPs – Edge-triggered RS FLIP-FLOPs – Edge-triggered D FLIP-FLOPs – Edge-triggered JK FLIP-FLOPs – FLIP-FLOP Timing.

Text Book :

1. Albert Paul Malvino, Donald P. Leach, Gautamsaha, **Digital Principles and Applications**, Tata McGraw Hill Publishing Company Limited, New Delhi, Seventh Edition, reprint 2013.

Unit I : Chapter 5 Section: 5.1 - 5.8

Chapter 2 Section: 2.1 - 2.4

Unit II : Chapter 6 Section: 6.1 - 6.7

Unit III : Chapter 3 Section: 3.1 - 3.8

Unit IV : Chapter 4 Section: 4.1 - 4.6, 4.8

Unit V : Chapter 8 Section: 8.1 - 8.6

Reference Books :

1. M.MorrisMano, **Digital Logic and Computer Design**, PrenticeHall of India Private Limited, New Delhi, Fourth Edition, reprint 2007
2. S.Salivahanan ,S.Arivazhagan **Digital Circuits and Design**, Vikas Publishing House Pvt Ltd, New Delhi, Fourth Edition, 2012.

MICRO PROCESSOR

Class : B.Sc(Computer Science)
Semester : III
Sub code : 15UELN31

Part IV : NME
Hours : 02
Credits : 02

Course Outcomes:

- CO1** To understand the Microprocessor Architecture.
- CO2** To understand the Concepts of interfacing techniques in 8085.
- CO3** To develop the program skills.

Unit- I

Central processing Unit – Microprocessor – Microcontroller – Organization of a microprocessor based system – Program model of 8085 – Operation of Microprocessor.

Unit- II

Features of 8085 microprocessor – Pin diagram of Intel 8085 – Architecture of Intel 8085 microprocessor.

Unit- III

Instruction Format – Opcode format – data format – instructions classification

Unit- IV

Logical group – Branch group – Stack I/O and machine control group – Addressing modes

Unit- V

Addition of two 8-bit numbers - 8-bit subtraction – two's complement of 8-bit number – Program to multiply two 8-bit numbers - Program to perform integer division (8-bit by 8-bit) – program to find the largest number in a data array.

Text Book:

1. M.K.Gupta, **Microprocessor, Microcomputer, Microcontroller and Interfacing**, Goyal Publishing House, Chennai, Second Edition, 2012.
UNIT I: Chapter 1: 1.1, 1.2, 1.3; Chapter 2: 2.1
UNIT II: Chapter 3: 3.1, 3.4
UNIT III: Chapter 4: 4.1, 4.2
UNIT IV: Chapter 4: 4.3, 4.4, 4.5
UNIT V: Chapter 7: 7.1,7.6, 7.9, 7.14, 7.15, 7.19

Reference Books :

1. Ramesh S.Gaonkar, **Microprocessor Architecture, Programming and Applications with the 8085**, Penram International Publishing, Prentice Hall, New Delhi, III Edition, 1995.
2. AdityaP.Mathur, **Introduction to Microprocessor**, MC Graw Hill, Europe, 1990.

WEB TECHNOLOGY

Class : B.Sc. (Computer Science)
Semester : IV
Sub Code : 15UCSC41

Part III : Core
Hours : 05
Credits : 04

Course Outcomes:

- CO1** To understand and practice mark up languages.
CO2 To understand the concepts and architecture of the World Wide Web.
CO3 To understand and practice embedded dynamic scripting on client side Internet Programming.

UNIT- I

HTML: Introduction – SGML – Outline of an HTML Document – Head Section – Body section – HTML Forms.

UNIT -II

Vb Script: Introduction – Embedding VBScript Code in an HTML Document – Comments – Variables – Operators – Procedures – Conditional Statements – Looping Constructs – Objects and VBScript – Cookies.

UNIT- III

Java Script: Introduction – Language Elements – Objects of Java Script – Other objects – Arrays – Worked Examples.

UNIT -IV

PHP: Fundamental of PHP – Loops, String and Statements – Arrays and Functions.

UNIT -V

PHP: Databases – PHP My SQL creating Database and tables – Cookies, Sessions and Forms.

Text Books:

1. N.P.Gopalan, J.Akilandeswari , **Web Technology: A Developer's Perspective**, Eastern Economy Edition, New Delhi, Seventh Edition, 2013.

Unit I : Chapter: 4 – Sections: 4.1- 4.6

Unit II : Chapter: 6 – Sections: 6.1-6.10

Unit III: Chapter: 5 – Sections: 5.1, -5.6

2. Dinesh Maidasani, **PHP**, Firewall Media (An Imprint of Laxmi Publication Pvt Ltd) NewDelhi, First Edition, 2007, reprint 2013.

Unit IV : Chapters – 1, 2, 3.

Unit V : Chapters – 4, 5.

Reference Books:

Web Technology:

1. RajKamal, **Internal and Web Technologies**, Tata McGraw Hill, New Delhi, Seventh Edition, 2011.
2. H.M.Deitel, P.J.Deitel, A.B.Goldberg, **Internet and Worldwide Web**, Deital Books, Cyber Classrooms, Complete Tra published, New Delhi, Third Edition, 2007.

PHP:

1. Bayross (Ivan), **Web Enabled Commercial Application Development using HTML, Java script, DHTML and PHP with CDROM**,BPB Publication, New Delhi, Fourth Edition, 2010.
2. Guengerich (Steve), **PHP6 and MYSQL**, Willey India, New Delhi, Fourth Edition, 2014

WEB DESIGNING - LAB

Class : B.Sc. (Computer Science)
Semester : IV
Sub Code : 15UCSCP4

Part III : Core
Hours : 05
Credits : 04

Course Outcomes:

- CO1** Helps the students to develop programming skills in HTML, DHTML, JAVASCRIPT, VBSCRIPT etc.
- CO2** Students gain the skills and project-based experience needed for entry into web design and development careers.
- CO3** Review the current topics in Web & Internet technologies.

HTML

1. Creation of HTML Document using basic tags.
2. Creation of Menu using ordered and unordered list and other options.
3. Creation of web page using table tags and their attributes.
4. Creation of personal profile web page using form.
5. Creation of college application form using form and frames.
6. Creation of Mark sheet using frame and form.
7. Creation of on-line application forms for any one application.

DHTML

8. Creation of web page using in-line style sheets.
9. Creation of web page using external style sheets.
10. Creation of document using CSS.

Java Script

11. Writing the word equivalent of a check amount using JavaScript.
12. Preparing class average using JavaScript.
13. Creation a program to illustrate mathematical objects in JavaScript.
14. Program to illustrate string objects in JavaScript.
15. Program to illustrate array objects in JavaScript.
16. Program to illustrate usage of cookie in JavaScript.

VBScript:

17. Program to illustrate various objects in VBScript.
18. Program to demonstrate various loop structure and condition statements in VBScript.

Servlets

19. Program to demonstrate GET and Post Requests using SERVLETS.
20. Program to demonstrate database application in SERVLETS.

JSP, ASP and XML

21. Creation of web page for a bookshop using JSP.
22. Program to demonstrate various objects in ASP.
23. Simple program in XML

NUMERICAL APTITUDE

Class : B.Sc. (Computer Science)
Semester : IV
Sub Code : 15UCSA41

Part III : Allied
Hours : 04
Credits : 04

Course Outcomes:

CO1: Make the students to learn how to solve the numerical and quantitative aptitude Problems

CO2: To enhance verbal aptitude and vocabulary of the students

CO3: To learn the power of Information and making data work

UNIT -I

Operations on Numbers – H.C.F and L.C.M of numbers - Decimal fractions – Square roots and cube roots.

UNIT -II

Problems on numbers – problems on ages – profit and loss.

UNIT -III

Time and work, time and distance, problems on trains.

UNIT -IV

Simple interest – compound interest – Area.

UNIT -V

Permutations and combination – probability

Text Book:

1. R.S .Agarwal, **Quantitative Aptitude**, Sultan Chand Publishing Company, New Delhi, Seventh Edition, 2013

Unit I	: Chapters	1,2,3,5.
Unit II	: Chapters	7, 8, 11.
Unit III	: Chapters	15, 17, 18.
Unit IV	: Chapters	21, 22, 24.
Unit V	: Chapters	30, 31.

Reference Books:

1. Abhijit Guha, **Quantitative Aptitude**, Tata McGraw Hill Education, New Delhi, Fifth Edition, 2014.
2. Arun Sharma, **Quantitative Aptitude**, Tata McGraw Hill Education, New Delhi, Fourth Edition, 2013.

PHP LAB

Class : B.Sc (Computer Science)
Semester : IV
Sub Code: 15UCSSP2

Part IV : Skill based
Hours 02
Credits 02

Course Outcomes:

CO1: Using PHP to manipulate files

CO2: Using the php MyAdmin utility to administer the MySQL database

CO3: Using PHP to manipulate files

1. Declaration and accessing variable in Php.
2. Decision making in Php.
3. Control structure in Php.
4. Types of arrays using Php.
5. Basic connection program in Php / MySql.
6. Electricity bill preparation using Php with MySql.
7. Employee pay slip preparation using Php with MySql.
8. Student mark list preparation using Php with MySql.
9. Merchant bill preparation using Php with MySql.
10. Combine java script and Php for client side validation.
11. Combine java script and Php for server side validation.
12. Image Uploads in Php with MySql.
13. To create simple Dynamic website with Php / MySql.
14. To create Pizza Management System using Php / MySql.
15. Write a Php program using Cookies.
16. Write a Php program using Sessions.

MOBILE COMMUNICATION

Class : B.Sc (CS)
Semester : IV
Sub code : 15UELN41

Part IV : NME
Hours : 02
Credits : 02

Course Outcomes

- CO1** To understand the concept of mobile Communication.
- CO2** To know about the mobile communication standards.
- CO3** To understand the principles of advanced modulation techniques.

Unit- I

Modulation Techniques: Introduction about Communication, Signal and their Classification, analog and Digital signal, Elements of communication system.

Unit-II

Mobile Communication Introduction : Cell Mobile Telephone system – Tuning efficiency – Frequency reuse concept – Co-channel interference reduction – Hand-off mechanism – Frequency spectrum utilization – Cell splitting.

Unit- III

Digital Cellular Systems: Digital speech – Group of special mobile (GSM) – Multiple access techniques (TDMA, FDMA, CDMA).

Unit- IV

Spectrum : Introduction – 2G -3G -4G

Unit - V:

Mobile Satellites: Architecture –Orbits-Constellation –Classification -GPS

Text Book:

1. V. Jeyasri Arokiamary, **Mobile Communication**, Technical Publications, Pune, First Edition, 2009.
2. Simon Haykin, **An Introduction to Analog and digital Communications**, John Wiley and Sons (Asia) Pvt.Ltd ,Singapore ,1989.

Reference Books:

1. The Odore S.Rappaport, **Wireless Communications**, Prentice Hall of India Private Limited, New Delhi, 2nd edition, 2003.
2. Jochen Schiller, **Mobile Communications**, an Imprint of Pearson Education, New Delhi, Second Edition, 2003

COMPUTER NETWORKS

Class : B.Sc (CS)
Semester : V
Subject Code : 15UCSC51

Part III : Core
Hours :06
Credits :05

Course Outcomes:

CO1: To understand networking concepts and basic communication model.

CO2: To analyze the function and design strategy of physical, data link, network layer and transport layer.

CO3: To understand network architectures and components required for data communication.

UNIT- I

Introduction: Data communication – Networks – Protocols and Standards – **Network**

Models: Layered Tasks – The OSI Model – Layers in the OSI Model – TCP/IP protocol suite.

UNIT - II

Transmission Media: Guided media – Unguided media (Wireless) – Radio waves,

Microwaves, Infrared –**Wireless WANs: Cellular Telephone and Satellite**

Networks: Cellular Telephony – Satellite Networks.

UNIT - III

Error Detection and Correction: Introduction – Block Coding – Linear Block

Codes – Cyclic Codes – Checksum –**Data Link Control:** Framing – Flow control and

Error control – Protocols – Noiseless Channels–Noisy Channels.

UNIT - IV

Network Layer: Delivery, Forwarding and Routing: Delivery – Forwarding –

Multicast Routing Protocols–**Congestion Control and Quality of Service:** Data

traffic – Congestion – Congestion Control – Quality of service.

UNIT V

Network Security : Security services – Message confidentiality – Message Integrity

– Message Authentication – Digital Signature – Entity Authentication

Text Book :

1. Behrouz A.Forouzan, **Data Communications and Networking**, Tata McGraw Hill Education Private Limited, New Delhi, Fourth Edition, 2007.

- Unit I : Chapter 1 – Section : 1.1, 1.2, 1.4
Chapter 2 – Section : 2.1- 2.4
- Unit II : Chapter 7 – Section : 7.1,7.2
Chapter 16 – Section :16.1,16.2
- Unit III : Chapter 10 – Section :10.1-10.5
Chapter 11 – Section :11.1-11.5
- Unit IV : Chapter 22 – Section : 22.1, 22.2, 22.4
Chapter 24 – Section : 24.1, 24.2, 24.3, 24.5
- Unit V : Chapter 31 – Section : 31.1-31.6

Reference Books :

1. Andrew S.Tanenbaum, **Computer Network**, Prentice Hall of India, New Delhi, Fifth Edition, 2014.
2. Prakesh C.Gupta, **Data Communications & Computer Networks**, Prentice Hall of India, New Delhi, Third Edition, 2006.
3. William Stallings, **Data and Computer Communications**, Prentice Hall of India, New Delhi, Seventh Edition, 2004.

OPERATING SYSTEM

Class : B.Sc (CS)
Semester : V
Subject Code : 15UCSC52

Part III : Core
Hours :06
Credits :05

Course Outcomes:

- CO1:** To be aware of the evolution and fundamental principles of operating system, processes and their communication.
- CO2:** To understand the various operating system components like process management, memory management.
- CO3:** To know about file management and the distributed file system concepts in operating systems.

UNIT- I

Introduction: What Is An OS-Mainframe Systems-Multiprocessor Systems- Distributed Systems- Clustered Systems- Real-Time Systems- Hand Held Systems- **Computer System Structures:**I/O Structure- Storage Structure-Hardware Protection- Network Structure- **Operating System Structures:**System Components- Operating System Services- System Calls- System Programs-System Structure-System Design and Implementation –System Generation.

UNIT- II

Process Management:Processes: Process Concept- Process Scheduling- Operations On Processes-Cooperating Processes-Inter-Process Communication-Communication in Client-Server Systems-**Threads:**Multithreading Models -Threading Issues- Windows 2000 Threads-Java Threads-CPU **Scheduling:** Scheduling Criteria- Scheduling Algorithms-Multiple-Processor Scheduling-Real-Time Scheduling- Algorithm Evaluation- Process Scheduling Models.

UNIT- III

Process Synchronization: Critical-Section Problem- Synchronization Hardware-Semaphores-Classic Problems Of Synchronization - Critical Regions- Monitors-OS Synchronization – **Deadlocks:** Deadlock Characterization- Deadlock Prevention- Deadlock Avoidance – Deadlock Detection- Recovery from Deadlock.

UNIT -IV

Storage Management: Memory Management:Swapping-Contiguous Memory Allocation – Paging- Segmentation-Segmentation With Paging-**Virtual Memory:**Demand Paging- Process Creation- Page Replacement- Allocation of Frames- Thrashing.

UNIT- V

File System Interface: File Concept -Access Methods-Directory Structure-**File System Implementation :**File-System Structure –File-System Implementation-Directory Implementation- Allocation Methods- Free Space Management.

I/O Systems: Mass Storage Structure:Disk Structure-Disk Scheduling -Disk Management-Swap Space Management.

Text Book:

1. Silberschatz A, Galvin P.B., Gange G, **Operating System Concepts**, John Wiley & Sons, INC, New Delhi, Sixth Edition, 2002.

Unit I : Chapter 1 - Section: 1.1 - 1.8
Chapter 2 - Section: 2.2-2.3, 2.5, 2.6
Chapter 3 - Section: 3.1-3.8

Unit II : Chapter 4 - Section: 4.1-4.6
Chapter 5 - Section: 5.2 - 5.3, 5.6, 5.8
Chapter 6 - Section: 6.2-6.7

Unit III : Chapter 7 - Section: 7.2 - 7.8
Chapter 8 - Section: 8.2, 8.4-8.7

Unit IV : Chapter 9 - Section: 9.2-9.6
Chapter 10 - Section: 10.2 - 10.6

Unit V : Chapter 11 - Section: 11.1 - 11.3
Chapter 12 - Section: 12.1 - 12.5
Chapter 14 - Section: 14.1 - 14.4

Reference Books:

1. Milan Milenkovic, **Operating System Concepts and Design**, Tata Mc Graw Hill, New Delhi, Third Edition, 1997.
2. Deitel Deitel Choffnes, **Operating System**, Pearson Education, New Delhi, Third Impression, 2008.

RELATIONAL DATABASE MANAGEMENT SYSTEM

Class : B.Sc (CS)
Semester : V
Subject Code : 15UCSC53

Part III : Core
Hours : 06
Credits :04

Course Outcomes:

- CO1:** To understand the fundamentals of data models and conceptualize and depict a database system using ER diagram.
- CO2:** To impart knowledge in transaction processing, concurrency control techniques and recovery procedures.
- CO3:** To make a study of SQL and relational database design.

UNIT - I

Overview Of Database Systems: Managing Data – A Historical Perspective – File Systems Versus a DBMS – Advantages of a DBMS – Describing and Storing Data in a DBMS – Queries in a DBMS – Transaction Management – Structure of a DBMS – People Who Work with Databases. **Introduction To Database Design:** Database Design and ER Diagrams – Entities, Attributes, and Entity Sets – Relationships and Relationship Sets – Additional Features of the ER Model – Conceptual Design With the ER Model.

UNIT - II

The Relational Model: Introduction to the Relational Model – Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data – Logical Database Design: ER to Relational – Introduction to Views – Destroying / Altering Tables and views. **Relational Algebra And Calculus:** Preliminaries – Relational Algebra: Selection and Projection – Set Operations – Renaming – Joins - Division – Relational Calculus: Tuple Relational Calculus – Domain Relational Calculus.

UNIT - III

SQL: Queries, Constraints, Triggers: The Form of a Basic SQL Query - UNION, INTERSECT, and EXCEPT – Nested Queries – Aggregate Operators – Null Values – Complex Integrity Constraints in SQL – Triggers and Active Databases – Designing Active Databases. **Schema Refinement And Normal Forms:** Functional Dependencies (FD) – Normal Forms:BCNF and 3NF–Properties of Decompositions – Normalization – Schema Refinement in Database Design – Other Kinds of Dependencies.

UNIT - IV

PL/SQL – Fundamentals of PL/SQL –Subprograms-Trigger – Error Handling- Package

UNIT - V

Overview Of Transaction Management: The ACID Properties – Transactions and Schedules – Concurrent Execution of transactions – Lock- Based Concurrency

Control – Performance of Locking – Transaction Support in SQL – Introduction to Crash Recovery. **Security And Authorization:** Introduction to Database Security - Access Control – Discretionary Access Control – Mandatory Access Control – Security for Internet Applications – Additional Issues Related to Security.

Text Books:

1. Raghuram Ramakrishnan and Johannes Gehrke, **Database Management Systems**, Tata McGraw Hill Private Limited, Third Edition, New Delhi, 2003.

- Unit I : Chapters 1 - Section 1.1 - 1.9.
 Chapters 2 - Section 2.1 - 2.5.
- Unit II : Chapters 3 - Section 3.1 - 3.7.
 Chapters 4 - Section 4.1 - 4.3.
- Unit III : Chapters 5 - Section 5.2 - 5.9
 Chapters 19 - Section 19.2 ,19.4- 19.8.
- Unit V : Chapters 16 - Section 16.1 - 16.7
 Chapters 21 - Section 21.1 - 21.6.

2. P.S.Deshpande, **SQL PL/SQL for ORACLE 8 & 8i**, Dream Tech press, Second Edition, New Delhi, 2003.

- Unit IV: Chapters 2 - Section 2.1-2.11.
 Chapters 11 - Section 11.1- 11.6.
 Chapters 13 - Section 13.1- 13.9.
- Chapters 12 - Section 12.1- 12.7.
 Chapters 10 - Section 10.1- 10.9.

Reference Books:

1. Alexis Leon and Mathew Leon, **Database Management Systems**, Leon Vikas Publishing, Chennai, 2002.
2. Frad R. McFadden, Jeffrey A.Hoffer and Mary. B. Prescott, **Modern Database Management**, Pearson Education, Fifth Edition, Asia, 2001.
3. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, **Database System Concepts**, Tata McGraw Hill Private Limited, New Delhi, 2006.

RELATIONAL DATABASE MANAGEMENT SYSTEM-LAB

Class : B.Sc (CS)
Semester : V
Subject Code : 15UCSCP5

Part III : Core
Hours : 06
Credits :04

Course Outcomes:

CO1: To write queries in SQL that implement the theoretical relational database operators such as selection, projection, joins.

CO2: To write queries in SQL that uses features such as group function (AVG, MIN, MAX, COUNT), individual functions (arithmetic functions, character, conversion functions), processing of date and time information.

CO3: To write complex queries (sub queries, correlated queries, update tables, inserting/deleting rows from tables using sub queries) and hiding data through the use of Views.

SQL Programs

1. Table Creation.
2. Selection queries.
3. Queries using Aggregate function.
4. Queries with Built-in function.
5. Nested and Parallel Queries.

PL/SQL Programs

1. Program using conditional control and sequential control.
2. Program using Exception Handling.
3. Program using implicit cursor.
4. Program using explicit cursor.
5. Program using Database Triggers.
6. Program to design procedure.
7. Program using functions.

SYSTEM SOFTWARE

Class : B.Sc (CS)
Semester : V
Subject Code : 15UCSE51

Part III : Elective
Hours :04
Credits :03

Course Outcomes

- CO1** To understand the relationship between system software and machine architecture, design and implementation of assemblers, linkers and loaders.
- CO2** To understand the design, function and implementation of assemblers, linkers and loaders.
- CO3** To have an understanding of macro processors and system software tools.

UNIT - I

Background: Simplified instructional Computer – Tradition machines – RISC Machines.
Assemblers: Basic Assembler Functions- Machine – Dependent Assembler Features- Machine Independent Assembler Features – Assembler Design Options – Implementation Examples.

UNIT- II

Loader And Linkers: Basic Loader Functions – Machine Dependent Loader Features- Machine Independent Loader Features – Loader Design Options – Implementations Examples.

UNIT- III

Macro Processors: Basic Macro Processor Functions – Machine Independent Macro Processor Features – Macro Processor Design Option - Implementation Examples.

UNIT - IV

Compilers: Basic Compiler Functions – Machine Dependent Compiler Features – Machine Independent Compiler Features – Compiler Design Options – Implementation Examples.

UNIT- V

Other System Software: Database Management Systems – Text Editors – Interactive Debugging Systems.

Text Book:

1. Leland L. Beck, D.Manjula, **System Software: An Introduction to Systems**

Programming, Pearson Education, India, Third Edition, 2011.

- Unit I : Chapter 1 - Section 1.3, 1.4, 1.5
Chapter 2 - Section 2.1 - 2.5 Unit
- II : Chapter 3 - Section 3.1 - 3.5 Unit
- III: Chapter 4 - Section 4.1 - 4.4 Unit
- IV : Chapter 5 - Section 5.1 - 5.5 Unit
- V : Chapter 7 - Section 7.1, 7.2, 7.3

Reference Books:

1. D.M.Dhamdhere, **Introduction to System Software**, Silicon Press, USA, reprint, 1997.
2. John J Donovan, **Systems Programming**, Tata McGraw Hill, New Delhi, Forty Sixth reprint, 2009.

DATA MINING

Class : B.Sc (CS)
Semester : V
Subject Code : 15UCSE52

Part III : Elective
Hours :04
Credits :03

Course Outcomes:

CO1: To expose the students to the concepts of Data warehousing Architecture and Implementation.

CO2: To Understand Data mining principles and techniques and Introduce DM as cutting edge business intelligence.

CO3: To learn to use association rule mining for handling large data.

UNIT - I

Data Warehousing: Introduction – Data Warehouse Architecture – Dimensional Modeling – Categorisation of Hierarchies – Aggregate Function.

UNIT - II

Data Mining: Definition – KDD Vs Data Mining – DBMS Vs DM – Other Related Areas – DM Techniques – Other Mining Problems – Issues and Challenges in DM – DM Application Areas – DM applications – Case Studies – Association Rules: Apriori algorithm – Partition algorithm – Pincer search algorithm – Border algorithm.

UNIT - III

Clustering Techniques: Clustering Paradigms – Partitioning Algorithms – K-Medoid - CLARA – CLARANS – Hierarchical Clustering- DBSCAN – BIRCH – CURE – Categorical clustering Algorithm – STIRR. **Decision Trees:** Tree Construction Principle – Best split – Splitting Indices – Splitting Criteria – Decision Tree Construction Algorithms – CART – ID3.

UNIT – IV

Genetic algorithm: Basic steps of GA - Other techniques – Neural network – Support Vector Machines.

UNIT- V

Web Mining: Introduction – Web Content Mining – Web Structure Mining – Web Usage Mining – Text mining – Hierarchy of categories – Text clustering.

Text Book:

1. Arun K. Pujari, **Data Mining Techniques**, Universities Press, Hyderabad, Third Edition, 2013.

Unit I : Chapter 2 - Section: 2.1-2.5

Unit II : Chapter 3

Chapter 4 - Section: 4.2, 4.4-4.6, 4.13

Unit III: Chapters 5 - Section: 5.1 – 5.12.

Chapters 6 - Section: 6.1 – 6.9.

Unit IV: Chapters 8 - Section: 8.1 – 8.2.

Chapters 9 - Section: 9.1 , 9.6.

Unit V : Chapter 10 - Section: 10.1- 10.6, 10.9, 10.10

Reference Books:

1. M. H. Dunham, **Data Mining: Introductory and Advanced Topics**, Pearson Education, India, Fourth impression.
2. D. Hand, H. Mannila and P. Smyth, **Principles of Data Mining**, The MIT Press, London, 2001.

EMBEDDED SYSTEM

Class : B.Sc (CS)
Semester : V
Subject Code : 15UCSE53

Part III : Elective
Hours :04
Credits :03

Course Outcomes

- CO1** To understand the Basic concepts of embedded systems.
- CO2** To understand the basics of RTOS and to learn the method of designing a real time systems.
- CO3** To provide experience to integrate hardware and software for microcontroller applications systems..

UNIT - I

Introduction to Embedded Systems: Embedded system – Processor Embedded into a system – Embedded Hardware Units and Devices in a System – Embedded software in a System- Examples of embedded system – Embedded System –on-chip (Soc) and use of VLSI Circuit Design technology- Complex Systems Design and Processors- Design Process in Embedded System- Formalization of System Design- Design process and Design Examples- Classification of Embedded Systems- Skills Required for an Embedded System Designer.

UNIT - II

Devices and communication Buses for Devices Network: Wireless Devices - Timer and Counting Devices – Watchdog Timer – Real time Clock- Networked Embedded Systems.

Programming Concepts and Embedded Programming in C, C++ and Java:Software Programming in Assembly Language (ALP) and in High Level Language ‘C’ –

C program elements : Header and source Files and Preprocessor Directives - Program Elements : Data Types- Data Structures- Modifiers- Statements – Object Oriented Programming- Embedded Programming in C++ - Embedded Programming in Java.

UNIT - III

Program Modeling Concepts: Program Models- DFG Models- State Machine

Programming Models for Event- Controlled Program flow – Modeling of Multiprocessor Systems- UML Modeling.

UNIT- IV

Inter process Communication and Synchronization of Processes, Threads and Tasks: Concept of Semaphores – Shared data- Inter process communication – Signal Function- Semaphore functions- Message Queue functions- Mailbox functions.

UNIT - V

Real Time Operating Systems: OS Services- Process management- Time Functions- Event Functions- Memory Management- Devices, File and IO Subsystems Management- Interrupt routines in RTOS Environment and Handling of Interrupt Source Calls- Real time Operating System- Basic Design using an RTOS – RTOS task Scheduling models ,Interrupt Latency and Response of the Task as performance Metrics – OS security Issues.

Text Book:

1. Raj Kamal, **Embedded Systems - Architecture, Programming and Design**, Tata McGraw Hill Education Private Limited, New Delhi, Second Edition, 2010.

Unit I : Chapter :1 - Section : 1.1 - 1.12

Unit II : Chapter: 3 - Section : 3.5- 3.9
Chapter: 5 - Section : 5.1- 5.7.

Unit III : Chapter: 6 - Section : 6.1- 6.5.

Unit IV : Chapter: 7 - Section : 7.7-7.13.

Unit V : Chapter: 8 - Section : 8.1- 8.11.

Reference Books :

- 1.A.P.Godse and A.O.Mulani, **Embedded Systems**, Technical Publications, Pune, First Edition, 2009.

2. Steve Health, **Embedded Systems Design**, Pearson Education, Second Edition, UK, 2003.

CRYPTOGRAPHY AND NETWORK SECURITY

Class : B.Sc (CS)
Semester : V
Subject Code : 15UCSE54

Part III : Elective
Hours : 04
Credits : 03

Course Outcomes:

- CO1** The course objective is to familiarize basic concepts of cryptography so as the students can use their understanding for information security purpose.
- CO2** Encrypt and decrypt messages using block ciphers, sign and verify messages using well known signature generation and verification algorithms.
- CO3** Enable the students to learn fundamental concepts of computer security and cryptography and utilize these techniques in computing systems.

UNIT - I

Introduction to the Concepts of Security: Introduction – The Need for Security – Security Approaches – Principles of Security – Types of Attacks.

UNIT - II

Cryptography Techniques : Introduction – Plain text and Cipher Text – Substitution Techniques – Transposition Techniques – Encryption and Decryption – Symmetric and Asymmetric Key Cryptography – Steganography – Key Range and Key Size – Possible Types of Attacks.

UNIT - III

Computer-based Symmetric Key Cryptographic Algorithms: Introduction – Algorithm Types and Modes – An Overview of Symmetric –Key Cryptography – Data Encryption Standard (DES) – International Data Encryption Algorithm (IDEA) - RC4 – RC5 – Blowfish – Advanced Encryption Standard (AES).

UNIT - IV

Internet Security Protocols: Introduction – Basic Concepts - Secure Socket Layer (SSL) – Transport Layer Security (TLS) – Secure Hyper Text Transfer Protocol (SHTTP) – Secure Electronic Transaction (SET) – Wireless Application Protocol (WAP) Security.

UNIT - V

User-Authentication Mechanisms – Introduction - Authentication Basics - Passwords Authentication Tokens-Certificate-based Authentication - Biometric Authentication.

Network Security, Firewalls and Virtual Private Networks (VPN): Brief Introduction to TCP/IP – Firewalls – IP Security – Virtual Private Networks (VPN) – Intrusion.

Text Book:

1. Atul Kahate, **Cryptography and Network Security**, Mc Graw Hill Education (India) Private Limited, New Delhi, Third Edition, 2013.

Unit I	:	Chapter 1 - Section : 1.1 – 1.5
Unit II	:	Chapter 2 - Section : 2.1 – 2.9
Unit III	:	Chapter 3 - Section : 3.1 – 3.8
Unit IV	:	Chapter 6 - Section : 6.1 – 6.6, 6.10
Unit V	:	Chapter 7 - Section : 7.1 – 7.6 Chapter 9 - Section : 9.2 – 9.6

Reference Books :

1. Behrouz A. Forozan, Debdeep Mukhopadhyay, **Cryptography and Network Security**, Tata McGraw Hill, New Delhi, Fourth Edition, 2008.
2. William Stallings, **Cryptography and Network Security Principles and Practice**, Pearson Education Inc, New Delhi, Sixth Edition, 2014.

LINUX LAB

Class : B.Sc (CS)
Semester : V
Subject Code : 15UCSSP3

Part IV : Skill Based
Hours :02
Credits :02

Course Outcomes:

CO1: The aim of the lab is to enable the student setup users and groups, Configure user defaults, logins and user profiles. On successful completion of this Lab the student will be able to understand the open source concept like Linux commands.

CO2: Effectively use the UNIX/Linux system to accomplish typical personal, office, technical, and software development tasks.

CO3: Identify and use UNIX/Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks.

AIM & OBJECTIVE:

The aim of the lab is to enable the student setup users and groups, Configure user defaults, logins and user profiles. On successful completion of this Lab the student will be able to understand the open source concept like Linux commands.

1. Basic Commands in Linux.
2. Number Checking in Linux
3. Multiplication Table in Linux.
4. Roman Letter Conversion in Linux.
5. Checking File or Directory in Linux.
6. File Operations in Linux.
 - Create
 - Copy
 - Delete
 - Rename
7. Directory Operations in Linux
 - Create
 - Remove
 - Toggle
8. Directory Operations in Linux
 - Copy
 - Move
9. Listing the files regarding their names in Linux.
10. Changing the access rights in Linux.

11. Counting number of users currently logged in Linux.
12. List of files having full access rights in Linux.
13. Counting number of lines, words and characters in a file in Linux
14. Fibonacci series in shell scripting.
15. Odd or even in shell scripting

ADVANCED VISUAL PROGRAMMING

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSC61

Part III : Core
Hours : 06
Credits : 05

Course Outcomes:

CO1: To develop and understand GUI applications.

CO2: To develop the skills necessary to create software solutions using Visual programming.

CO3: Analyzing certain solutions for software problems.

UNIT- I

Introduction - Essential Visual Basic .NET – The Visual Basic language: Operators, Conditionals and loops – The Visual Basic Language: Procedures, Scope and Exception Handling.

UNIT - II

Windows Forms: Text Boxes, Rich Text Boxes, Labels and Link Labels-Buttons, Checkboxes, Radio Buttons, Panels and Group Boxes.

UNIT- III

Windows Forms: List Boxes, Checked List Boxes, Combo Boxes and Picture Boxes – Scroll Bars, Splitters, Track Bars, Pickers, Notify Icons , Tool Tips and Timers- Menus , Built in Dialog Boxes and Printing.

UNIT - IV

Windows Forms: Image Lists, Tree and List Views, Toolbars, Status and Progress Bars and Tab Controls - Object-Oriented Programming- Object Oriented Inheritance.

UNIT - V

Data Access with ADO.NET-Building Controls to Databases- Handling Databases in Code.

Text Book:

1. Steven Holzner, **Visual Basic .NET Programming Black Book**, Dream Tech Press, New Delhi, First Edition , 2008.

Unit I	: Chapters	: 1, 2, 3
Unit II	: Chapters	: 4, 5, 6
Unit III	: Chapters	: 7, 8, 9
Unit IV	: Chapters	: 10, 11, 12
Unit V	: Chapters	: 21, 22, 23

Reference Books:

1. Jesse Liberty, **Programming Visual Basic .NET**, O'Reilly Media Inc, UK, Second Edition, 2002.
2. Richard Blair, **Beginning VB.Net**, Wrox Press Publisher, London, Second Edition, 2002.

SOFTWARE ENGINEERING

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSC62

Part III : Core
Hours : 06
Credits :05

Course Outcomes:

CO1: To provide an insight into the processes of software development.

CO2: To understand and practice the various fields such as analysis, design, development, testing of Software engineering.

CO3: To apply metrics and testing techniques to evaluate the software.

Unit- I

Introduction To Software Engineering: Some Definitions-Some Size Factors-Quality And Productivity Factors-Managerial Issues. **Planning a Software Project:** Defining The Problem-Developing a Solution Strategy-Planning the Development Process-Planning an Organizational Structure-Other Planning Activities.

Unit - II

Software Cost Estimation: Software Cost Factors-Software Cost Estimation Techniques-Staffing-Level Estimation-Estimating Software Maintenance Costs.

Unit- III

Software Requirements Definitions: The Software Requirements Specification- Formal Specification Techniques-Language and Processors for Requirements Specification.

Unit- IV

Software Design: Fundamental Design Concepts – Modules And Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real-Time and Distributed System Design – Test Plans.

Implementation Issues: Structured Coding Techniques – Coding Style – Standards and Guidelines – Documentation Guidelines.

Unit- V

Verification And Validation Techniques: Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing And Debugging – System Testing – Formal Verification – **Software Maintenance:** Introduction – Enhancing Maintainability during Development – Managerial Aspects of Software Maintenance – Configuration Management – Source Code Metrics – Other Maintenance Tools And Techniques.

Text Book :

1. Richard E.Fairley, **Software Engineering Concepts**, Tata Mc Graw - Hill Education private Limited, New Delhi, 39th reprint, 2013.

Unit I:	Chapter 1 - Section 1.1 – 1.4. Chapter 2 - Section 2.1 – 2.5.
Unit II:	Chapter 3 - Section 3.1 – 3.4.
Unit III:	Chapter 4 - Section 4.1 – 4.3.
Unit IV:	Chapter 5 - Section 5.1– 5.7. Chapter 6 - Section 6.1– 6.4.
Unit V:	Chapter 8 - Section 8.1– 8.7. Chapter 9 - Section 9.1– 9.5.

Reference Books :

1. Roger S. Pressman, **Software Engineering Concepts**, Tata McGraw Hill Publishing Company, Seventh reprint, 2007.
2. Ian Sommer Ville, **Software Engineering**, Prentice Hall of India Private Ltd, New Delhi, Tenth Edition, 2003.

.NET LAB

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSCP6

Part III : Core
Hours : 05
Credits : 04

CO1: To develop and understand GUI applications.

CO2: To develop the skills necessary to create software solutions using Visual programming.

CO3: Concept of web services and distributed system environment are understood.

1. Using Decision Structures
 - a. Checking User Input
 - b. Confirming Application Close
2. Implementing Structured Exception Handling
3. Creating Menus, Status Bars and Toolbars
4. Create and open a connection to a database using ADO.NET
5. Create, read, update, and delete records in a database using ADO.NET
6. Write a program to implement date and time functions.
7. Develop an application using various controls.
8. Using control arrays write a program (arithmetic calculation.)
9. Create MDI form and implement it with an example.
10. Write a program for menu creation.
11. Using pop-up menu write simple program.
12. Write a program to implement mouse events.
13. Write a program to create sequential/random file using file system controls.
14. Program to design a digital clock.
15. Process student's mark list using data control i.e. using DAO, RDO, control.
16. Library maintenance, Telephone billing, stock inventory etc using DAO reference and RDO reference with ODBC.
17. Write a program to generate Data report
18. Write a program using Flex grid control.
19. Write a program using Input and Message Dialog boxes.

SQL server:

1. Create an application using Data list control to access information from table in SQL server and display the result in neat format.
2. Case Studies (Must include basic database operations such as Insertion, Deletion, Modification, Selection and Searching)
3. Job Search Portal.
4. College Portal.
5. Company Portal.

CLOUD COMPUTING

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSE61

Part III : Elective
Hours : 04
Credits : 03

Course Outcomes

- CO1** To understand the concept of Virtualization and design of cloud Services.
CO2 To introduce the broad perspective of cloud architecture and model.
CO3 To learn to design the trusted cloud Computing system.

UNIT– I:

CLOUD INTRODUCTION – Introduction - Cloud computing definition - Characteristics – Cloud Models – Cloud services – Cloud- based Services & Applications.

UNIT-II:

CLOUD CONCEPTS & TECHNOLOGIES: Virtualization – Load balancing – Scalability & Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – Map Reduce – Identity and Access Management – Service level agreement - Billing

UNIT – III:

CLOUD SERVICES AND PLATFORMS – Compute service – Storage services – Database Services – Application Services – Content Delivery Services – Analytics Services – Deployment & Management Services – Identity & Access Management Services – Open Source Private Cloud Software.

UNIT – IV:

CLOUD SECURITY – Introduction – CSA Cloud security Architecture - Authentication – Authorization – Identity & Access Management -Data Security – Key management – Auditing.

UNIT-V:

CLOUD FOR INDUSTRY,HEALTHCARE& EDUCATION – Cloud computing for Healthcare - Cloud computing for Energy systems- Cloud computing for Transportation systems - Cloud computing for Manufacturing Industry - Cloud computing for Education.

Text Book:

1. ArshdeepBahga, Vijay Madiseti, **Cloud Computing – A Hands-On Approach**, University Press, Calcuta, 2014.

Unit I : Chapter 1 (Full)
Unit II : Chapter 2 (Full)
Unit III : Chapter 3 (Full)
Unit IV : Chapter 12 (Full)

Unit V : Chapter 13 (Full)

Reference Books:

1. Barrie Sosinsky, **Cloud Computing Bible**, Wiley Publishing, New Delhi, 2014.
2. Ray Rafaels, **Cloud Computing: From Beginning to End**, CreateSpace Independent Publishing Platform, New Delhi, 2015.

MOBILE COMPUTING

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSE62

Part III : Elective
Hours :04
Credits :03

Course Outcomes

- CO1** To Know the Network, Transport Functionalities of Mobile communication.
CO2 To have an exposure about wireless protocols -WLN, Bluetooth, WAP, Zig Bee issues.
CO3 To impart knowledge about Mobile Application Development.

UNIT - I

Introduction: Applications – History of wireless communication - A Simplified reference model – **Wireless Transmission:** Signals – Antennas – Signal Propagation – Multiplexing – Modulation – Cellular Systems.

UNIT - II

Tele Communications Systems: GSM – DECT –TETRA – **Satellite Systems:** History – Applications – Basics – Routing- Localization – Handover - Examples.

UNIT - III

Broadcast systems: Digital audio broadcasting – Digital video broadcasting - **Wireless LAN:** Infrared vs. radio transmission – Infrastructure and ad-hoc networks - IEEE 802.11– HIPERLAN – Bluetooth.

UNIT - IV

Mobile network layer: Mobile IP – Dynamic host configuration protocol – Ad hoc networks.

UNIT - V

Mobile Transport Layer: Traditional TCP –Snooping TCP – Mobile TCP – Fast retransmit/fast recovery – transmission/time-out freezing- Selective retransmission- **Support for mobility:** World wide web – wireless application protocol.

Text book:

1. Jochen Schiller, **Mobile Communications**, Pearson Education, New Delhi, Second Edition, 2002.

UNIT I : Chapter 1: Sections: 1.1, 1.2,1.5
Chapter 2: Sections: 2.2 - 2.6, 2.8

UNIT II: Chapter 4: Sections: 4.1 - 4.3
Chapter 4: Sections: 5.2 – 5.7

UNIT III: Chapter 6: Sections: 6.3 -6.4
Chapter 7: Sections: 7.1 – 7.5

UNIT IV: Chapter 9: Sections: 9.1-9.3
UNIT V: Chapter 10: Sections: 10.1,10.3 - 10.7
Chapter 11: Section: 11.2,11.3

Reference Books:

1. Dr. N.N. Jani, Kamaljit I. Lakhtaria, Dr. Ashish N. Jani, Nita Kanabar, **Mobile Computing (Technologies and Applications)**, S. Chand and Company Ltd, New Delhi, Fifth Edition, 2010.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, **Principles of Mobile Computing**, Springer (India) Private Limited, New Delhi, Second Edition, 2008.
3. Charles E. Perkins, **Adhoc Networking**, Addison-Wesley, Pearson Education, New Delhi, First Impression 2008.

E – COMMERCE

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSE63

Part III : Elective
Hours :04
Credits :03

Course Outcomes

- CO1:** To make the students to understand the e-commerce concepts.
- CO2:** Provides guiding principles behind the design and strategy of the customer web interface.
- CO3:** Describe E-Commerce payment systems

UNIT- I

Foundation of E – Commerce: Foundation of E - Commerce - Business to Consumer (B2C) Electronic Commerce – Business to Business (B2B) Electronic commerce.

UNIT- II

Network Infrastructure for E – Commerce: Network Infrastructure E - Commerce -The Internet, Intranets and Extranets as E - Commerce Infrastructure.

UNIT- III

Web security: Web security - Cryptography – Firewall.

UNIT- IV

Electronic Payment Systems: Electronic Payment Systems.

UNIT-V

Mobile commerce: Mobile commerce – WAP (Wireless Application Protocol) - Legal Requirements in E –Commerce.

Text Book:

1. MamtaBhusry, **E – Commerce**, Firewall Media (An Imprint of Laxmi Publications Pvt. Ltd), New Delhi, Second Edition, 2005.
Unit I : Chapters 1, 2, 3.
Unit II : Chapters 4, 5.
Unit III : Chapters 6, 7, 8.
Unit IV : Chapters 9.
Unit V : Chapters 10, 11, 12.

Reference Books:

1. P.T.Joseph, S.J, **E - Commerce**, Prentice Hall of India Pvt Ltd, New Delhi, Third Edition, 2008.
2. Pete Loshin, John Vacca, **Electronic Commerce**, Firewall Media (An Imprint of Laxmi Publications Pvt.Ltd.), New Delhi, Fourth Edition, 2004

NEURAL NETWORKS

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSE64

Part III : Elective
Hours :04
Credits :03

Course Outcomes

- CO1** To introduce the neural networks for classification and regression
- CO2** To give design methodologies for artificial neural networks
- CO3** To demonstrate neural network applications on real-world tasks.

UNIT- I

What is AI?: The problem, assumptions, AI technique, level of the model, criteria for success, Problems: problem spaces and search, production systems, problem characteristics, production system characteristics, issue in the design of search programs.

UNIT- II

Heuristic search techniques: Generate and test, Hill climbing, best – first search, problem reduction, constraint satisfaction, Means – Ends analysis.

UNIT -III

Knowledge Representation Issue: Representation and mappings – approaches, issue in knowledge representation, frame problem. Using predicate Logic: Representation of simple facts in logic, instance and ISA relationships, computable function and predicates, resolution, natural deduction.

UNIT -IV

Representing knowledge using rules: Procedural versus declarative knowledge, logic programming, forward versus backward reasoning, matching control knowledge.

UNIT -V

Symbolic reasoning under uncertainty: Introduction to non monotonic reasoning – logic for non monotonic reasoning, Implementation issues – Augmenting problem solver implementation of DFS, Breadth–First search.

Text Book:

1. Elaine Rich, Kevin Knight, **Artificial Intelligence**, Tata McGraw Hill Ltd, New Delhi, Second Edition, 1992.

Unit I : Chapters 1 – Section 1.1 – 1.5.

Chapter 2 – Section 2.1, 2.5

Unit II : Chapter 3 – Section 3.1 –3.6

Unit III : Chapter 4 – Section 4.1 – 4.4.

Chapter 5 – Section 5.1–5.5

Unit IV : Chapter 6 – Section 6.1 – 6.5

Unit V : Chapter 7 – Section 7.1 – 7.6

Reference Books:

1. Stuart J.Russell and Peter Norvig, **Artificial Intelligence: A Modern Approach**, Pearson Education, New Delhi, Second Edition, 2009.
2. Simon Haykin, **Neural Networks and learning Machines**, Prentice Hall, New Delhi, Third Edition, 2008.

PROJECT AND VIVA VOCE

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSPR1

Part III : Project
Hours :05
Credits :03

Course Outcomes

- CO1** To estimate the ability of the student in transforming the theoretical knowledge studied so far into application software.
- CO2** For enabling the students to gain experience in organization and implementation of a project.
- CO3** To understand and gain the knowledge of software engineering practices, so as to participate and manage large software engineering projects in future.

COMPUTER GRAPHICS

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSS61

Part IV : Skill based
Hours : 02
Credits : 02

Course Outcomes

CO1: Identify and explain the core concepts of computer graphics.

CO2: Apply graphics programming techniques to design, and create computer graphics scenes.

CO3: Develop design and problem solving skills with application to computer graphics

UNIT - I

A Survey Of Computer Graphics: Computer Aided Design - Presentation Graphics- Computer Art – Entertainment – Education and Training – Visualization - Image Processing – Graphical User Interfaces.

UNIT - II

Overview of Graphics Systems: Video Display Devices – Input Devices - Hard Copy Devices.

UNIT - III

Output Primitives: Points And Lines – Line Drawing Algorithms - Circle Generating Algorithms.

UNIT- IV

Attributes of output primitives: Line Attributes – Curve Attributes - Area Fill Attributes – Character Attributes – Bundled Attributes.

UNIT - V

Two – Dimensional Geometric Transformations: Basic Transformations - Composite Transformations – Other Transformations.

Text Book :

1. Donald Hearn , M.Pauline Baker, **Computer Graphics**, Donald Hearn, M.Pauline Baker, Prentice Hall of India, New Delhi, Second Edition,2003.

Unit – I : Chapter 1 – Section 1.1 – 1.8. Unit –

II : Chapter 2 – Section 2.1 – 2.5, 2.6.

Unit – III : Chapter 3 – Section 3.1, 3.2, 3.5.

Unit – IV : Chapter 4 – Section 4.1, 4.2, 4.4, 4.5, 4.6.

Unit – V : Chapter 5 – Section 5.1, 5.3, 5.4.

Reference Books:

1. Steven Harrington, **Computer Graphics**, McGraw Hill, New Delhi, Second Edition, 1987.
2. Er.Rajiv Chopra, **Computer Graphics**, S.Chand and Company Ltd, New Delhi, First Edition, 2011.

COMPUTER GRAPHICS-LAB

Class : B.Sc (CS)
Semester : VI
Subject Code : 15UCSSP4

Part IV : Skill based
Hours : 02
Credits : 02

Course Outcomes

CO1: Understand graphics programming.

CO2: Be exposed to creation of 3D graphical scenes using open graphics library suits.

CO3: Learn to create animations.

1. Write a program to draw a line through DDA algorithm.
2. Write a program to draw a line through BRESENHAM'S algorithm.
3. Write a program to draw a circle using midpoint algorithm.
4. Write a program to translate a triangle.
5. Write a program to scale a triangle.
6. Write a program to rotate a triangle.
7. Write a program to fly a kite.
8. Write a program to fish movement.
9. Write a program to boundary fill algorithm.
10. Write a program to flood fill algorithm.