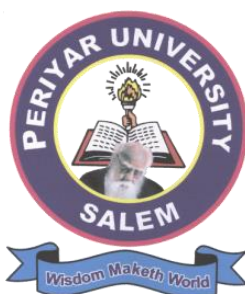


**PERIYAR UNIVERSITY**

**SALEM 636 011**



**M. Sc DEGREE**

**COMPUTER SCIENCE**

**REGULATIONS AND SYLLABUS**

**(Effective from the Academic year 2015-2016 and thereafter)**

## **Regulations**

**Effective from the Academic year 2015 - 16**

### **1. OBJECTIVE OF THE COURSE**

To Develop the Post Graduates in **Computer Science** with strong knowledge of theoretical computer science subjects who can be employed in research and development units of industries and academic institutions.

### **2. CONDITION FOR ADMISSION**

A candidate who has passed B.Sc Computer Science/B.C.A/B.Sc Computer Technology/B.Sc Information Science/Technology degree of this University or any of the degree of any other University accepted by the syndicate as equivalent thereto subject to such conditions as may be prescribed therefore shall be permitted to appear and qualify for the **M. Sc Computer Science** degree examination of this University after a course of study of two academic years.

### **3. DURATION OF THE COURSE**

The programme for the degree of **Master of Science in COMPUTER SCIENCE** shall consist of **two Academic years** divided into four semesters. Each semester consist of 90 working days.

**4. STRUCTURE OF M. Sc (Computer Science) PROGRAMME UNDER CBCS PATTERN FOR UNIVERSITY DEPARTMENT (FROM 2015 AND THEREAFTER)**

**CURRICULUM AND SCHEME OF EXAMINATIONS**

Course	Number of Credits	Hours Per Week	Examination Duration (hrs)	Marks		
				I. A	ESE	Total
<b>Semester-I</b>						
<b>Course-15UPCSC2C01</b> Discrete Mathematics for Computing	4	4	3	25	75	100
<b>Course-15UPCSC2C02</b> Web Technology	4	4	3	25	75	100
<b>Course-15UPCSC2C03</b> Design and Analysis of Algorithms	4	4	3	25	75	100
<b>Course-15UPCSC2C04</b> Advanced Database Management systems	4	4	3	25	75	100
<b>Course-15UPCSC2C05</b> Theory of Computation	4	4	3	25	75	100
<b>Course-15UPCSC2C06</b> Web Technology-Lab	2	4	3	40	60	100
<b>Course-15UPCSC2C07</b> Algorithms-Lab	2	4	3	40	60	100
<b>Semester-II</b>						
<b>Course-15UPCSC2C08</b> Web Programming	4	4	3	25	75	100
<b>Course-15UPCSC2C09 / Course-15UPCSC2C09A</b> Advanced Operating Systems	4	4	3	25	75	100
<b>Course-15UPCSC2C10</b> Advanced Java Programming	4	4	3	25	75	100
<b>Elective-I</b>	3	3	3	25	75	100
<b>Supportive-I</b>	4	4	3	25	75	100
<b>Course-15UPCSC2C11</b> Web Programming-Lab	2	4	3	40	60	100
<b>Course-15UPCSC2C12</b> Advanced Java-Lab	2	4	3	40	60	100

M. Sc-Computer Science Syllabus under CBCS Pattern effect from 2015-2016 Onwards  
Periyar University, Salem

<b>Human Rights</b>		2	3	-	100	100
<b>Semester-III</b>						
<b>Course-15UPCSC2C13</b> Data Mining Techniques	4	4	3	25	75	100
<b>Course-15UPCSC2C14</b> C# Programming	4	4	3	25	75	100
<b>Course-15UPCSC2C15</b> Machine Learning	4	4	3	25	75	100
<b>Course-15UPCSC2C16</b> Mobile Computing	4	4	3	25	75	100
Elective-II	3	3	3	25	75	100
<b>Course-15UPCSC2C17</b> Data Analytics - Lab	2	4	3	40	60	100
<b>Course-15UPCSC2C18</b> Mini Project	2	4	3	40	60	100
<b>Course-15UPCSC2C19</b> Soft skill development-Lab	1	2	3	100	-	100

<b>Semester-IV</b>						
<b>Course-15UPCSC2C20</b> Cloud Computing	4	4	3	25	75	100
<b>Course-15UPCSC2C21</b> Big Data Analytics	4	4	3	25	75	100
<b>Elective-III</b>	3	4	3	25	75	100
<b>Course-15UPCSC2C22</b> Python Programming Lab	2	4	3	25	75	100
<b>Course-15UPCSC2C23</b> <b>Dissertation and Viva-Voce</b>	6	-	-	50	150	200
Total no. of Credits } <b>Core</b>	70					
of Credits } <b>Elective</b>	12					
of Credits } <b>Non Major Elective</b>	8					
<b>Grand Total</b>	90					
<b>Total Marks</b>						2300

**Supportive Course:**

Students are expected to opt Supportive Course (Non major elective) offered by other departments.

I. A – INTERNAL ASSESSMENT

E. E – EXTERNAL EXAMINATIONS

The content of the syllabus and regulations may be followed for first, second, third and fourth semesters as per the regulations passed in the academic year 2015-2016.

**Elective Course Code** :

**List of Electives**

**Elective Course -I**

Course 15UPCSC2E01	-	Operations Research
Course 15UPCSC2E02	-	Statistical Methods
Course 15UPCSC2E03	-	Numerical Methods
Course 15UPCSC2E04	-	Compiler Design

**Elective Course -II**

Course 15UPCSC2E05	-	Image Processing
Course 15UPCSC2E06	-	Information security
Course 15UPCSC2E07	-	Internetworking with TCP/IP
Course 15UPCSC2E08	-	Computer Graphics

**Elective Course -III**

Course 15UPCSC2E09	-	Open Source Technologies
Course 15UPCSC2E10	-	Network Management
Course 15UPCSC2E11	-	Bio-Informatics
Course 15UPCSC2E12	-	Programming for application development

**EXAMINATIONS - THEORY**

**EVALUATION OF INTERNAL ASSESSMENT**

Test	:	10 Marks
Seminar	:	05 Marks
Assignment	:	05 Marks
Attendance	:	05 Marks
		-----
Total	:	25 Marks
		-----

The Passing minimum shall be 50% out of 25 marks (13 marks)

**EVALUATION OF EXTERNAL EXAMINATIONS**

**QUESTION PAPER PATTERN**

Time duration: 3 Hours

Max. Marks: 75

**PART- A: 15x1 = 15**

Answer all the questions

Objective type three questions from each unit

**PART- B: 5x4 = 20**

Answer all the questions

Either or type for each unit

**PART- C: 5x8 = 40**

Answer all the questions

Either or type for each unit

The Passing minimum shall be 50% out of 75 marks (38 marks)

**PRACTICAL / SOFTWARE DEVELOPMENT**

**EVALUATION OF INTERNAL ASSESSMENT**

Test 1	:	15 Marks
Test 2	:	15 Marks
Record	:	10 Marks
		-----
Total	:	40 Marks
		-----

The Passing minimum shall be 50% out of 40 marks (20 Marks)

**EVALUATION OF EXTERNAL EXAMINATIONS**

Time duration: 3 Hours

Max. Marks: 60

**QUESTION PAPER PATTERN**

1. One compulsory question from the given list of objectives : 30 Marks
2. One Either/OR type question from the given list of objectives : 30 Marks

**Distribution of Marks**

Problem Understanding	:	05 Marks
Program writing	:	10 Marks
Debugging	:	10 Marks
For Correct Results	:	05 Marks
Mini-Project Viva-voce (joint)	:	60 Marks

## DISSERTATION

<b>Evaluation (External)</b>	<b>: 50 Marks</b>
<b>Viva-voce (joint)</b>	<b>: 100 Marks</b>

### 5. REGULATIONS OF PROJECT WORK

- a. Students should do their five months **[Dec to Apr]** Project work in Company / Institutions.
- b. The Candidate should submit the filled in format as given in **Annexure-I** to the department for approval during the I<sup>st</sup> Week of January in their Project semester.
- c. Each internal guide shall have maximum of eight Students.
- d. Periodically the project should be reviewed minimum three times by the advisory committee.
- e. The Students should prepare three copies of the dissertation and submit the same to the college on **30<sup>th</sup> April** for the evaluation by examiners. After evaluation one copy is to be retained in the College Library and one copy is to be submitted to the University (Registrar) and the student can hold one copy.
- f. A Sample format of the dissertation is enclosed in **Annexure-II**.
- g. Format of the **Title page** and **certificate** are enclosed in **Annexure III**.
- h. The Students should use OHP / Power Point Presentation during their Project Viva voce Examinations.

### 6. PASSING MINIMUM

The candidate shall be declared to have passed the examination if the candidate secures not less than 50% marks in the University examination in each paper / practical. However submission of a record notebook is a must.

For the project work and viva-voce a candidate should secure 50% of the marks for pass. The candidate should compulsorily attend viva-voce examination to secure pass in that paper.

### 7. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in **First Class**. All other successful candidates shall be declared to have passed in **Second Class**. Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in **First Class with Distinction** provided they pass all the examinations prescribed for the course at the first appearance.

Candidates who pass all the examinations prescribed for the course in first instance and within a period of two academic years from the year of admission to the course only are eligible for **University Ranking**.

#### **8. COMMENCEMENT OF THIS REGULATION**

These regulations shall take effect from the academic year 2015-16, i.e., for students who are to be admitted to the first year of the course during the academic year 2015-16 and thereafter.

#### **9. TRANSITORY PROVISION**

Candidates who were admitted to the PG course of study before 2015-16 shall be permitted to appear for the examinations under those regulations for a period of three years i.e., up to and inclusive of the examination of April/May 2018. Thereafter, there will be permitted to appear for the examination only under the regulations then in force



**ANNEXURE - I**  
**PERIYAR UNIVERSITY**

College Name :  
Course :  
Student Name :  
Register Number :  
Title of the Project :  
Address of Organization / Institution :  
Name of the External Guide :  
Designation :  
Place :  
Date : Signature of External Guide  
(with seal)

Name of the Internal Guide :  
Qualification :  
Teaching Experience :  
Place :  
Date : Signature of Internal Guide

Principal

[Approved or not Approved]

[ University Use]

## **ANNEXURE II**

COLLEGE BONAFIDE CERTIFICATE

COMPANY ATTENDANCE CERTIFICATE

**ACKNOWLEDGEMENT**

**CONTENTS**

SYNOPSIS

Page No.

1. INTRODUCTION  
ORGANIZATION PROFILE  
SYSTEM CONFIGURATION  
HARDWARE CONFIGURATION  
SOFTWARE CONFIGURATION
  2. SYSTEM STUDY  
EXISTING SYSTEM  
DRAWBACKS  
PROPOSED SYSTEM  
SYSTEM STUDY  
FEATURES
  3. SYSTEM DESIGN AND DEVELOPMENT  
FILE DESIGN  
INPUT DESIGN  
OUTPUT DESIGN  
CODE DESIGN  
DATABASE DESIGN  
SYSTEM DEVELOPMENT
  4. TESTING AND IMPLEMENTATION  
CONCLUSION  
BIBLIOGRAPHY
- APPENDICES
- A. DATA FLOW DIAGRAM
  - B. TABLE STRUCTURE
  - C. SAMPLE INPUT
  - D. SAMPLE OUTPUT / REPORT

**ANNEXURE III**

A. Format of the title page

**TITLE OF THE DISSERTATION**

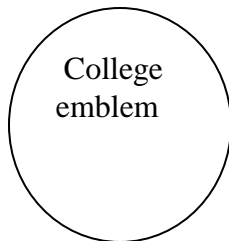
A Dissertation submitted in partial fulfillment of the requirements for the degree of  
**Master of Science in Computer Science** to the

Periyar University, Salem - 11

By

**STUDENT NAME**

**REG. NO.**



**COLLEGE NAME**

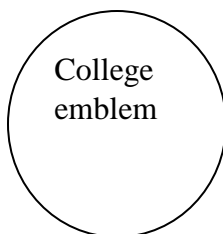
**(AFFILIATED TO PERIYAR UNIVERSITY)**

**PLACE with Pin Code**

**MONTH – YEAR**

B. Format of the Certificate

***COLLEGE NAME***  
**(AFFILIATED TO PERIYAR UNIVERSITY)**  
**PLACE with PIN CODE**



MONTH – YEAR  
**PROJECT WORK**

**TITLE OF THE DISSERTATION**

Bonafide Work Done by

STUDENT NAME

REG.NO

A Dissertation submitted in partial Fulfillment of the requirements for the degree of  
**Master of Science in Computer Science to the Periyar University, Salem - 11.**

INTERNAL GUIDE

HEAD OF THE DEPARTMENT

Submitted for the Viva-Voce Examination held on \_\_\_\_\_

Internal Examiner

External Examiner

## **SEMESTER I**

### **DISCRETE MATHEMATICS FOR COMPUTING**

**Course-15UPCSC2C01**

**Credits: 4**

**(Theorems and Proofs are not expected)**

#### **Objective**

- To understand the applications of functions and relations
- To understand the basic concepts of mathematical logic and predicate calculus
- To understand the concept of method of induction
- To develop the skills in solving recurrence relations

#### **Unit-I**

Wellformed formulas – truth table of well formed formula – tautology, contradiction and contingency –equivalence of formulas. Algebra of propositions – Functionality complete sets – Normal forms of well formed formulas- Rules of Inference for propositional calculus – well formed formulas of predicate calculus – Rules of Inference for predicate calculus – predicate formulas involving two or more quantifiers. (2.1-2.11)

#### **Unit-II**

Set theory – relations- functions – set identities – Binary relations – properties of binary relations in a set – Equivalence relations and partial orderings – Representation of a relation by a matrix .representation of a relation by a digraph - Basics of Counting – Integers and Induction. (1.3-1.7, 4.1-4.2, 5.1-5.5)

#### **Unit-III**

Formulation as Recurrence Relations-solving recurrence Relation by Iteration- solving Recurrence Relations- Solving Linear Homogeneous Recurrence Relations of Order Two-Solving Linear Non homogeneous Recurrence Relations. Permutations-Combinations-Permutations with repetitions-Combinations with repetition-permutations of sets with indistinguishable objects.(6.1-6.5, 3.1-3.6)

#### **Unit-IV**

Definition and examples-properties of lattices –lattices as algebraic systems-Sub lattices and lattice Isomorphism-special classes of lattice –distributive lattices and Boolean algebras.(8.1-8.6)

**Unit-V**

Connected Graphs-Euler Graphs-Hamiltonian circuits and paths – planar graphs – matrix representation of graphs. (10.1-10.5 and 10.8)

**Text Book:**

1. N.Chandrasekaran and M.Umaparvathi, Discrete mathematics, PHI Learning Private Limited, New Delhi, 2010

**References:**

1. J.P.Trembley and R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, New Delhi, 1997.
2. T. Sengadir, Discrete Mathematics and Combinatorics, Pearson New Delhi 2009.
3. RakeshDube ,AdeshPandeyRitu Gupta, Discrete Structures and Automata Theory, Narosa publishing House New Delhi 2007.

## **WEB TECHNOLOGY**

**Course-15UPCSC2C02**

**Credits: 4**

### **Objective**

- To understand the basic concepts, WWW, Web browsers and Web servers.
- To understand how static and dynamic web documents are created using HTML and Java script
- To understand Server side programming using PHP
- To understand how web services can be created using XML

### **Unit – I**

A Brief Introduction to the Internet – The World Wide Web – Web Browsers – Web Servers, Uniform Resource Locator – Multipurpose Internet Mail Extension – The Hypertext Transfer Protocol – Origin and Evaluation of HTML &XHTML, Standard XHTML document structure – Basic text markup – Images – Hypertext link – Lists – Tables – Forms – Frames – Syntactic differences between HTML & XHTML.

### **Unit – II**

Cascading Style Sheet(CSS) – Overview of Java Script – Object Orientation & Java Script – Primitives, Operation and Expressions – Screen Output and Keyboard Input – Control Statements – Object Creation Modifications, Arrays – Function Construction – Pattern matching using Regular expression.

### **Unit – III**

Java Script Execution Environment – Document Object Model(DOM) – Element Access in Java Script – Events and Events Handling – Handling Events from Body Elements, Button Elements, Textbox and Password Elements – DOM Tree traversal and Modification – Positioning Elements – Moving Elements – Elements Visibility – Changing colors and fonts – Dynamic Content – Stacking Elements – Locating the Mouse Cursor, Reacting to a Mouse Click – Dragging and Dropping Elements.

### **Unit – IV**

Introduction – XML Document Structure – Document Type Definition – Namespace – XML Schemas – Displaying Raw XML Document – Displaying XML Document with CSS – XSLT Style Sheet - XML Processors– Web services

## **Unit – V**

Overview of PHP – General Syntactic characteristics – Primitives, Operation and Exception – Output – Control Statement – Arrays – Functions - Pattern Matching – Form Handling – Files – Cookies, Session Tracking – MySQL database system -Database access with PHP& MySQL. Overview of Ajax – The Basics of Ajax- Rails with Ajax.

### **Text Book**

1. Robert W.Sebesta, Programming with World Wide Web, 4th Edition, Pearson Education, 2008, Chapter 1-7, 11,13,4,13.6,16

### **Reference Books**

1. Harvey & Paul Deitel& Associates, Harvey Deitel and Abbey Deitel, “Internet and World Wide Web - How To Program”, Fifth Edition, Pearson Education, 2011.
2. Achyut S Godbole and AtulKahate, “Web Technologies”, Second Edition, Tata McGraw Hill, 2012.
3. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, Tata McGraw Hill, 2013.
4. David Flanagan, “JavaScript: The Definitive Guide, Sixth Edition”, O'Reilly Media, 2011
5. Steven Holzner, “The Complete Reference - PHP”, Tata McGraw Hill, 2008
6. Mike Mcgrath, “PHP& MySQL in easy Steps”, Tata McGraw Hill, 2012.



## **DESIGN AND ANALYSIS OF ALGORITHMS**

**Course-15UPCSC2C03**

**Credits: 4**

### **Objective**

- Apply the algorithms and design techniques to solve problems
- Analyze the complexities of various problems in different domains.
- Analyze the performance of various algorithms.

### **Unit-I**

Introduction – Notion of Algorithm - Fundamentals of algorithmic problem solving – Important problem types – Fundamentals of the analysis of algorithm efficiency – analysis frame work – Asymptotic Notations and Basic Efficiency Classes- Mathematical analysis of non-recursive Algorithms – Non-recursive solution to the Matrix Multiplication - Mathematical analysis of recursive algorithms – Recursive solution to the Tower of Hanoi Puzzle.

### **Unit-II**

Divide and conquer Technique – Multiplication of large integers – Strassen's matrix multiplication – Closest pair and Convex Hull Problems - Greedy method – Prim's algorithm – Kruskal's algorithm – Dijkstra's algorithm.

### **Unit-III**

Dynamic Programming - Computing a binomial coefficient – Warshall's and Floyd's Algorithm – Application of Warshall's Algorithm to the digraph – Floyd's Algorithm for the all pairs shortest paths Problem - The Knapsack problem and Memory function.

### **Unit-IV**

Backtracking – N-Queens problem – Hamiltonian circuit problem – Subset sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem.

### **Unit-V**

P, NP and NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem – Knapsack problem.

**Text Book**

1. AnanyLevitin “Introduction to the Design and Analysis of Algorithms” Pearson Education 2009. (Chapters 1.1-1.3, 2.1, 2.2, 2.3, 2.4, 4.5, 4.6, 8.2, 8.4, 9.1-9.3, 11.3, 12.1,12.2, 12.3)

**Reference Books**

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, “Introduction to algorithms”, Prentice Hall 1990.
2. S.K. Basu, “Design methods and Analysis of Algorithms”, Prentice Hall, 2005.

## **ADVANCED DATABASE MANAGEMENT SYSTEM**

**Course-15UPCSC2C04**

**Credits: 4**

### **Course Objective**

- To enable the students to learn basic functions, principles with the advanced concept of data base management system
- To enlighten the students about advanced database systems.

### **Course Objectives:**

- **Course enables the students to learn basic functions, principles with the advanced concept of data base management system**

### **Unit-I**

Introduction to Database Systems: Role and Advantages of DBMS – Types of databases – Limitations of File system – Database systems - Data models: Importance of data models – Data model building blocks – Evolution of data models – Data abstraction models – Relational Database model: Table and their characteristics – Keys – Integrity rules – Relational set operators – Relationships – Codd's rules.

(Chapters: 1.1, 1.2, 1.5, 1.6, 2.1, 2.2, 2.3 - 2.5, 3.1-3.4, 3.6, 3.7, 3.9)

### **Unit-II**

ER modeling: ER model – ER diagram – Database design challenges – Normalization of database tables: Need for Normalization – Normalization process: First normal form – Second normal form – Third normal form - Improving the design – Key considerations – BCNF – Fourth normal form – Denormalization..

(Chapters: 4.1 - 4.3, 5.1 – 5.4, 5.6, 5.8)

### **Unit-III**

SQL: DDL – DML – Virtual tables – Joining database tables – Relational set operators – Join Operators – Sub queries and Correlated queries – SQL functions Database design: Information system – Database life cycle – Database design strategies – Centralized vs. Decentralized design

(Chapters: 7.1 – 7.8, 8.1 -8.4, 9.1, 9.3 -9.5)

### **Unit-IV**

Transaction management and concurrency control: Transactions – Concurrency control – Locking methods – Time stamping methods – Optimistic methods – Database recovery management – Database performance tuning concepts – Query processing – Query formulation - DBMS performance tuning.

(Chapters: 10.1-10.6, 11.1, 11.6, 11.7)

### **Unit-V**

Distributed database management systems: Evolution – Pros and cons – Distributed processing and databases – Characteristics of DDBMS- DDBMS components – Levels of distribution – Transparency features – Distribution transparency – Transaction transparency – Performance transparency and Query optimization – Distributed database design – Client server vs. DDBMS - Database connectivity and web development: Database connectivity – Internet databases - Database administration – Need and Role of database in organization – DBA function – DBA role – DBA tools – Data administration strategy.

(Chapters: 12.1 -12.12, 14.1 -14.2, 15.1 -15.7)

**Text Book:**

Peter Rob, Carlos coronel, “Database Systems – Design, Implementation and Management”, 7<sup>th</sup> edition, Thomson learning, India Edition 2007.

**Reference Books:**

1. Ritchie Colin, “Principles of Database Systems and Design” First edition, Cengage Learning India editon, 2011.
2. Coronel carlos, “Database Principles: Fundamentals of Design, Implementation and Management” 10<sup>th</sup> edition, Cengage Learning India editon, 2013.
3. Ramez Elmasri, Shamkant B Navathe, “Fundamentals of Database Systems – Models, Languages, Design and application programming” 6<sup>th</sup> edition, Pearson Education, 2013.

## THEORY OF COMPUTATION

Course-15UPCSC2C05

Credits: 4

### Objective

- To Enable the students to learn the concepts behind the computational process of a system
- To make the students to understand about the turing machine.

### Unit – I

Basic Terminology – String –Set theory- relation on set-graph and tree-Automata theory and computation- history of automata- grammar-Chomsky hierarchy-use of automata-characteristics of automata-finite automata-graphical and tabular representation-transactional system-DFA and NFA –conversion of NFA to DFA-Equivalence of DFA and NFA-Dead state-Finite automata with output-conversion of one machine to another-minimization of finite automata-Myhill--Nerode Theorem-Two way finite automata-applications-limitations.

(Chapters: 1.1-1.4,1.7-1.8,2.1-2.2,3.1-3.18)

### Unit – II

Finite state machine-state equivalence and minimization of machine - incompletely specified machine-merger graph- merger table-finite memory and definite memory-information lossless machine-inverse machine-minimal inverse machine-regular expression-operations on regular expression-identities of regular expression-arden's theorem-construction of finite automata from regular expression-NFA with  $\epsilon$  move and conversion to DFA by  $\epsilon$  -closure method.

(Chapters: 4.3-4.12,5.1-5.6)

### Unit – III

Equivalence of two finite automata- Equivalence of two regular expression- construction of regular grammar from an RE-constructing FA from regular grammar-Pumping lemma for regular expression-closure properties of regular set-decision problems of regular expression-‘Grep’ and regular expression-applications-context free grammar-derivation and parse tree-Ambiguity in context free grammar-left recursion and left factoring-simplification of context free grammar-linear grammar-normal form-closure properties – pumping lemma for CFL-Ogden's lemma for CFL-Decision problems for CFG-CFG and regular language-Applications.

(Chapters: 5.7-5.15,6.1-6.13)

#### **Unit- IV**

Push down automata-acceptance PDA-DPDA and NPDA-Construction of PDA from CFG-construction of CFG equivalent to PDA-Graphical notation for PDA-Turing Machine-transactional representation of turing machine –non deterministic turing – conversion of regular expression to turing machine.

(Chapters: 7.1-7.6,8.1-8.4)

#### **Unit- V**

Variations of turing machine-turing machine as an integer function-Universal turing machine-linear bounded automata-TM languages-unrestricted grammar-modified Chomsky hierarchy-Properties of recursive and recursively enumerable languages.

(Chapters: 9.1-9.4,10.1-10.4)

#### **Text book**

ShyamleenduKandar, “Introduction to automata theory, formal languages and Computation” First Edition, Pearson Education, 2013.

#### **Reference Books:**

1. John E Hopcraft, “Introduction to Automata theory, Languages and Computation”, 3<sup>rd</sup> edition, Pearson Education, 2008.
2. Rajesh Shukla, E V Prasad, “Formal Languages and Automata theory”, 1<sup>st</sup> edition, Cengage learning India edition, 2012.

## WEB TECHNOLOGY LAB

Course-15UPCSC2C06

Credits: 2

### Objective:

- To make the students work web pages and style sheets effectively.
- To enable the students to design the web pages with java script.

1. Design Online Book Store using List and Frames
2. Design a Time Table using Table and Images
3. Embedding Video and Audio Files in HTML
4. Design Event Web Page using Style Sheet (Font/Text, Color and Border Properties)
5. Write an XML document to display your bio-data. Write an XSL style sheet and attach it to the XML document. Validate the document using DTD or XSD.
6. Write an Ajax Program to get the User name suggestions in Registration Form
7. Web page using XML with Java Script
8. Design Image Map using Java Script
9. Registration Form Validation using Java Script
10. Simple Game using Event handling in Java Script
11. History of web pages using DOM
12. String Functions in PHP
13. Accessing the Student Exam Result Database (MySQL) using PHP
14. Develop a web application for Airline Reservation System using PHP& AJAX.
15. Online Shopping cart with Table operations(Insert, Select, Delete, Update) using PHP

## **ALGORITHMS LAB**

**Course-15UPCSC2C07**

**Credits: 2**

- To enable the students to implement different computational methods and techniques.
  - To develop understanding of diverse algorithms by implementing them systematically.
1. Apply the divide and Conquer technique to arrange a set of numbers using merge sort method.
  2. Perform Strassen's matrix multiplication using divide and conquer method.
  3. Solve the knapsack problem using Dynamic Programming.
  4. Construct a minimum spanning tree using greedy method.
  5. Perform Warshall's Algorithm using Dynamic Programming.
  6. Solve Dijkstra's Algorithm using Greedy Technique.
  7. Solve Subset Sum problem using Backtracking
  8. Implement the 8-Queens Problem using backtracking.
  9. Implement knapsack problem using backtracking.
  10. Find the solution of traveling salesperson problem using branch and bound technique.



## **SEMESTER II**

### **WEB PROGRAMMING**

**Course-15UPCSC2C08**

**Credits: 4**

#### **Objectives**

- To enable the students to understand the basic concepts of .Net environment
- To make the students to develop strong internet programs, web applications and web services

#### **Unit – I**

Introduction to .NET - .NET Defined – The .NET Framework - Visual Basic .NET. VB6 and VB .NET Differences – Data Type Changes- Arrays- Operators- User Defined Types- Null Values, Variables- Procedures- Properties- Control Flow- Form-based Application Changes- Application Types- Data Access- Object Oriented Programming and VB .NET – Encapsulation- Inheritance, Polymorphism - Data Types, Variables, and Operators – Arrays –Conditional Logic.

#### **Unit –II**

Procedures - Dialog Boxes – Introduction to Dialog Boxes- File IO and System Objects – Directory object - Error Handling –Namespaces –Classes and Objects –Multithreading.

#### **Unit –III**

Data Access – Introduction to Data Access in .NET - ADO.NET - Data Access in Visual Studio .NET – Visual Studio .NET Database Tools, Visual Studio .NET and ADO.NET - Visual Studio .NET and XML - Manipulating XML in Code - Windows Forms – Introduction to System.Windows.Form - Controls – Specific Controls – Base Controls, Derived Controls, Display Controls, Dialog Controls, Miscellaneous Controls.

#### **Unit –IV**

“Visual” Inheritance – Irregular Forms – Other Namespaces and Objects in the Catalog – Introduction to Web Development - Introduction to ASP.NET - Page Framework – HTML Server Controls.

#### **Unit –V**

Web Controls – Validation Controls –User Controls –Events – Cascading Style Sheets – State Management – ASP.NET Applications – Creating Web Application, Deleting an Application, global.asax, Understanding web.config.

**Text Book:**

1. Bill Evjen, Jason Beres, et al, “Visual Basic .NET Programming Bible”, Wiley India Publication,2002 – Chapters 1-15,21-41.

**Reference Books:**

1. David Chappell, Understanding .NET , Pearson education, 2002
2. David.S.Platt, Introducing Microsoft .Net , PHI, 2003.
3. G.AndrwDuthie , Microsoft ASP .NET Programming with Microsoft Visual C# .NET step by step , PHI ,2003.
4. George Shepherd, Microsoft ASP .NET 3.5 , PHI, New Delhi, 2008.
5. Steven Holzner, Visual Basic .NET Programming Black Book ,Dreamtech Press.
6. EvangelosPetroustos, Mastering Visual Basic .NET ,BPB Publications.
7. Barbara Doyle, Programming in C#, Cengage Learning publications –I Edition – 2008
8. Kathleen Kalata , Web Applications using ASP .NET 2.0 - Cengage Learning publications.

**ADVANCED OPERATING SYSTEM**  
**(For 2015-16 batch only)**

**Course-15UPCSC2C09**

**Credits: 4**

**Objective:**

- To understand the fundamental principles of operating systems, processes and their design.
- To understand the various operating system components like distributed resource management, Shared and Memory management and process synchronization.
- To understand basic and advanced concepts of virtual machines and distributed systems.

**Unit-I**

Operating System Structure: Operating-System Services – User and Operating-System Interface – System Calls – Types of System Calls – System Programs – Operating-System Design and Implementation – Operating-System Structure – Operating-System Debugging – Operating-System Generation – System Boot – Multiprocessor Operating Systems: Introduction – Structures of Multiprocessor Operating Systems – Operating System Design.

**Unit-II**

Distributed Resource Management: Introduction – Architecture – Mechanisms for Building Distributed File Systems – Design Issues – Distributed Shared Memory: Introduction – Architecture and Motivation – Algorithms for Implementing DSM – Memory Coherence – Coherence Protocols – Design Issues.

**Unit-III**

Process Management: Process – Process Concept – Process Scheduling – Operations on Processes – Interprocess Communication – Process Synchronization: Background – The Critical-Section Problem – Peterson’s Solution – Synchronization Hardware – Mutex Locks – Semaphores – Deadlocks: System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

**Unit-IV**

Memory Management: Main Memory: Background – Swapping – Contiguous Memory Allocation – Segmentation – Paging – Structure of the Page Table – Virtual Memory:

Background – Demand Paging – Copy-on-Write – Page Replacement – Allocation of Frames – Thrashing – Memory-Mapped Files – Allocating Kernel Memory.

### **Unit-V**

Virtual Machines: Overview – History – Benefits and Features – Building Blocks – Types of Virtual Machines and Their Implementations – Virtualization and Operating-System Components – Distributed Systems: Advantages of Distributed Systems – Types of Network-based Operating Systems – Network Structure – Communication Structure – Communication Protocols – Robustness.

### **Text Book:**

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, “Operating System Concepts”, Ninth Edition, John Wiley & Sons, Inc., 2013. Chapters (2, 3 (3.1-3.4),5 (5.1-5.6),7(7.1-7.7,8 (8.1-8.6),9(9.1-9.8), 16 (16.1-16.6),17(17.1-17.5, 17.7)
2. MukeshSinghal, Niranjan G. Shivaratri, “Advanced Concepts in Operating Systems: Distributed, Database, and Multiprocessor Operating Systems”, Tata McGraw-Hill, 2008. Chapters (17(17.1-17.3), 9 (9.1-9.4), 10(10.1-10.6))

### **Reference Books:**

1. Andrew S. Tanenbaum, “Modern Operating Systems”, 2nd Edition, Prentice-Hall of India, 2001.
2. William Stallings, “Operating Systems – Operating System: Internals and Design Principles”, 4th Edition, Prentice Hall, 2005.

**ADVANCED OPERATING SYSTEM**  
**(effect from 2016-17 batch onwards)**

**Course-15UPCSC2C09A**

**Credits: 4**

**Objective:**

- To understand the fundamental principles of operating systems, processes and their design.
- To understand the various operating system components like distributed resource management, Shared and Memory management and process synchronization.
- To understand basic and advanced concepts of virtual machines and distributed systems.

**Unit-I**

Introduction : Computer system organization - Computer system Architecture –Operating system Operating .System Structure: Operating-System Services – User and Operating-System Interface – System Calls – Types of System Calls – System Programs – Operating-System Design and Implementation – Operating-System Structure – Operating-System Debugging – Operating-System Generation – System Boot.

**Unit-II**

Process Management:– Process Concept – Process Scheduling – Operations on Processes – Interprocess Communication – Process Synchronization: Background – The Critical-Section Problem – Peterson’s Solution – Synchronization Hardware– Semaphores – Deadlocks: System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

**Unit-III**

Memory Management: Background – Swapping – Contiguous Memory Allocation– Paging – Structure of the Page Table– Segmentation – Virtual Memory: Background – Demand Paging – Copy-on-Write – Page Replacement – Allocation of Frames – Thrashing – Memory-Mapped Files – Allocating Kernel Memory.

**Unit-IV**

Virtual Machines: Overview – History – Benefits and Features – Building Blocks – Types of Virtual Machines and Their Implementations – Virtualization and Operating-System Components – Distributed Systems: Advantages of Distributed Systems – Types

of Network-based Operating Systems – Network Structure – Communication Structure –  
Communication Protocols – Robustness.

### **Unit-V**

Distributed Resource Management: Introduction – Architecture – Mechanisms for  
Building Distributed File Systems – Design Issues – Distributed Shared Memory:  
Introduction – Architecture and Motivation – Algorithms for Implementing DSM –  
Memory Coherence – Coherence Protocols – Design Issues.

### **Text Book:**

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, “Operating System Concepts”, 8<sup>th</sup> Edition, John Wiley & Sons, Inc., 2013. Chapters (2, 3 (3.1-3.4),5 (5.1-5.6),7(7.1-7.7,8 (8.1-8.6),9(9.1-9.8), 16 (16.1-16.6),17(17.1-17.5, 17.7)
2. MukeshSinghal, Niranjan G. Shivaratri, “Advanced Concepts in Operating Systems: Distributed, Database, and Multiprocessor Operating Systems”, Tata McGraw-Hill, 2008. Chapters (17(17.1-17.3), 9 (9.1-9.4), 10(10.1-10.6))

## **ADVANCED JAVA PROGRAMMING**

**Course-15UPCSC2C10**

**Credits: 4**

### **Objective**

- To get familiar with core java, packages, client side programming using Applets, and database connectivity
- To understand server side programming using servlets and JSP
- To provide knowledge on advanced features like Swing and Sockets

### **Unit-I**

An Overview of Java: Object Oriented Programming-Lexical Issues- class Libraries. Data Types, Variables, and Arrays: Primitive Types-Literals-Variables-Type Conversion and Casting- Arrays. Operators: Arithmetic-Bitwise – Relational - Boolean Logical- Assignment – Conditional - operator Precedence. Control Statements: Selection statements-Iteration Statements-Jump Statements. Classes and Methods: Fundamentals- Declaring objects- Methods- Constructors-Garbage Collection- Overloading Methods- Recursion – Access Control- Nested and Inner Classes- Command Line Arguments.

### **Unit-II**

Inheritance: Basics- Super Class- Method overriding- Abstract Class. Packages and Interfaces: Packages-Access Protection-Importing Packages- Interfaces- Default Interface Methods. Exception Handling: Fundamentals- types- Uncaught Exceptions- Try and Catch- throw-throws-finally-built-in exceptions. Multi-threaded programming: Thread Model-Creating a Thread- Thread Priorities-Synchronization-Interthread Communication.

### **Unit-III**

String Handling: Constructors- Length - Special String Operations - Character Extraction - String Comparison - Modifying a String - String Buffer. Input/Output: The I/O Classes and Interfaces – File - I/O Exceptions - Byte Streams - Character Streams – Serialization. The Applet Class: Basics-Architecture - Applet Skeleton - Display methods - Status Window - Passing Parameters. Event Handling: Event Model – Classes - KeyEvent Class- Event Listener Interfaces.

### **Unit-IV**

AWT: Window Fundamentals - Working with Frame Windows – Graphics -Working with Color - Working with fonts - Controls – Labels- Buttons- Check Box - Choice Controls- Lists- Scroll Bars- Text Field- Text Area - Layout Menubars and Menus. Java

Beans: Advantages - Introspection – properties - Java Beans API. Servlets: Life Cycle-Simple Servlet-Servlet API-Packages-Cookies-session tracking.

#### **Unit-V.**

Using Relational Databases: Introduction- JDBC Drivers for RDBM Systems - Using Java.sql API - Using Javax.sql API - Connection Pooling.Network Programming: Introduction- Working with URLs-Working with Sockets- Remote Method Invocation.

#### **Text Book**

1. Herbert Schildt, “The Complete Reference Java J2SE”, 9th ed., TMH Publishing Company Ltd, New Delhi, 2014.Chapter: 2-11, 16, 22, 23,24,25,26,37,38
2. Joe Wiggles worth and Paula McMillan, “Java Programming Advanced Topics”, 3rd ed., TMH, 2009.Chapter: 9, 11

#### **Reference Book**

1. John Dean, Raymond Dean, “ Introduction to Programming with JAVA – A Problem Solving Aproach”, Tata McGrawHil, 2012
2. Ralph Bravaco, Shai Simonson, “Java Programming : From the Ground Up”, Tata McGraw Hil Edit on, 2012
3. Herbert Schildt, Dale Skrien, “Java Fundamentals – A Comprehensive Introduction”, Tata McGrawHil, 2013



## WEB PROGRAMMING LAB

Course-15UPCSC2C11

Credits: 2

### Objective:

- To enable the students to design and develop the Web applications in .net environment.
- To produce the students with software development skills.

### A. Implement the following using VB.NET

1. Creating and using Variables, Arrays, Structure and Procedures
2. Using Decision Structures
  - a. Checking User Input
  - b. Confirming Application Close
3. Creating Menus, Status Bars and Toolbars
4. Create and open a connection to read, update and delete records in a database using ADO.NET

### B. Implement the following using ASP.NET

1. Create a master page to serve as a template with an admin page that has an editable master-detail.
2. Create and open a connection to read, update and delete records in a database using ADO.NET
3. Use SqlDataSource to populate a DropDownList and GridView
4. Use ObjectDataSource to Populate a GridView

### Case study

1. Create an simple VB.NET applications with the basic control s with ADO.NET
2. Design Web Application using ASP.NET that uses validation controls with ADO.NET

## **JAVA PROGRAMMING LAB**

**Course-15UPCSC2C12**

**Credits: 2**

### **Objective:**

- To enable the students to implement different java packages.
- To develop the students with the skills to implement different java tools.

### **Use JAVA Programming Language to implement the following:**

1. Concept of different types of inheritance.
2. Concept of Interface.
3. Concept of Package.
4. To handle mouse events.
5. To handle keyword events
6. To create applets incorporating the following Features:
  - a. Create a color palette with matrix of buttons
  - b. Set background and foreground of the control text area by selecting a color from color palette.
  - c. In order to select Foreground or background use check box control as radio buttons
  - d. To set background images
7. Use GridLayout to design a calculator and simulate the functions of simple calculator.
8. To Create Input output and Random files
9. To develop chat application with datagram sockets and datagram packets.
10. To invoke servlet from HTML forms.
11. To invoke servlet from Applets.
12. To invoke servlet from JSP.
13. Simple client/server application.
14. JDBC to interact with database.
15. To create multiple chat applications using TCP packets.

**SEMESTER III**  
**DATA MINING TECHNIQUES**

**Course Code: 15UPCSC2C13**

**Credits: 4**

**Objective:**

- To understand and implement knowledge extraction methods.
- To understand the concepts of clustering and classification.

**Unit I**

INTRODUCTION TO DATA MINING: Data miners-The Need for Human Direction of Data Mining-The Cross-Industry Standard Process for Data Mining: CRISP-DM- CRISP-DM: The Six Phases -Fallacies of Data Mining –Data Preprocessing :Data Cleaning- Handling Missing Data-Identifying Misclassification-Data Cleaning - Handling Missing Data- Identifying Misclassifications-Graphical Methods for Identifying Outliers - Measures of Center and Spread - Data Transformation-Min–Max Normalization- Z-Score Standardization - Decimal Scaling- Transformations to Achieve Normality-Numerical Methods for Identifying Outliers - Flag Variables - Transforming Categorical Variables into Numerical Variables- Binning Numerical Variables- Reclassifying Categorical Variables-Adding an Index Field - Removing Variables that are not Useful - Variables that Should Probably not be Removed- Removal of Duplicate Records

**Unit II**

DIMENSION –REDUCTION METHODS:Need for Dimension-Reduction in Data Mining- Principal Components Analysis-Appling PCA to the Houses Data Set- The Eigenvalue Criterion - The Proportion of Variance Explained Criterion- The Minimum Communality Criterion- The Scree Plot Criterion-Profiling the Principal Components-Communalities-Minimum Communality Criterion- Validation of the Principal Components-Factor Analysis-Appling Factor Analysis to the Adult Data Set- Factor Rotation- User-Defined Composite.

**Unit III**

K-NEAREST NEIGHBOR ALGORITHM: Classification Task- k-Nearest Neighbor Algorithm-Distance Function - Combination Function-Simple Unweighted Voting-Weighted Voting-Quantifying Attribute Relevance: Stretching the Axes-Database Considerations-k-Nearest Neighbor Algorithm for Estimation and Prediction- Choosing k -Application of k-Nearest Neighbor Algorithm Using IBM/SPSS Modeler-Decision Tree: Requirements for Using Decision Trees- Classification and Regression Trees- C4.5 Algorithm- Decision Rules-Comparison of the C5.0 and CART Algorithms Applied to Real Data.

**Unit IV**

CLUSTERING:The Clustering Task - Hierarchical Clustering Methods-Single-Linkage Clustering- Complete-Linkage Clustering - k-Means Clustering- Example of k-Means

Clustering at Work-Behavior of MSB, MSE, and Pseudo-F as the k-Means Algorithm Proceeds-Application of k-Means Clustering Using SAS Enterprise Miner-Using Cluster Membership to Predict Churn-MEASURING CLUSTER GOODNESS: Rationale for Measuring Cluster Goodness-The Silhouette Method - Silhouette Example - Silhouette Analysis of the IRIS Data Set-The Pseudo-F Statistic-Example of the Pseudo-F Statistic - Pseudo-F Statistic Applied to the IRIS Data Set - Cluster Validation- Cluster Validation Applied to the Loans Data Set.

#### **Unit V**

ASSOCIATION RULES-Affinity Analysis and Market Basket Analysis-Data Representation for Market Basket Analysis-Support, Confidence, Frequent Itemsets, and the a Priori Property-Generating Frequent Itemsets- Generating Association Rules-Extension from Flag Data to General Categorical Data- Information-Theoretic Approach: Generalized Rule Induction Method-J-Measure-Association Rules are Easy to do Badly--Local Patterns Versus Global Models- Case Study: Business understanding, Data Preparation and EDA

Chapters:1,2,4,10,11,19,22,23,29

#### **Text Book**

Daniel T. Larose , Chantal D. Larose, Data mining and Predictive analytics, Second Ed., Wiley Publication, 2015.

#### **Reference**

1. David L. Olson DursunDelen , Advanced Data Mining Techniques, Springer-Verlag Berlin Heidelberg, 2008
2. Jiwei Han, MichelenKamber, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers an Imprint of Elsevier, 2006.
3. John Wang, Encyclopedia of Data warehousing and Mining, Idea Group Publishing, 2005.

## **C# PROGRAMMING**

**Course: 15UPCSC2C14**

**Credits: 4**

### **Course Objective**

- **To understand the various OOPs Concepts**
- **To study and developed the various applications like Console, Windows and Web**
- **To acquire knowledge on Web Services**

### **Unit-I**

A First programming using C#–UsingData –Making Decisions – Looping.

### **Unit-II**

Using Arrays – Introductionto methods–Using classes and objects–Using GUI Objects and the Visual Studio IDE.

### **Unit-III**

Introduction to Inheritance–Exception Handling–Using Controls–Handling Events-Files and Streams.

### **Unit-IV**

Introduction to Windows Programming–Contrasting Windows and Console Applications–Graphical User Interfaces –Elements of Good Design–Using C# and Visual Studio to Create Windows–Based Applications –Window Forms–Controls.

### **Unit-V**

Programming based on events– Delegates –Event Handling in C# –List box, Combo box, Menu Strip, Check box, Radio Button and Tab Control objects.ASP.NET– Web Forms Page–Controls–Web forms server controls–Validation, Custom and Composite Controls –Web Services –Smart Device Applications.

### **Text-Books:**

- 1) Joyce Farrell “OOP Using Microsoft Visual C# 2008”, First Edition, Cengage Learning, 2009.  
**Chapters-1,2,3,4,5,6,7,8,9,10,11,12,13**
- 2) Barbara Doyle “Programming in C#”, First Edition,Cengage Learning, 2009.  
**Chapters-8, 9,14**

### **Reference Books:**

- 1) Anders Hejlsberg, Mads Torgersen, ScottWiltamuth, and Peter Golde ,“C# Programming Language”, 4<sup>th</sup> Edition, Addison-Wesley Professional, 2010.
- 2) Daniel Solis, “Illustrated C# 2008”, First Edition, Apress, 2008.
- 3) E.Balagurusamy, “Programming in C#”, Third Edition, Tata McGraw-Hill Education, 2010.

## **MACHINE LEARNING**

**Course: 15UPCSC2C15**

**Credits: 4**

### **Objective:**

- To make the students understand different regression models.
- To understand the concepts of neural networks.
- To implement the WEKA tool for validating logical regressions.

### **Unit I**

**SIMPLE LINEAR REGRESSION:** Introduction to Simple Linear Regression-The Least-Squares Estimates- Dangers of Extrapolation- The Coefficient of Determination,  $r$ - Standard Error of the Estimate  $s$ - Correlation Coefficient  $r$ -ANOVA Table for Simple Linear Regression- Outliers, High Leverage Points, and Influential Observations-Population Regression Equation- Verifying the Regression Assumptions- Inference in Regression-t-Test for the Relationship Between  $x$  and  $y$  -Confidence Interval for the Slope of the Regression Line - Confidence Interval for the Correlation Coefficient  $\rho$  - Confidence Interval for the Mean Value of  $y$  Given  $x$  - Prediction Interval for a Randomly Chosen Value of  $y$  Given  $x$  - Transformations to Achieve Linearity-Box–Cox Transformations.

### **Unit II**

**MULTIPLE REGRESSION AND MODEL BUILDING:** Introduction to Multiple Regression-The Population Multiple Regression Equation-Inference in Multiple Regression- Regression with Categorical Predictors, Using Indicator Variables-Adjusting  $R^2$ : Penalizing Models for Including Predictors that are not Useful- Sequential Sums of Squares- Multicollinearity- Variable Selection Methods- An Application of Variable Selection Methods- Using the Principal Components as Predictors in Multiple Regression.

### **Unit III**

**NEURAL NETWORKS:** Input and Output Encoding- Neural Networks for Estimation and Prediction- Simple Example of a Neural Network-Sigmoid Activation Function-Back-Propagation-Gradient-Descent Method - Back-Propagation Rules- Example of Back-Propagation-Termination Criteria -Learning Rate- Momentum Term- Sensitivity Analysis Application of Neural Network Modeling.

### **Unit IV**

**LOGISTIC REGRESSION:** Simple Example of Logistic Regression- Maximum Likelihood Estimation- Interpreting Logistic Regression Output-Odds Ratio and Relative Risk-Interpreting Logistic Regression for a Dichotomous Predictor-Interpreting Logistic Regression for a Polychotomous Predictor-Interpreting Logistic Regression for a Continuous Predictor- Assumption of Linearity-Zero-Cell Problem- Multiple Logistic

Regression- Introducing Higher Order Terms to Handle Nonlinearity - Validating the Logistic Regression Model-WEKA: Hands-On Analysis Using Logistic Regression.

### **Unit V**

GENETIC ALGORITHMS:Introduction To Genetic Algorithms-Basic Framework of a Genetic Algorithm- Simple Example of a Genetic Algorithm at Work - Modifications and Enhancements: Selection-Modifications and Enhancements: Crossover- Genetic Algorithms for Real-Valued Variables- Using Genetic Algorithms to Train a Neural Network - WEKA: Hands-On Analysis Using Genetic Algorithms- Case Study: Clustering and Principal Components Analysis

**Chapters:** 8,9,12,13,27,30

### **Text Book**

Daniel T. Larose , Chantal D. Larose, Data mining and Predictive analytics, Second Ed., Wiley Publication, 2015.

### **Reference**

1. Bertt Lantz , Machine Learning with R, Packt Publishing, 2013
2. Jason Bell, Machine Learning:Hands-On for Developers and Technical Professionals, Wiley Publication, 2015.

## **MOBILE COMPUTING**

**Course: 15UPCSC2C16**

**Credits: 4**

### **Objectives:**

- To introduce the concepts of wireless devices with signal, Antenna, Radio Frequencies, Signal Propagation.
- To introduce wireless communication and networking principles, that support connectivity to cellular networks, Wireless LAN.
- To introduce WAP architecture, MANET and Routing

### **Unit-I**

Introduction – Applications – History of wireless communication – A Simplified reference model - Wireless transmission – Frequencies for radio transmission – Regulations – Signals –Antennas - Signal propagation: Path loss of radio signals - Additional signal propagation effects - Multi-path propagation – Multiplexing - Modulation

Chapters: 1, 2.1 to 2.6

### **Unit-II**

Spread spectrum – Direct sequence spread spectrum – Frequency hopping spread spectrum – Cellular systems. Medium access control: Hidden and exposed terminals – Near and far terminals – SDMA, FDMA, TDMA, Fixed TDM, Classical Aloha, slotted Aloha, Carrier sense multiple access – Reservation TDMA – Multiple access with collision avoidance – Polling – CDMA – Spread Aloha multiple access.

Chapters: 3.1 to 3.3, 3.4.1 to 3.4.4, 3.4.7 to 3.4.9, 3.5.1

### **Unit-III**

GSM - Mobile services – System architecture – Radio interface – Protocols – Localization and calling – Handover – Security – New Data services. UMTS and IMT-2000 - Satellite Systems: Applications – Basics – Routing – Localization – Handover.

Chapters: 3.6, 4.1.1 to 4.1.8, 4.4, 5.2 to 5.6

### **Unit-IV**

Wireless LAN: Infra red vs. radio transmission – Infrastructure and ad-hoc network – IEEE 802.11 – System architecture – Protocol architecture – Physics layer – Medium access control layer – MAC management – Blue tooth. Mobile network layer: Mobile IP: Goals, assumptions and requirements – entities and terminology – packet delivery – Agent discovery – Registration – Tunneling and encapsulation Recent technologies

Chapters: 7.1 to 7.3.5, 7.5, 8.1.1 to 8.1.6

### **Unit-V**



WAP: Architecture – wireless datagram Protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Mobile ad-hoc networks – MANET Characteristics – Classification of MANETs, Routing of MANETs, Proactive Routing Protocol - DSDV, Reactive Routing Protocols – DSR, AODV. Chapter 10.3.1 to 10.3.6 (Text Book 2- 6.1, 6.2, 6.4, 6.5, 6.6)

**Text Book:**

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2009.
2. KumKumGarg, “Mobile Computing Theory and Practice”, Pearson Education, 2014.

**References Books:**

1. Rifaat A. Dayen “Mobile Data & Wireless LAN Technologies”, Prentice Hall, 1997.
2. Steve Mann and Scoot Schibli, “The Wireless Application Protocol”, John Wiley & inc., 2000.

### **DATA ANALYTICS LAB**

**Course: 15UPCSC2C17**

**Credits: 2**

Objective:

- To implement mathematical aggregation operators in “R-script”.
  - To understand the Statistical operations in “R”.
1. To get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND) using in R.
  2. To perform data import/export (.CSV, .XLS, .TXT) operations using data frames in R.
  3. To get the input matrix from user and perform Matrix addition, subtraction, multiplication, inverse transpose and division operations using vector concept in R.
  4. To perform statistical operations (Mean, Median, Mode and Standard deviation) using R.
  5. To perform data pre-processing operations
    - i) Handling Missing data
    - ii) Min-Max normalization
  6. To perform dimensionality reduction operation using PCA for Houses Data Set
  7. To perform Simple Linear Regression with R.
  8. To perform K-Means clustering operation and visualize for iris data set
  9. Write R script to diagnose any disease using KNN classification and plot the results.
  10. To perform market basket analysis using Association Rules (Apriori).

M. Sc-Computer Science Syllabus under CBCS Pattern effect from 2015-2016 Onwards  
Periyar University, Salem

**Course-15UPCSC2C18**

Mini Project

2 Credits

### **Soft Skill Development-Lab**

**Course: 15UPCSC2C19**

**1 Credit**

#### **Unit I - Listening and Reading skills**

**Listening skills:** Listening and typing – Listening and sequencing of sentences – Filling in the blanks -Listening and answering questions. **Reading Comprehension:** Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

#### **Unit II - Speaking**

Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation) - Common Errors.

#### **Unit III - Resume / Report Preparation / Letter Writing**

Structuring the resume / report - Letter writing / Email Communication - Samples.

#### **Unit IV - Group Discussion**

Why is GD part of selection process ? - Structure of GD – Moderator – Strategies in GD – Team work - Body Language - Mock GD – **Interview Skills:** Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews - Video samples.

#### **Unit V - Interpretation skills**

Sign - Symbols - Paragraphs - Tables - Charts - Figures - Audio - Video

#### **TEXT BOOKS**

1. E. Suresh Kumar, P.Sreehari, J.Savithri, Communication Skills and Soft Skills- An Integrated Approach, Pearson Education, Sixth Edition 2015.
2. S.P. Dhanavel, English and Soft Skills, Orient Black Swan 2010.

#### **REFERENCES:**

1. S.R.Bhatia, A. K.Jain Praveen, Professional Communication Skills, S. Chand and Company, Sixth Edition.
2. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press.
3. Sally Vanson, Improve your Data Interpretation Skills, Hodder & Stoughton, 2011
4. Ananta ashisha, Data Interpretation and Data Sufficiency, Arihant Publication, 2015
5. Anderson, P.V, Technical Communication, Thomson Wadsworth , Sixth Edition, New Delhi, 2007.
6. Prakash, P, Verbal and Non-Verbal Reasoning, Macmillan India Ltd. Second Edition, New Delhi,2004.
7. John Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New Delhi, 2004.
8. Evans, D, Decision maker, Cambridge University Press, 1997.
9. Thorpe, E, and Thorpe, S, Objective English, Pearson Education, Second Edition, New Delhi, 2007.

10. Turton, N.D and Heaton, J.B, Dictionary of Common Errors, Addison Wesley Longman Ltd., Indian reprint 1998.
11. Eric Garner, The A to Z of Presentations, Bookboon.com
12. David beckett, 33 Steps to Great Presentations, Bookboon.com
13. Melissa Conteras, Interpersonal Skills for Entrepreneurs, Bookboon.com

## **SEMESTER IV CLOUD COMPUTING**

**Course: 15UPCSC2C20**

**Credits: 4**

### **Objective:**

- Enable the students to learn and understand the fundamental concepts of Cloud and its services.
- To understand the service oriented architecture in cloud database.

### **Unit I**

Introduction – Definition of Cloud – Cloud types – Characteristics of Cloud – Cloud standards – Measuring cloud's value – Early adopters and new applications - Laws of cloudonomics – Cloud obstacles – Cloud adoption – Cloud computing costs – Service level agreements – Licensing model - Cloud architecture: Cloud computing stack – Composability – Infrastructure – Platforms – Virtual appliances – Communication protocol – Applications – Connecting to cloud.

### **Unit II**

Cloud Services: IaaS – PaaS – SaaS – IaaS – CaaS - Abstraction and Virtualization: Virtualization technologies – Load balancing – Hypervisors – Machine imaging – Porting applications – Capacity planning: Baseline and Metrics – Measurements – System metrics – Load testing – Resource ceilings – Servers and Instance types – Network Capacity – Scaling

### **Unit III**

Exploring Platform as a Service (PaaS) : Service model – Development – Sites and tools – Application features - Exploring Cloud Infrastructures: Administrating the clouds – Management responsibilities – Life cycle management - Cloud management products – Cloud management standards – Cloud Security: Securing the Cloud – Securing the Data – Establishing identity and presence

### **Unit IV**

Service oriented architecture – Introduction – SOA communications – Managing and Monitoring SOA – Relating SOA and Cloud - Applications to the cloud : Functionality mapping – Applications attributes – Cloud service attributes – System abstraction – Cloud bursting – Applications and Cloud APIs – Cloud Storage: Measuring digital universe – Provisioning cloud storage – Cloud backup solutions – Cloud storage interoperability.

**Unit – V**

Exploring cloud mail service – Syndicate services – Instant messaging – Collaboration technologies using social networking – Audio and Video streaming – VoIP applications – Mobile market – Smart phones with the cloud - Mobile Web service : Service types – Service discovery – SMS – Protocols – Synchronization

**Text Book**

Barrie Sosinsky, Cloud Computing Bible, Wiley Publications, 2011  
(Unit I to V)

**Reference Books**

1. Rountree, Castrillo, The Basics of Cloud Computing - Understanding the Fundamentals of Cloud Computing in Theory and Practice, First Edition, Syngress Publication, 2013
2. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, 2008
3. Srinivasan. S, Cloud Computing Basics, Springer, 2013

## **BIG DATA ANALYTICS**

**Course: 15UPCSC2C21**

**Credits: 4**

### **Objective**

- To understand the basic concepts of big data, methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and the business needs.

### **UNIT I**

Introduction to Big Data Platform - Challenges of Conventional Systems - Intelligent data analysis - Nature of Data - Analytic Processes and Tools - Analysis Vs reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions -Re-Sampling- Statistical Inference – Prediction Error.

### **UNIT II**

Introduction To Streams Concepts - Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream - Filtering Streams - Counting Distinct Elements in a Stream - Estimating Moments - Counting Oneness in a Window - Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

### **UNIT III**

History of Hadoop- The Hadoop Distributed File System - Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS- Java interfaces to HDFSBasics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort - Task execution - Map Reduce Types and Formats- Map Reduce Features

### **UNIT IV**

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop - HDFS - Monitoring- Maintenance-Hadoop benchmarks- Hadoop in the cloud

### **UNIT V**

Applications on Big Data Using Pig and Hive - Data processing operators in Pig - Hive services - HiveQL - Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphereBigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications



**Text Book**

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer,2007.
2. Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media,2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,  
"Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data",  
McGrawHill Publishing,2012
4. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets",  
Cambridge University Press,2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data  
Streams with Advanced Analytics", JohnWiley& sons,2012.

## **PYTHON PROGRAMMING LAB**

**Course: 15UPCSC2C22**

**Credits: 2**

**Objective:**

- To implement different programs using python.
- To develop dynamic and interactive web pages.

**Implement the following in Python:**

1. Programs using elementary data items, lists, dictionaries and tuples.
2. Programs using conditional branches, loops.
3. Programs using functions
4. Programs using exception handling
5. Programs using classes and objects
6. Programs using inheritance
7. Programs using polymorphism
8. Programs to implement file operations.
9. Programs using modules.
10. Programs for creating dynamic and interactive web pages using forms.

**Course: 15UPCSC2C22**

**Credits:**

**ELECTIVES – I**

**OPERATIONS RESEARCH**

**Course-15UPCSC2E01**

**Credits: 3**

**Objective**

- To understand the concept of optimization
- To develop mathematical model of real life cases
- To study Optimization algorithms

**Unit – I**

Linear Programming Problem (LPP): Formulations and graphical solution of (2 variables) canonical and standard terms of linear programming problem.

**Unit – II**

Algebraic Solution: Simplex algorithm, Simplex methods – solving problems with slack variable

**Unit – III**

Transportation Model: North West corner Method, Least cost method, and vogel's approximation method. Assignment Model : Hungarian assignment model – Travelling sales man problem.

**Unit – IV**

Replacement Problem: Replacement policy for equipment that deteriorate gradually, Replacement of item that fail suddenly-Individual and group replacement, Problems in mortality and staffing.

**Unit – V**

Project Scheduling PERT/CPM Networks – Fulkerson's Rule – Measure Of Activity – PERT Computation – CPM Computation – Resource Scheduling.

**Reference Books:**

1. KantiSwarup, P.K. Gupta & Manmohan – Operation Research 1996.

M. Sc-Computer Science Syllabus under CBCS Pattern effect from 2015-2016 Onwards  
Periyar University, Salem

2. S.Kalavathy: Operations Research – Second Edition – Vikas Publishing House Pvt.Ltd., 2

## STATISTICAL METHODS

Course-15UPCSC2E02

Credits: 3

### Objective

- To understand the applications of various correlation methods
- To study and model the sampling concepts
- To acquire knowledge on Hypotheses test

### Unit-I: Correlation

Definition of Correlation- Scatter Diagram- Kari Pearson's Coefficient of Linear Correlation- Coefficient of Correlation and Probable Error of r- Coefficient of Determination - Merits and Limitations of Coefficient of Correlation- Spearman's Rank Correlation(7.1-7.9.4).

### Unit-II: Regression Analysis:

Regression and Correlation(Intro)- Difference between Correlation and Regression Analysis- Linear Regression Equations -Least Square Method- Regression Lines- Properties of Regression Coefficients- Standard Error of Estimate.(8.1-8.8)

### Unit-III: Probability Distribution and mathematical Expectation:

Random Variable- Defined - Probability Distribution a Random Variable- Expectation of Random Variable- Properties of Expected Value and Variance(12.2-12.4).

### Unit-IV: Sampling and Sampling Distributions:

Data Collection- Sampling and Non-Sampling Errors – Principles of Sampling-- Merits and Limitations of Sampling- Methods of Sampling- Parameter and Statistic- Sampling Distribution of a Statistic- Examples of Sampling Distributions- Standard Normal, Student's  $t$ , Chi-Square ( $\chi^2$ ) and Snedecor's F- Distributions(14.1-14.16).

### Unit-V: Statistical Inference- Estimation and Testing of Hypothesis:

Statistical Inference- Estimation- Point and interval- Confidence interval using normal,  $t$  and  $\chi^2$  Distributions- Testing of Hypothesis- Significance of a mean - Using  $t$  Distribution(15.1-15.10.2).

### Textbook:

1. K.L. Sehgal, "Quantitative Techniques and Statistics", First Edition, Himalaya Publishing House, 2011.

### Reference:

1. N. P. Bali, P. N. Gupta, C. P. Gandhi, "A Textbook of Quantitative Techniques", First Edition, Laxmi Publications, 2008.

2. U. K. Srivastava, G. V. Shenoy, S. C. Sharma, “Quantitative Techniques for Managerial Decisions”, Second Edition, New Age International Publishers, 2005.

## NUMERICAL METHODS

Course: 15UPCSC2E03

Credits: 3

Objective (Theorems and Proofs are not expected)

- To understand the concept of approximation
- To study various Numerical Method based algorithms

### Unit – I

Empirical laws and curve fitting :Introduction-Laws reducible to the linear law – method of group averages – Laws containing three constants – principle of least squares – Fitting of a straight line – Fitting of a parabola – Fitting an exponential curve – method of moments.

### Unit – II

Transcendental Equation and Algebraic Equations : Introduction - Bisection Method, Newton – Rapson Method – Method of False Position – Horner’s Method

### Unit – III

Solutions of Linear algebraic Equations :Direct Methods: Gauss elimination Method-Gauss Jordan Method-Crout’s Method. Iterative Methods: Gauss Jacobi’s Method-Gauss Seidel method-Relaxation Method.

### Unit –IV

Finite Differences: Newton’s forward interpolation formula-Newton’s backward interpolation formula. Central Differences – Gauss’s Forward Formula – Gauss’s Backward Formula Stirling’s Formula-Bessel’s Formula

### Unit-V

Interpolation with unequal Intervals: Divided Differences – Inverse Interpolation – Numerical Differentiation – Numerical integration

### Text Book:

**A. Singaravelu, Numerical Methods, Meenakshi Publications, Chennai, 1999.**

### Reference:

1. S.S.Sastry, “Introductory methods of numerical analysis”, PHI, New Delhi 1982.
2. M.K.Jain, S.R.K.Iyengar and R.K.Jain “Numerical methods for science and Engineering computation”, Wiley Eastern Limited – 2nd edition –1995.

## COMPILER DESIGN

Course-15UPCSC2E04

Credits: 3

### Objectives:

- To enable the students to learn the basic concepts of translator
- To make the students to understand the structure and functions of each phases of Compiler

### Unit-I

Introduction to compilers: Compilers and Translators – Structure of a Compiler – Lexical Analysis – Syntax Analysis – Intermediate code generation – Optimization – Code generation – Book keeping – Error handling – Compiler Writing tools – Lexical Analysis: The role of the Lexical analysis – A simple approach to the design of lexical analyzers – Regular expressions – Implementation of a lexical analyzer.

### Unit-II

Basic Parsing techniques: Derivations and parse trees – Parsers – shift reduce parsing – Operator Precedence Parsing – Top down parsing – Predictive parsing – Automatic construction of efficient parsers: LR parsers – The Canonical collection of LR (0) items – Constructing SLR parsing tables – Constructing canonical LR parsing tables – Constructing LALR parsing tables – Using ambiguous grammars – An automatic parser generator – Implementation of LR parsing tables – Constructing LALR set of items.

### Unit-III

Syntax- Directed translation: Syntax-directed translation schemes – Implementation of syntax-directed translators – Intermediate code – Postfix notation – Three address code, quadruples, and triples- Postfix translations.

### Unit-IV

Symbol tables: The contents of a symbol table – Data structures for symbol tables – Representing scope information – Error detection and recovery: Errors – Lexical-Phase errors – Syntactic –phase errors – Semantic errors.

### Unit-V

Introduction to Code optimization: The principal sources of optimization – Loop optimization – The DAG representation of basic blocks – Code generation: Object programs – Problems in code generation – A simple code generator – Peephole optimization.

### Text Book:

AlferdV.Aho and Jeffrey D.Ullman, “Principles of Compiler Design”, Narosa Publishing House, 2002.



M. Sc-Computer Science Syllabus under CBCS Pattern effect from 2015-2016 Onwards  
Periyar University, Salem

Chapters: 1.1, 1.3, 1.4, 1.5 to 1.11, 3.2,3.3, 3.8, 4.2,5,6,7.1 to 7.4, 7.6, 7.10, 9,11,12.1 to 12.3, 15.1, 15.2,15.4, 15.7.

**Reference Books:**

3. Alfred V. Aho, Ravi Sethi, Jeffery D.Ullman and Monica S Lam, “Compilers”, 2<sup>nd</sup> edition, Pearson Education, 2014.
4. V. Raghavan, “Principles of Compiler Design”, McGraw Hill International Editions, 2009.

**ELECTIVES – II**  
**IMAGE PROCESSING**

Course: **15UPCSC2E05**

**Credits: 3**

**Objective:**

- To introduce different Mathematical tools.
- To implement different morphological image processing techniques.

**Unit-I**

**Digital Image Processing**

Introduction – Origins - Examples of fields - Fundamental steps - Components of a image processing system - Elements of visual perception - Light and the electromagnetic spectrum -Image sensing and acquisition - Image sampling and quantization - Basic relationships between pixels - Mathematical tools.

**Unit-II**

**Intensity Transformations**

Background – Basic intensity transformation functions – Histogram processing – Fundamentals of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – Spatial enhancement methods – Basics of filtering in the frequency domain – Image smoothing using frequency domain filters – Selective filtering – Implementation.

**Unit-III**

**Image Compression and Segmentation**

Fundamentals – Basic compression methods – Digital image watermarking – Morphological image processing – Erosion and dilation – Opening and closing – Hit-or-miss transformation – Basic morphological algorithms – Gray scale morphology – Image segmentation – Fundamentals – Point, Line and edge detection – Thresholding – Region based segmentation – Segmentation using morphological watersheds – Use of motion in segmentation.

**Unit-IV**

**Representation and Description**

Representation – Boundary descriptors – Regional descriptors – Use of principal components for description – Relational descriptors.

**Unit-V**

**Object Recognition**

Patterns and pattern classes – Recognition based on decision – Theoretic methods – Structural methods.

**TEXT BOOKS:**

1. Gonzalez.R.C& Woods. R.E., Digital Image Processing, 3<sup>rd</sup> Edition, Pearson Education, 2012.(Chapters: 1,2,3,4,8,9,10,11,12).
2. Anil K. Jain, Fundamentals of Digital image processing, Prentice Hall of India, 2009.(Chapters: 5,7,8,11).

**REFERENCE BOOKS:**

1. Chanda and Majumdar, Digital image processing and analysis, Prentice Hall, 9<sup>th</sup> Edition, 2007.
2. Rafeal C. Gonzalez Richard E. Woods, Digital image processing, 3<sup>rd</sup> Edition, Pearson Education, 2009.
3. Madhuri a. Joshi, Digital image processing an algorithmic approach, Prentice Hall of India, 2006.
4. Sonka, Hlavac, Boyle, Digital image processing and computer vision, Cengage Learning, 6<sup>th</sup> Edition, 2011.
5. S. Jayaraman, S.Esakkirajan, T.Veerakumar, Digital image processing, Tata McGraw Hill, 2011.
6. AbhishakYadev, PoonamYadev, Digital image processing, University Science Press, 2011.
7. Rafeal C. Gonzalez Richard E. Woods, Digital image processing using MATLAB, 2<sup>rd</sup> Edition, Tata McGraw Hill, 2011.

## **INFORMATION SECURITY**

**Course: 15UPCSC2E06**

**Credits: 3**

### **Objective:**

- To understand the foundations of Information security.
- To implement different cryptography techniques.

### **UNIT –I**

Foundations: Information Security Overview: The importance of information Protection-The evolution of Information Security –Justifying Security Investment – Security Methodology –Build a Security Program-The Impossible Job- the Weakest Link-Strategy and Tactics-Business Process vs. Technical Controls –Risk Analysis: Threat Definition –Types of Attacks- Information Security Standards –Regulations Affecting Information Security Professionals-Laws Affecting Information Security Professionals-Secure Design Principles-Authentication and Authorization.

### **UNIT-II**

Introduction to cyber security science: The scientific method-cyber security theory and practice-Human factors-The role of Metrics-Conducting cyber security experiments: Asking Good questions and Formulating Hypotheses-Designing a Fair Test-Analyzing Your Results-Putting Results to work-A checklist for conducting Experimentation –Cyber security Experimentation and Test Environments: Modeling and simulation-Open Datasets for Testing-Desktop Testing –Cloud Computing –Cyber security Test beds-A checklist for selecting an Experimentation and Test Environment.

### **UNIT-III**

Software Assurance: An example scientific Experiment in Software Assurance – Fuzzing for Software Assurance –The scientific Method and the software Development Life Cycle-Adversarial Models -How to find More Information-Intrusion Detection and Incident Response: An example Scientific Experiment in Intrusion Detection –False Positives and False Negatives- Performance, Scalability , and Stress Testing –Situational Awareness and Data Analytics: An example Scientific Experiment in Situational Awareness -Experimental Results to Assist Human Network Defenders- Machine Learning and Data mining for Network Monitoring.

### **UNIT –IV**

Cryptography: An Example Scientific Experiment in Cryptography – Experimental Evaluation of Cryptographic Designs and Implementation- Provably Secure Cryptography and security Assumptions-Cryptographic Security and the Internet of the Things-Digital Forensics: An Example Scientific Experiment in Digital Forensics– Scientific Reproducibility and Repeatability– Malware Analysis:An Example Scientific

Experiment in Malware Analysis-Scientific Data Collection for simulators and Sandboxes-Game Theory for Malware Analysis.

#### **UNIT-V**

System security Engineering: An Example Scientific Experiment in System security Engineering –Regression Analysis –Moving Target Defense –Human-Computer Interaction and Usable Security: An Example Scientific Experiment in Usable Security – Double –Blind Experimentation-Usability Measures: Effectiveness, Efficiency, and Satisfaction – Methods for Gathering Usability Data-Visualization :An Example Scientific Experiment in Cyber security Visualization –Graphical representations of Cyber security Data – Experimental Evaluation of security Visualization.

#### **Text Book**

1. Mark Rhodes Ousley, The Information security the complete Reference ,2013 Second Edition Chapters:1-4,6,7
2. Josiah Dykstra ,Essential Cyber Security Science, 2016 First Edition Chapters:1-12

## **INTERNETWORKING WITH TCP/IP**

**Course: 15UPCSCE07**

**Credits: 3**

### **Objectives:**

- To study the standards of TCP / IP protocol and addressing types.
- To Study various protocols like UDP, TCP, ICMP.
- To study the important network protocols, DNS, SNMP and IPV6 standards.

### **UNIT 1:**

Introduction and overview – Network Technologies - Internetworking concepts and architectural model –Classful Internet address

### **UNIT 2:**

Mapping Internet Address to Physical Addresses – Internet Protocol: Connectionless Datagram Delivery (IPv4) – Internet Protocol: Forwarding IP Datagrams – Internet Protocol: Error and Control Message (ICMP).

### **UNIT 3:**

User Datagram Protocol (UDP) – Reliable Stream Transport Service (TCP) – Routing Architecture : Cores, Peers and Algorithms.

### **UNIT 4:**

Internet Multicasting – Mobile IP – Private Network Interconnection.

### **UNIT 5:**

The Domain Name System (DNS) – Electronic Mail – Voice and Video Over IP – Network Management –IPv6

### **TEXT BOOKS:**

1.DouglasE.Comer, “Internetworking with TCP/IP Principles, Protocols andArchitecture”, Vol 1 & 2, fifth edition, PHI, 2006.

### **REFERENCES:**

- 1.BehrouzA.Forouzan, “TCP/IP protocol suite” Fourth edition, Tata McGraw Hill, 2003.
- 2.W.Richard Stevens “TCP/IP illustrated” Volume 2, Pearson Education 2003.

## COMPUTER GRAPHICS

Course: 15UPCSC2E08

Credits: 3

### Objective:

- To implement different Display techniques.
- To understand different transformation techniques.

### Unit I

Overview: Video display devices – Raster and Random scan system – Input devices  
Output primitives: Points and Lines – Line drawing algorithms – Loading the frame buffer – Line function.

### Unit II

Circle generating and Ellipse generating algorithm Pixel addressing and object geometry – Filled area primitives – Fill area function – Cell array – Character generation. Attributes of output primitives: Line attributes – Color and Grayscale levels – Area fill and Character attributes – Antialiasing. 2D Geometric transformations: Basic transformations – Composite – Reflection and Shear – Transformations between Coordinate systems.

### Unit III

Affine transformations – Functions – Raster methods 2D Viewing: Viewing Pipeline – Coordinate reference frame – Window to Viewport – Viewing functions – Clipping operations – Line, Polygon, Text and Exterior clipping – GUI and Interactive input methods: User dialogue – Input of Graphical data – Input functions – Initial value – Picture construction – Virtual reality environments.

### Unit IV

3D Concepts: Display methods Object Representations – Polygon surface – Curved lines and surface – Quadratic – Spline representation. 3D Geometric and Modeling transformations: Translation – Rotation – Scaling – Reflections – Shears – Composite transformations – functions. 3D Viewing: Pipeline – Coordinates – Projections – Clipping – Functions.

### Unit V

Visible surface detection methods: Classification – Back face – Depth buffer – A buffer – Depth sorting – BSP – Area subdivision – Octree – Ray casting Color models and Applications: Properties of light – Standard primaries and Chromaticity diagram – RGB, YIQ, CMY, and HSV color models. Computer animations: Design – functions – Raster animations – Key frame systems – Motion specifications.

### Text Book

1. Donald Hearn M. Pauline Baker, “Computer Graphics”, Second Edition, PHI Private Limited, 2004.  
(Chapters: 2.1- 2.3, 2.5, 3.1 - 3.6, 3.10 - 3.14, 4.1, 4.3 - 4.5, 4.8, 5.1, 5.3 - 5.8, 6.1 - 6.8, 6.10 – 6.11, 8.1 – 8.6, 9.1, 10.1 – 10.3, 10.6, 11.1 – 11.6, 12.1 – 12.3, 12.5, 12.7, 13.1 – 13.10, 15.1 – 15.2, 15.4 – 15.7, 16.1 – 16.3, 16.5 – 16.6)

**Reference Books:**

1. F.S Hill, JR, "Computer Graphics using Open GL", Second Edition, PHI, 2005
2. R.G.S Asthana, N. K. Sinha, "Computer Graphics for Scientists and Engineers"  
Second Edition, New Age international Publishers, 2003



**ELECTIVES - III**  
**OPEN SOURCE TECHNOLOGIES**

**Course: 15UPCSC2E09**

**Credits: 3**

**Unit-I**

Python Introduction – Numbers, Strings, and Variables – Lists, Tuples, Dictionaries, and Sets – Code Structures: if, elif, and else – Repeat with while – Iterate with for – Comprehensions – Functions – Generators – Decorators – Namespaces and Scope – Uses of \_ and \_\_ in Names – Handle Errors with try and except – Make Your Own Exceptions.

**Unit-II**

Modules, Packages, and Programs:- Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library – Objects and Classes:- Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Your Parent with super – In self Defense – Get and Set Attribute Values with Properties – Name Mangling for Privacy – Method Types – Duck Typing – Special Methods – Composition – Text Strings – Binary Data.

**Unit-III**

File Input/Output – Structured Text Files – Relational Databases – NoSQL Data Stores – Web Clients – Web Servers – Web Services and Automation – System Files – Directories – Programs and Processes – Calendars and Clocks – Concurrency – Install Packages – Testing Your Code.

**Unit-IV**

Perl History – Perl Components – The Execution Process – Syntax and Parsing Rules – Basic Naming Rules – Scalar Variables – Literals – Numeric Literals – String Literals – Quotes- Interpolation of Array Values – Arrays – Hashes – Lists – Typeglobs – The defined Function and the Undefined Value – Default Values – Code Blocks – Conditional Statements – Loops– Functions – Packages – Modules – Scope.

**Unit-V**

Working with Files:-Filehandles- File Management - Working with Numbers - Working with Strings - Regular Expressions - Errors and Trapping – Complex Structures - Objects - Using the DBI and Win32::ODBC Toolkits.

**Text Books:**

1. Bill Lubanovic, “Introducing Python”, O’Reilly (2014), First Edition-Second Release. [Chapters: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12]
2. Martin C. Brown, “Perl: The Complete Reference, Second Ed”, Osborne/McGraw Hill(2001). [Chapters: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13]

**Reference Books:**

1. Mark Lutz, “Learning Python”, O’Reilly (2013), Fifth Edition.
2. David M. Beazley, “Python Essential Reference”, Developer’s Library (2009), Fourth Edition.
3. Joseph N. Hall, Joshua A. McAdams, Brian d foy, “Effective PerlProgramming”, Addison Wesley (2010), Second Edition.
4. Tom Christiansen, Brian d foy & Larry Wall, with Jon Orwant, “Programming Perl”, O’Reilly (2012), Fourth Edition.

## **NETWORK MANAGEMENT**

**Course 15UPCSC2E10**

**Credits: 3**

### **Objectives:**

- To Learn NMS domain knowledge and obtain strong knowledge on Network Management Concepts and Principles.
- To understand different security threat and models.

### **UNIT I - Data Communications and Network Management Overview**

Analogy of Telephone Network Management – Data (Computer) and Telecommunication Network – Distributed Computing Environment – TCP/IP–Based Networks: Internet and Intranet – Communication Protocols and Standards – Communication Architectures – Protocol Layers and Services – Networks, Systems, and Services – Broadband Networks, Systems, and Services – Wide Area Networks – Broadband Access Networks – Home/CPE Networks – Quality of Service in Broadband Systems – Security and Privacy in Broadband Systems – Network Management: Goals, Organization and Functions.

### **UNIT II - SNMP and Network Management**

Basic Foundations: Standards, Models, and Language – Network Management Standards – Network Management Models – Organization Model – Information Model – Abstract Syntax Notation One: ASN.1 – SNMPv1 Network Management: Organization and Information Models – SNMPv1 Network Management: Communication and Functional Models – SNMPv2 – SNMPv2 Structure of Management – SNMPv2 Protocol – SNMPv3 – SNMPv3 Applications.

### **UNIT III - Security**

Security Threats – Security Model – Message Format – SNMPv3 User-Based Security Model – Access Control: Elements of the Model – VACM Process – VACM MIB – SNMP Management: RMON – Introduction to Remote Monitoring – RMON SMI and MIB – RMON1: RMON1 Textual Conventions – RMON1 Groups and Functions – Relationship between Control and Data Tables – RMON1 Common and Ethernet Groups – RMON Token-Ring Extension Groups – RMON2 – ATM Remote Monitoring.

### **UNIT IV- Network Management Tools, Systems and Engineering**

Basic Tools – SNMP Tools – Protocol Analyzer – Network Statistics Measurement Systems – MIB Engineering: General Principles and Limitations of SMI – Counters vs. Rates – Object-Oriented Approach to MIB Engineering – SMI Tables – SMI Transactions – NMS Design: Functional Requirements – Architecture of the NMS Server – Key Design Decisions – Discovery Module – Performance Manager – Fault Manager – Distributed Management Approaches – Server Platforms – NMS Client Design – Network Management Systems: Network Management

– System and Application Management – Enterprise Management – Telecommunications Management Systems.

### **UNIT V- Network Management Applications**

Configuration Management: Network Provisioning – Inventory Management – Network Topology – Fault Management – Performance Management: Performance Metrics – Data Monitoring – Data Monitoring – Problem Isolation – Performance Statistics – Event Correlation Techniques: Rule-Based Reasoning – Model-Based Reasoning – Case-Based Reasoning – Casebook Correlation Model – State Transition Graph Model – Finite State Machine Model – Security Management: Policies and Procedures – Resources to Prevent Security Breaches – Firewalls – Cryptography – Authentication and Authorization – Client-Server Authentication Systems – Message Transfer Security – Network Protection from Virus Attacks – Accounting Management – Report Management – Policy Management – Policy-Based Management – Service Level Management.

#### **Text Books:**

1. Mani Subramaniam, “Network Management: Principles and Practice“, Pearson Education India”, Second Edition, 2010.  
(Chapters: 1, 3, 4, 5, 6, 7, 8, 9, 11)

#### **References:**

1. D.E. Comer, “Internetworking with TCP/IP Vol- III”, (BSD Sockets Version), Second Edition, Pearson Education, 2000UNIT III
2. William Stallings, “SNMP, SNMPv2, SNMPv3 and RMON 1 and 2”, Third Edition, Addison Wesley, 1999.

## **BIOINFORMATICS**

**Course: 15UPCSC2E11**

**Credits: 3**

### **Objective:**

- To understand the basics of bio-informatics
- To analyse genome basics.
- To implement micro array dataset in mathematical tool.

### **Unit – I**

Bioinformatics: An Introduction – Introduction to Biological Databases –Databases - Types of Databases – Biological Databases Considerations – Information Search and Data Retrieval – Electronic Libraries – Tools for Web Search – Data Retrieval Tools – Data Mining of Biological Databases.

(Chapters: 1, 2 and 3)

### **Unit – II**

Genome Analysis and Gene Mapping – The Sequence Assembly Problem – Genetic Mapping and Linkage Analysis – Physical Maps – Cloning the Entire Genome – Genome Sequencing – Applications of Genetic Maps – Sequence Assembly Tools – Identification of Genes in Contigs – The Human Genome Project.

(Chapter: 4)

### **Unit – III**

Introduction to Phylogenetics – Taxonomic Relationships from Molecular Properties – Terminology – Tree Topologies – Gene Trees – Tools for Tree Visualization – Methods of Phylogenetic Analysis – Distance-based Methods – Character-based Method – Tree Evaluation – Problems in Phylogenetic Analysis – Automated Tools for Phylogenetic Analysis.

(Chapters: 7, 8)

### **Unit- IV**

Gene Identification and Prediction – Basis of Gene Prediction – Pattern Recognition – Gene Prediction Methods – Other Gene Prediction Tools – Gene Expression and Microarrays – Working with DNA Microarrays – Clustering GENE Expression Profiles – Data Sources and Tools for Microarray Analysis - Applications of Microarray Technology.

(Chapters: 11, 13)

### **Unit- V**

Protein Classification and Structure Visualization – Overview of the Protein Structure - Protein Structure Visualization – Structure-based Protein Classification - Protein Structure Databases – Protein Structure Visualization Databases and Tools - Protein Structure Alignment – Domain Architecture Databases – Tools for Plotting Protein-ligand Interaction – Protein Classification Approaches – Protein Structure Prediction – Protein Identification and Characterization – Primary Structure Analysis and Prediction – Secondary Structure Analysis and Prediction – Motifs, Profiles, Patterns and Fingerprints

Search – Methods of Sequence-based Protein Prediction – *Ab Initio* Approach for Protein Prediction – Methods of 2-D Structure Prediction – Protein Function Prediction – Protein Prediction from a DNA Sequence.

(Chapters: 14, 15)

**Text book**

S. C. Rastogi, N. Mendiratta and P. Rastogi, “Bioinformatics Methods and Applications”, Fourth Edition, PHI Learning Private Ltd., 2013.

## **PROGRAMMING FOR APPLICATION DEVELOPMENT**

**Course 15UPCSC2E12**

**Credits: 3**

### **Objectives:**

- To Learn the Android Applications and its Development Environment
- To Development of different Android Applications.

**Unit-I:** Introduction to Android the Android Platform, Understanding Android Market, Layers of Android, Intent of Android Development, Types of Android Components, Mapping Applications to Processes, Creating an Android Application.

**Unit II:** Android's Development Environment: Introduction to Android SDK, Exploring Android Development Environment and Building Android Application in Eclipse, Android Emulator and User Interfaces, Working with Views, Using Resources, and Understanding and Exploring Android Manifest File.

**Unit-III:** Intents and Services Serving up Restaurant finder with Intent, Checking Weather with a Custom URI and Broadcast Receivers, Building a Background Weather Services, Communicating Weather alert service From Other Apps. Storing and Retrieving Data: Using Preferences, Using the File System, Persisting Data to a Database, Working with Content provider Classes. Networking and Web Services: An Overview of Networking and Web Services, Checking The Network Status, Communicating with a Server Socket, Working with HTTP and Web Services, Introducing Toast, Introducing Notifications, Introducing Alarms.

**Unit-IV:** Graphics, Animation and Multimedia Drawing Graphics in Android, Creating Animations with Android's Graphics API, Introducing Openly for Embedded Systems, Introduction to Multimedia and Open core, Playing Audio, Playing Video, Capturing Media, Recording Video, Simulating Your Location within The Emulator, Using Location manager and Location provider, Working with Maps, Converting Places and Addresses with Decoder.

**Unit-V:** Platform Maturity with Android Applications Using Android to Work in a Field Service Application, Building Android Applications in C, Bluetooth and Sensors, Integration, Android Web Development, Appwidgets, Localization, Android Native Development Kit

### **TEXT BOOK**

1) W. Frank Ableson, RobiSen, Chris King, "Android in Action", 2nd Edition, Manning Publications Co., 2011, ISBN 978-1-935182-72-6

2) Damon Oehlman, Sebastien Blanc, "Pro Android Web Apps - Develop for Android Using HTML5,CSS3 and Javascript", Apress Publications, 2011, ISBN-13: 978-1-4302-3276-6

3) Chris Haseman, “Android Essentials”, A press Pub., 2008, ISBN-13: 978-1-4302-1064-1

4) James Steele, Nelson to, “The Android Developer’s Cookbook-Building Applications with The Android SDK”, Wesley Publications, 2011, ISBN-13: 978-0-321-74123-3

## **REFERENCES**

1) Lucas Jordan, Pieter Greyling, “Practical Android Projects”, Apress Publications, 2011, ISBN-13: 978-1-4302-3243-8

2) ZigurdMednieks, Laird Dornin, G. Blake Meike and Masumi Nakamura, “Programming Android”, O’reilly Publications, 2011,

3) Reto Meier, “Professional Android 4 Application Development”, John Wiley & Sons, 2014