**NATIONAL COLLEGE (AUTONOMOUS), Tiruchirapalli – 620 001**
**Nationally Re-Accredited at "A+" Level by NAAC**

**Post Graduate Programmes Structure under CBCS**

**M.Sc., COMPUTER SCIENCE (Revised Syllabus 2019 -2021 Onwards)**

## PROGRAMME OUTCOMES

**PO1- Computational Knowledge:** Apply knowledge of computing fundamentals and domain knowledge.

**PO2- Problem Analysis:** Identify, formulate and solve complex computing problems reaching substantiated conclusions.

**PO3- Development of Solutions:** Design and evaluate solutions for complex computing problems with appropriate consideration.

**PO4- Investigations of complex Computing problems:** Use research-based knowledge and research methods for analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5- Modern Tool Usage:** Create, identify and apply appropriate techniques, resources, and modern computing tools to complex computing activities.

**PO6- Professional Ethics:** Understand and commit to professional ethics and cyber regulations for professional computing practices.

**PO7- Life-long Learning:** Identify the need and have the ability, to engage in independent learning as a computing professional.

**PO8- Project Management and Finance:** Understand and apply computing, management principles to manage multi-disciplinary projects.

**PO9- Communication Efficacy:** Communicate effectively with the computing community, and with society.

**PO10- Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues.

**PO11- Individual and Team Work:** Function effectively in diverse teams and in multidisciplinary environments.

**PO12- Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity.

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**M.Sc., COMPUTER SCIENCE (Revised Syllabus 2019 -2021 Onwards)**

| Semester | Course Code | Course Title | Hours | Credits | Marks | | Total |
|---|---|---|---|---|---|---|---|
| | | | | | Internal | External | |
| I | P19CS1 | Mathematical Foundations for Computer Science | 6 | 4 | 25 | 75 | 100 |
| | P19CS2 | J2EE Technologies | 6 | 4 | 25 | 75 | 100 |
| | P19CS3P | J2EE Technologies Lab | 3 | 3 | 25 | 75 | 100 |
| | P19CS4 | Compiler Design | 6 | 4 | 25 | 75 | 100 |
| | P19CS5E | Relational Database Management System / Distributed DBMS/ Database Security and Privacy | 6 | 4 | 25 | 75 | 100 |
| | P19CS6P | RDBMS Lab | 3 | 3 | 25 | 75 | 100 |
| **Papers: 6** | | | **30** | **22** | | | **600** |
| II | P19CS7 | Soft Computing | 6 | 5 | 25 | 75 | 100 |
| | P19CS8 | Data Mining and Data Warehousing | 6 | 5 | 25 | 75 | 100 |
| | P19CS9P | Data Mining and Data Warehousing Lab | 3 | 3 | 25 | 75 | 100 |
| | P19CS10 | Cloud Computing | 6 | 5 | 25 | 75 | 100 |
| | P19CS11E | Mobile Application/Mobile Communication/Mobile Computing | 6 | 5 | 25 | 75 | 100 |
| | P19CS12P | Mobile Application Lab | 3 | 3 | 25 | 75 | 100 |
| **Papers: 6** | | | **30** | **26** | | | **600** |
| III | P19CS13 | Python Programming | 6 | 4 | 25 | 75 | 100 |
| | P19CS14P | Python Programming Lab | 3 | 3 | 25 | 75 | 100 |
| | P19CS15 | Web Programming | 6 | 4 | 25 | 75 | 100 |
| | P19CS16P | Web Programming Lab | 3 | 3 | 25 | 75 | 100 |
| | P19CS17E | Artificial Intelligence/ Embedded System/ Agent Based Learning | 6 | 5 | 25 | 75 | 100 |
| | P19CS18E | Digital Image Processing / Distributed Operating System / Multimedia Systems | 6 | 5 | 25 | 75 | 100 |
| | | **Papers: 6** | **30** | **24** | | | **600** |
| IV | P19CS19 | Big Data Analytics | 6 | 4 | 25 | 75 | 100 |
| | P19CS20 | Network Security and Cryptography | 6 | 5 | 25 | 75 | 100 |
| | P19CS21E | Software Testing / Agile Software Process/ Software Project Management | 6 | 4 | 25 | 75 | 100 |
| | P19CSP22 | Project | 12 | 5 | 25 | 75 | 100 |
| **Papers: 4** | | | **30** | **18** | | | **400** |
| **Total** | | | **54** | **90** | | | **2200** |

## MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE

**Semester I** **Hours/Week: 6**

**Core Course (P19CS1)** **Credit: 4**

**Preamble**

A Computer Science student needs to have some basic mathematical tools and techniques to understand various designing concepts, storage methods, concepts in digital principles, managing databases etc. The main objective of this course is to understand the concepts and operations of Matrix Algebra needed for computing graphics model. This emphasizes the development of rigorous logical thinking for solving different kinds of problems that occur in computer science. Based on this the course aims at giving adequate exposure in the theory and applications of Graphs and PERT, Mathematical Modelling which helps the learner to use them eventually in practical applications of computer science.

**Prerequisite**

Higher Secondary Level, Degree Level –Set Theory, Logic Theory

**Course Outcomes**

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

CO1: Prove implication problems using Graph theory, Matrix representation of Graphs Apply

CO2: Obtain PERT and related techniques Apply

CO3: Check the validity of cryptography through Caesar cipher coding, matrix encoding And Hamming metric. Apply

CO4: Construct reasoning using equivalence transformation, detective proof. Apply

CO5: Represent the given relation in matrix, digraph and vice versa Apply

CO6: Verify preposition, precedence rules and Tautologies reasoning Apply

CO7: Design Hamming distance, error detecting capability of an encoding Apply

CO8: Check mutually exclusive events, conditional probability and Baye's theorem Apply

**Unit-I: Graph theory:** Basic concepts of graph theory-paths, reachability and connectedness -Matrix representation of graphs-Trees.

**Unit-II: Graph theory:** Storage representation and manipulation of graphs: Trees and list structures and graphs-simple precedence grammars-PERT and related techniques.

**Unit-III: Coding theory:** Introduction-cryptography-Caesar cipher coding-Matrix encoding-Scrambled codes-Hamming metric-Hamming distance-Error detecting capability of an encoding.

**Unit-IV: Mathematical Logic:** Propositions-evaluation-precedence rules-Tautologies-reasoning using equivalence transformation-Laws of Equivalence-Substitution rules-a natural detection system-Detective proofs-Inference rules-Proofs and sub proofs.

**Unit-V: Probability theory:** Historic perspective, Mathematical modelling-Equiprobable spaces-Mutually exclusive events-Conditional probability-Bayes theorem.

**Text books :**

1.Unit I&II- J.P.Tremblay,R.Manohar "Discrete mathematical structures with applications to computer science".2006

2.Unit III- James L.Fisher "Application oriented algebra",2004

3.Unit IV- David Gries "science of programming ",2007

4.Unit V- Harsh Bhasin,Dharminder Kumar "Discrete mathematical structures"

**Reference Books:**

1.Kenneth H.Rosen, " Discrete Mathematics and Its Applications", Tata McGraw Hill, Fourth Edition,2002 .

2. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002.

3. A.Tamilarasi & A.M.Natarajan, "Discrete Mathematics and its Application", Khanna Publishers,2nd Edition 2005

**Semester I** **Hours/Week: 6**

**Core Course (P19CS2)** **J2EE TECHNOLOGIES** **Credit: 4**

**Preamble -**This course aims at facilitating the student to understand the advanced internet programming concepts and the programming concepts of JAVA towards developing Java based applications and hands on practices by applying the concepts for implementing internet applications.

**Prerequisite -** Object Oriented Programming using C++

**Course Outcomes**

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

CO1: Use the object oriented concepts of java for the given problem. Understand

CO2: Use exceptions, threads, collections, logs of Java for the given problem. Understand

CO3: Apply events through swing, RMI, JAR operations for the given application. Apply

CO4: Select the proper library classes in Java based on the need of a Problem Apply

CO5: Apply JDBC with SQL and Servlets to solve Internet applications. Apply

CO6: Design an application using EJB and JSP Apply

**Unit-I**: -Understood the internet program with database, client/server environment, distributed application & online processing using j2ee server. Introduction – RMI - Understanding RMI Architecture - Working With RMI - Application Development With RMI - Created Distributed Application Development With RMI - Remote Object Activation. RMI Security Using SSL Bypassing Self-study: Understanding RMI Architecture.

**Unit-II:-**GUI Components: Simple GUI Based I/O With Joptionpane - Overview Of Swing Components - Displaying Text And Images in a Window - Common GUI Event Types and Listener Interfaces - How Event Handling Works - Jbutton - Jcheckbox - Jradiobutton - Jlist - Multiple Selection Lists - Mouse Event Handling - Jpanel Subclass For Drawing With The Mouse - Key - Event Handling - Layout Managers. JDBC And Database Programming: Introduction To JDBC - JDBC Drivers - Using Data Source Object To Make a Connection- JDBC Process With Java.Sql - The Result Set - JDBC Processes With Javax.Sql. Self-study: Mouse Event Handling

**Unit-III:-**Understanding Servlet Programming: Overview - Features of Java Servlets - Package Javax.Servlet Description - Servlet Configuration - Servlet Life Cycle - Understanding Response and Request - Reading Form Data from Servlet. Self-study: Servlet Configuration

**Unit-IV:-**Understanding of JSP and JSTL: Section A: Understanding Java server Pages - Introducing JSP Technology - Understanding Page Life Cycle - JSP Documents - JSP Elements - JSP Tag Extensions – Tag Libraries.

Self-study: Understanding Page Life - Cycle

**Unit-V:-**Understanding EJB: EJB Fundamentals – EJB Architecture - The EJB Interfaces - EJB Roles - Session Bean - State full Versus Stateless Session Bean - Developing Session Bean. Entity Bean. Bean Managed Persistence in Entity Beans. Container Managed Persistence - Deployment Descriptor. Self-study: Developing Session Bean.

**Text Book:**

Black Book, “Java Server Programming (J2EE 1.4)”, Platinum Edition, 2007

**Reference Books:**

1. Justin Cough & Daniel H Steinberg, “J2EE Bible”.
2. Koegh, “The Complete Reference J2EE”, Tata McGraw Hill
3. Pallavi Jain & Shadabsidigui, “J2EE Professional Projects”
4. Dr. C.Muthu, “Programming with java”, 2nd edition, 2008
5. Kogent solution Inc, “Java 6 programming”, new edition, 2009.

**Semester I** **Hours/Week: 3**

**Core Course (P19CS3P)** **J2EE TECHNOLOGIES LAB** C**redit: 3**

**Preamble**

To enable the students practice the concepts of J2EE and develop solutions for real world problems.

**Prerequisite**

Internet and Java Programming

**Course Outcomes**

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

CO1: Understand the enabling technologies for building internet applications. Understand

CO2: Write Java programs for techniques and features of the networking and remote method development to Construct a internet application. Apply

CO3: Implement packages, access specifiers and interfaces in a program Apply

CO4: Implement Program for Events and interactivity using Layout Manager. Apply

CO5: Generate program for network chatting Analyze

CO6: Write technical report on the observations from the experiments Apply

**List of Programs**

1. Develop A Complete Data Manipulation Application Using Swing/JFC and JDBC.

2. Develop A Simple Notepad Application Using Swing/JFC.

3. Develop An Interest Calculator Using Swing/JFC.

4. Develop An Application For User Authentication And Personalization Using Servlet and JDBC

5. Develop A Simple Shopping Cart Using JSP and JDBC.

6. Develop A Simple On-Line Banking Using JSP.

7. Develop A Complete Data Manipulation Application Using JSTL and JDBC.

8. Develop An On-Line Examination Application Using JSTL and JDBC.

9. Create Java Beans: GUI Component, Converting GUI Component Into a Bean

10. Write A Java Program to add an Event Set to a Bean

**Note:** Exercise 9 And 10 Available In Net Beans User Guide - Chapter 10 Java Beans.

**Semester I** **Hours/Week: 6**

**Core Course (P19CS4)** **COMPILER DESIGN** C**redit: 4**

**Preamble**

To understand the various phases of a compiler and to develop skills in designing a compiler.

**Pre requisites**

Familiarity with programming languages, Basic knowledge in Theory of Computation and Data Structures and Algorithm Analysis.

**Course Outcome**

At the end of this course, the students will be able to

| | |
|---|---|
| CO1: To analyze and be able to know the various phases of compiler | Analyze |
| CO2: To design and implement a Lexical analyzer. | Understand |
| CO3: To design and implement a parser | Apply |
| CO4: To know about storage allocation | Analyze |
| CO5: To optimize and design code generator | Apply |

**Unit-I**:

Compiler - Phases of Compiler – Compiler writing tools – Lexical Analysis – Role of Lexical analyzer – Finite Automata – Regular Expression – From a Regular expression to an NFA , NFA to DFA – Design of Lexical Analyzer.

**Unit-II:**

Syntax Analyzer – CFG – Role of the Parser – CFG – Top Down Parsing – Recursive descent parsing, predictive Parsers – Bottom up Parsing – Shift reduce, operator precedence parsers, LR Parsers.

**Unit-III:**

Syntax directed definition:- Construction of Syntax trees – Intermediate code generation – Intermediate Languages – Syntax trees, post fix form, Three address code – Boolean expressions – Back Patching.

**Unit-IV:**

Symbol table – contents of Symbol table – Data Structures for Symbol table – Runtime storage Administration – Implementation of Stack allocation scheme block structured Languages – Storage allocation in Fortran.

**Unit-V:**

Code Optimization and code generation – principles sources of optimization – loop optimization – Dag Representation of Basic blocks. Code generation – problems in code generation – a simple code generator –Register allocation and Assignment – Peephole optimization.

**Text Book:**

1.Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, “Compilers- Principles, Techniques, andTools”,PearsonEducationAsia,2007.

**Reference Books:**

1. David Galles, “Modern Compiler Design”, Pearson Education Asia, 2007
2. C. N. Fisher and R. J. LeBlanc “Crafting a Compiler with C”, Pearson Education, 2000.

**Semester I** **Hours/Week: 6**

**Elective Course-I (P19CS5E) RELATIONAL DATABASE MANAGEMENT SYSTEM Credit: 4**

**Preamble**

This course aims at facilitating the student to understand the various functionalities of DBMS software and perform many operations related to creating, manipulating and maintaining databases for Real-world applications and student to understand the various designing concepts, storage methods, querying and managing databases.

**Course Outcomes**

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

CO1: Explain the structure and model of the relational database system Understand

CO2: Design multiple tables, and using group functions, sub queries Apply

CO3: Design a database based on a data model considering the normalization to a specified level Analyze

CO4: Estimate the storage size of the database and design appropriate real world storage techniques Apply

CO5: Analyze the requirements of transaction processing, concurrency control and creating different views and also data modification through views Analyze

CO6: Explain the basic requirements for Backup and recovery Understand

**Unit- I: -** RDBMS: Structure of Relational Databases – Fundamental Relational algebra Operations – Additional Relational Algebra Operations – Extended Relational Algebra Operations – Tuple Relational Calculus –Domain Relational Calculus – Entity Relationship Model – Features of Good Relational Design.

**Unit- II:** -Introduction – SQL and Relational Database Management – Designing Databases: Database Design –Data Entity Relationships – The Normalization Guidelines – Reviewing of Databases – Implementing the design.

**Unit- III: -**Creating and Filling the Databases- Selecting Data from Databases – Sorting Data and Other Selection Techniques – Grouping Data and reporting it: Grouping – The Group By clause – The Having clause –More on Nulls – Working with Multiple Tables.

**Unit- IV:-**Joining Tables for Comprehensive Data Analysis – Structuring Queries with Sub Queries – Creating Using Classes: View towards Flexibility – Creating Views – Advantages of Views – How View Works? – Data Modification through Views – Creating Copies of Data – Database Administrative Issues.

**Unit- V:-**Security, Transaction, Performance and Integrity: Database Management in the Real world – Data Security–Transaction – Performance – Data Integrity – Solving Business Problems.

**Text books:**

1."Database System Concepts "Fifth Edition, Abraham Silberschtz Henry F.Korth, S.Sudarshan Mc Graw – Hill International Edition

2. "The Practical SQL Handbook Using Structured Query Language" Third Edition, Judith S.Bowman Sandra L.Emerson Marcy Darnovsky.

**Reference Books:**

1. "The Complete Reference My SQL" Tata McGraw Hill Edition, Vikaram Vaswani

2. Sharon Allen, Second edition, Published March 25th 2005"Beginning Relational Data Modeling"

3. Er. Rajiv Chopra.," Database Management Systems - A Practical Approach (DBMS)"

4. C.J Date: Published January 30th 2009 "SQL and Relational Theory: How to Write Accurate SQL Code".

**Semester I** **Hours/Week: 3**

**Core Course (P19CS6P)** **RDBMS Lab** **Credit: 3**

**Preamble**

This course aims at giving adequate exposure to students on the Database design and E-R modelling. The course also facilitates students with hands on training on SQL and programming language extension to SQL within the RDBMS environment.

**Course Outcomes**

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

CO1: Model Entity Relationship with E-R diagrams
Apply

CO2: Design database schema considering normalization and relationships within database
Apply

CO3: Write SQL queries to user specifications
Apply

CO4: Develop triggers, procedures, user defined functions and design accurate and PLSQL programs in Oracle and DB2.
Apply

CO5: Use the database from a front end application
Apply

CO6: Prepare technical report on the observations of the experiments
Apply

**Program List:**

1. DDL ,DML, DCL Commands
   Logical, Comparison, Conjunctive & Arithmetic Operators.
2. Retrieving rows with Characters functions:
   - CONCAT(Concatenation)
   - REPLACE
   - SUBSTR(Substring)
   - LENGTH
3. Retrieving rows with Aggregate functions:
   - GROUPBY
   - HAVING
4. Retrieving rows with date functions & number function:
   - SYSDATE
   - ABS,FLOOR,CEIL,ROUND,POWER
5. JOINS:
   - Union ,Intersection & Unionall
   - Simple Join
   - Self-Join
   - Outer Join
6. CONSTRAINTS:
   - Domain Integrity(Not Null, Check)
   - Entity Integrity(Unique& Primary Key)
   - Referential Integrity(Foreign Key)
7. VIEW:PL/SQL
   - PL/SQL Programs with Control Structures
   - PL/SQL Programs with Exception Handling
   - PL/SQL Programs with Cursors
   - Creating & Calling Procedure

**Semester I** **Hours/Week: 6**

**Elective Course-I (P19CS5E)** **DISTRIBUTED DBMS** **Credit: 4**

**Preamble**

This course will to build on the previous background of database systems by deepening the understanding of the theoretical and practical aspects of the database technologies, showing the need for distributed database technology to tackle deficiencies of the centralized database systems and finally introducing the concepts and techniques of distributed database including principles, architectures, design, implementation and major domain of application.

**Prerequisite**

Basic concept of DBMS and RDBMS.

**Course Outcomes**

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

CO1: Identify the introductory distributed database concepts and its structures. Analyze

CO2: Describe terms related to distributed object database design and management. Understand

CO3: Produce the transaction management and query processing techniques in DDBMS. Apply

CO4: Relate the importance and application of emerging database technology Apply

CO5: Explain the current trends & developments related to Distributed database applications Understand

**UNIT I:** -Introductory concepts and design of (DDBMS) : Data Fragmentation,Replication and allocation techniques for DDBMS, Methods for designing and implementing DDBMS, designing a distributed relational database, Architectures for DDBMS, cluster federated, parallel databases and client server architecture.

**UNIT II:**-Query processing & Transaction Management: Overview Of Query Processing, Query processing problem, Objectives of Query Processing, Complexity of Relational Algebra operations, characterization of Query processors, Layers of Query Processing. Introduction To Transaction Management: Definition of Transaction, Properties of Transaction, types of transaction, Distributed Concurrency Control, Serializability theory, Taxonomy of concurrency control mechanisms, locking bases concurrency control algorithms.

**UNIT III:**-Distributed Object Database Management systems: Fundamental Object concepts and Object models, Object distribution design, Architectural issues, Object management, Distributed object storage, Object query processing

**UNIT IV:**-Current trends & developments related to Distributed database applications technologies: Distributed Object/component-based DBMS, Database Interoperability including CORBA, DCOM and Java RMI, Distributed document-based systems, XML and Workflow management.

**UNIT V:** -Emerging related database technologies: Parallel Database, Mobile database, Multimedia Database, Spatial Database and Web Databases.

**TextBooks:**

1. Distributed Databases - Principles and Systems, Stefano Ceri, Guiseppe Pelagatti, Tata McGraw Hill, 1985.
2. Fundamental of Database Systems, Elmasri & Navathe, Pearson Education, Asia Database System Concepts, Korth & Sudarshan, TMH
3. Principles of Distributed Database Systems, M.Tamer Özsu and Patrick Valduriez Prentice Hall

**References:**

1. Data Base Management System; Leon & Leon; Vikas Publications
2. Introduction to Database Systems; Bipin C Desai; Galgotia

**Semester I** **Hours/Week: 6**

**Elective Course-I (P19CS5E) DATABASE SECURITY AND PRIVACY** **Credits: 4**

**Preamble:-**This course aims at facilitating the student to understand the fundamentals of database security and to learn to implement privacy.

**Course Outcomes:-**On the successful completion of the course, students will be able to

CO1: Explain the fundamentals of security and information systems Understand

CO2: Analyze risks and vulnerabilities in OS from a database perspective Analyze

CO3: Design good password policies & techniques to secure passwords in an organization Apply

CO4: Estimate to implement administration policies for users Understand

CO5: Explain the various database security models Understand

CO6: Explain privacy preserving data mining algorithms Apply

**UNIT I:-**SECURITY ARCHITECTURE & OPERATING SYSTEM SECURITY FUNDAMENTALS: Security Architecture: Introduction-Information Systems- Database Management Systems-Information Security Architecture- Database Security–Asset Types and value-Security Methods. Operating System Security Fundamentals: Introduction-Operating System Overview-Security Environment – Components- Authentication Methods-User Administration-Password Policies Vulnerabilities-E-mail Security.

**UNIT II-**ADMINISTRATION OF USERS & PROFILES,PASSWORD POLICIES, PRIVILEGES AND ROLES Administration of Users: Introduction-Authentication-Creating Users, SQL Server User-Removing, Modifying Users-Default, Remote Users-Database Links-Linked Servers-Remote Servers-Practices for Administrators and Managers-Best Practices Profiles, Password Policies, Privileges and Roles: Introduction-Defining and Using Profiles-Designing and Implementing Password Policies-Granting and Revoking User Privileges-Creating, Assigning and Revoking User Roles-Best Practices

**UNIT III-**DATABASE APPLICATION SECURITY MODELS & VIRTUAL PRIVATE DATABASES Database Application Security Models: Introduction-Types of Users-Security Models- Application TypesApplication Security Models-Data Encryption Virtual Private Databases: Introduction-Overview of VPD-Implementation of VPD using Views, Application Context in Oracle-Implementing Oracle VPD-Viewing VPD Policies and Application contexts using Data Dictionary, Policy Manager Implementing Row and Column level Security with SQL Server

**UNIT IV-**AUDITING DATABASE ACTIVITIES Auditing Database Activities: Using Oracle Database Activities-Creating DLL Triggers with OracleAuditing Database Activities with Oracle-Auditing Server Activity with SQL Server 2000-Security and Auditing Project Case Study.

**UNIT V-**PRIVACY PRESERVING DATA MINING TECHNIQUES Privacy Preserving Data Mining Techniques: Introduction- Privacy Preserving Data Mining AlgorithmsGeneral Survey-Randomization Methods-Group Based Anonymization-Distributed Privacy Preserving Data Mining-Curse of Dimensionality-Application of Privacy Preserving Data Mining

**TEXT BOOK**

1. Hassan A. Afyouni, “Database Security and Auditing”, Third Edition, Cengage Learning, 2009.

2. Charu C. Aggarwal, Philip S Yu, “Privacy Preserving Data Mining”: Models and Algorithms, Kluwer Academic Publishers, 2008

**REFERENCES**

1. Ron Ben Natan, ”Implementing Database Security and Auditing”, Elsevier Digital Press, 2005.

**Semester II** **Hours/Week: 6**

**Core Course (P19CS7)** **SOFT COMPUTING** **Credit: 5**

**Preamble**

This course aims at fundamental concepts used in Soft computing such as Fuzzy logic (FL), Artificial Neural Networks (ANNs) and optimization techniques using Genetic Algorithm (GA). Soft Computing techniques are used to solve a number of real-life and will provide exposure to theory and algorithms used in soft computing.

**Pre requisites**

- A strong mathematical background and Proficiency with algorithms.
- Programming skills in C, C++, or Java, MATLAB, etc.
- Critical thinking and problem solving skills.

**Course Outcome:**

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

CO1: Describe Fuzzy set theroies and their roles in building intelligent machines Understand

CO2: Analyze various fuzzy models in developing fuzzy inference systems to be appropriate with specific real time problems using optimization methods Analyze

CO3: Apply specific unsupervised and supervised neural networks to find approximate solutions to real world problem Apply

CO4: Use Neuro fuzzy modelling to optimization problems Apply

CO5: Explain the behavior of neuro fuzzy algorithms Understand

CO6: Present the feasibility of applying a soft computing methodology for specific problem Analyze

**Unit I**

Fuzzy Set Theory : Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set – Theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

**Unit II**

Optimization: Derivative based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative Free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

**Unit III**

Neural Networks: Supervised Learning Neural Networks – Perceptrons – AdalineBackpropagation Multilayer perceptrons – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks – Kohonen Self – Organizing Networks – Learning Vector Quantization – Hebbian Learning.

**Unit IV**

Neuro Fuzzy Modeling: Adaptive Neuro – Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

**Unit V**

Application Of Computational Intelligence: Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

**Text Book(s)**


1. J.S.R. Jang, C.T. Sun and E. Mizutani, "Neuro Fuzzy and Soft Computing", PHI, Pearson Education, 2004.


**Reference Book(s)**


1. Timothy J. Ross, "Fuzzy Logic with Engineering Application, "McGraw Hill, 1977.
2. Davis E. Goldberg, "Genetic Algorithms Search, Optimization and Machine Learning", Addision Wesley, 1989.
3. S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003. Emereo Pty Limited, July 2008.
4. Ahmar, Abbas, "Grid Computing - A Practical Guide to technology and Applications", Charles River media, 2003.

**Semester II** **Hours/Week: 6**

**Core Course (P19CS8) DATA MINING AND DATA WAREHOUSING Credit: 5**

**Preamble**

This course aims at facilitating the student to understand the concepts of data warehousing and data mining. Students to understand the various techniques involved in mining the data from the databases.

**Prerequisite**

- Database management systems

**Course Outcomes**

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

**CO1**: Identify data mining tools and techniques in building intelligent machines **Understand**

**CO2**: Analyze various data mining algorithms in applying in real time applications. **Analyze**

**CO3**: Analyze unsupervised and supervised naive algorithms in real world applications **Analyze**

**CO4**: Demonstrate the data mining algorithms to combinatorial optimization problems **Apply**

**CO5**: Illustrate the mining techniques like association, classification and clustering on transactional databases. **Apply**

**CO6**: Compare various supervised and unsupervised learning techniques in data mining **Analyze**

**UNIT : I -Data mining and data preprocessing**: Data Mining – Motivation – Definition – Data mining on kind of data – Functionalities – Classification – Data Mining Task Primitives– Major issues in Data Mining – Data Preprocessing – Definition – Data Clearing – Integration and Transformation – Data Reduction.

**UNIT:II- Data warehousing**: Introduction – Multidimensional Data Model – Data WarehouseArchitecture – Data Warehouse Implementation – From data warehousing to DataMining –On Line Analytical Processing – On Line Analytical Mining.

**UNIT: III -Mining Frequent patterns:**The Apriori algorithm-Generating Association Rules from Frequent Itemsets:Efficiency of Apriori-Mining various kinds of Association Rules:Mining Multilevel Assosiation Rules-Mining Multidimensional Assosiation Rules from Relational Databases and Datawarehouse. **Classification and Prediction:**Decision Tree Induction-Bayesian-Rules Based classification-Classification by back propogation-Other classification methods.

**UNIT:IV- Cluster Analysis:**Types of Data in Cluster analysis:(a)Interval-(b)Scaled variables-(c)Binary-(d)Categorical-(e)Ordinary-(f)Ratio_Scaled-(g)Vector objects. Categorization of major method: K-Means-K-Medoids Method-CLARANS.**Hierarachical Methods:**Agglometrive and divise Hierarachical clustring-Birch-ROCK-Chameleon-Grid Based methods: String-Wave Cluster.

**UNIT:V-**Spatial DM - Multimedia DM - Text Mining - Web Mining - **DM Application**: Finance - Retail Industry – Telecommunication – Biological - Intrusion Detection - Social impacts of DM - Trends in DM.

**Text Book:**

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, 2nd Ed.,Morgan Kaufmann, 2006.

**Reference Books:**

1. Margaret H.Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, 2003.
2. Arun K.Pujari, “ Data Mining Techniques”, University Press, 2001.

**Semester II** **Hours/Week: 3**

**Core Course (P19CS9P) DATA MINING & DATA WAREHOUSING LAB** **Credit: 3**

**Preamble**

In this laboratory, students will implement the various Data Warehousing and Data Mining concepts using Oracle and WEKA / R tool

**Prerequisite**

- RDBMS Laboratory

**Course Outcomes**

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

**CO1:** Develop various real time applications using data mining techniques
Understand
**CO2:** Test the developed code using VB.net and Weka/R tool
Apply
**CO3:** Apply text mining on the data warehouse
Apply
**CO4:** Perform multi-dimensional data model using Oracle
Analyze
**CO5:** Develop a program using a R Tool to solve a association rule
Apply
**CO6:** Develop a program to perform Clustering and Classification using various algorithm
Analyze

**List of Exercises**

1. Create a table[Employee, Weather Table] with the help of Data Mining Tool Weka.
2. Apply Pre-Processing Technique to the Training data set of Table [Employee, Weather].
3. Normalize Table [Employee, Weather] data using Knowledge Flow.
4. Finding Association Rules for Buying Data / Banking Data / Employee Data (Apply Apriori Alogrithm).
5. Construct Decision Tree for Table [Weather / Customer data ]
6. Visualization for Table [Weather / Banking data / Employee data]
7. Cross-Validation using J48 Algorithm for Table [Weather / Banking ]
8. Apply Clustering technique on Tables.
9. Apply Clustering technique on tables using EM Algorithm.
10. Apply Density based Cluster algorithm on Tables.
11. Apply simple K-Means algorithm on Tables.
12. Apply Naïve-Bayes algorithm on Tables.

**Semester II** **Hours/Week:6**

**Core Course (P19CS10)** **CLOUD COMPUTING** **Credit: 5**

**Preamble:-** Cloud computing paradigm covers a range of distributed computing, hosting and access solutions, including service-based computing. The objective of the course is to provide comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.

**Prerequisite:-** Computer Networks

**Course Outcomes :-**On the successful completion of the course, students will be able to

**CO1:** Describe the key technologies, architecture, strengths, limitations and applications of cloud computing Understand

**CO2:** Explain the types and service models of cloud. Understand

**CO3:** Describe the core issues such as security, privacy and interoperability in cloud platform. Understand

**CO4:** Apply suitable technologies, algorithms, and applications in the cloud computing driven systems Apply

**CO5:** Provide appropriate cloud computing solutions for the given scenario Analyze

**CO6:** Analyze how applications are deployed in cloud Analyze

**Unit I:** DEFINING CLOUD COMPUTING:-Cloud Types - The NIST model - The Cloud Cube Model - Deployment models - Service models - Examining the Characteristics of Cloud Computing - Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing - Assessing the Role of Open Standards. ASSESSING THE VALUE PROPOSITION:Early adopters and new applications - The laws of cloudonomics - Cloud computing obstacles - Behavioral factors relating to cloud adoption.

**Unit II:** UNDERSTANDING CLOUD ARCHITECTURE:-Exploring the Cloud Computing Stack– ComposabilityInfrastructure – Platforms - Virtual Appliances - Communication Protocols – Applications. UNDERSTANDING SERVICES AND APPLICATIONS BY TYPE:Defining Infrastructure as a Service (IaaS) - Defining Platform as a Service (PaaS) - Defining Software as a Service (SaaS) - SaaS characteristics - Open SaaS and SOA.

**Unit III:** UNDERSTANDING ABSTRACTION AND VIRTUALIZATION:- Using Virtualization Technologies - Load Balancing and Virtualization - Advanced load balancing - The Google cloud - Understanding Hypervisors - Virtual machine types - VMware vSphere - Understanding Machine Imaging - Porting Applications - The Simple Cloud API - AppZero Virtual Application Appliance. CAPACITY PLANNING - Load testing - Resource ceilings - Server and instance types.

**Unit IV:** Managing the Cloud:-Administrating the Clouds - Management responsibilities - Lifecycle management - Emerging Cloud Management Standards. UNDERSTANDING CLOUD SECURITY:Securing the Cloud – Securing Data – Establishing Identity and Presence.

**Unit V:** USING THE MOBILE CLOUD: -Working with Mobile Devices – Defining the Mobile Market – Using Smartphones with the Cloud. WORKING WITH MOBILE WEB SERVICES: Understanding Service Types – Performing Service Discovery – Using SMS – Defining WAP and other Protocols – Performing Synchronization.

**Text Book:**

1. Barrie Sosinsky, “Cloud Computing Bible”, Wiley Publishing Inc., 2011.

**Reference Books:**

1. Michael Miller, “Cloud Computing”, Pearson Education Inc., 7th Edition, 2012.

2. Rajkumar Buyya and James Broberg, “Cloud Computing: Principles and Paradigms”, John Wiley & Sons Publications, 2011.

**Semester II** **Hours/Week: 6**

**Elective Course-II (P19CS11E) MOBILE APPLICATION** C**redit: 5**

**Preamble:-**On completion of the course, the students will know the basics involved in Application development in Mobile platforms, develop User Interface and Mobile Applications using Android tools, know the components and structure of mobile application development frameworks for Android and windows OS based mobiles, Understand how to work with various mobile application development frameworks, Learn the basic and important design concepts and issues of development of mobile applications, Understand the capabilities and limitations of mobile devices.

**COURSE OUTCOMES**

At the end of the course, the student should be able to:

CO1 :Design and Implement various mobile applications using emulators. Understand
CO2 : Deploy applications to hand-held devices Apply
CO3 : Learn the structure of Mobile application development frameworks Understand
CO4 : Application of Mobile development frameworks Apply
CO5: Handling User Input and how to creating the User Input Interface Apply

**UNIT 1: -**Introduction: Applications - A Simplified Reference Model. Multiplexing: Space Division Multiplexing – Frequency Division Multiplexing – Time Division Multiplexing – Code Division Multiplexing. Cellular Systems – Comparison of S/T/F/CDMA. GSM: Mobile Services – System Architecture – Localization and Calling – Handover.

**UNIT 2:-**Developing Spectacular Android Applications: Why Develop for Android? – Android Programming Basics – Hardware Tools – Software Tools. Prepping Your Development Headquarters: Assembling Your Toolkit – Installing and Configuring Your Support Tools – Getting Acquainted with the Android Development Tools.

**UNIT 3:-**Your First Android Project: Starting a New Project in Eclipse – Deconstructing Your Project – Setting up an Emulator – Creating Launch Configurations – Running the Hello Android App – Understanding the Project Structure. Designing the User Interface: Creating the Silent Mode Toggle Application – Laying Out the Application – Developing the User Interface – Adding an Image to Your Application – Creating a Launcher Icon for the Application – Adding a Toggle Button Widget – Previewing the Application in the Visual Designer.

**UNIT 4:-**Coding Your Application: Understanding Activities – Creating Your First Activity – Working with the Android Framework Classes – Installing Your Application – Reinstalling Your Application – Responding to Errors. Understanding Android Resources: Understanding Resources – Working with Resources.

**UNIT 5:-**Handling User Input: Creating the User Input Interface – Getting Choosy with Dates and Times – Creating Your First Alert Dialog Box – Validating Input. Getting Persistent with Data Storage: Finding Places to Put Data – Asking the User for Permission – Creating Your Application's SQLite Database. Creating and Editing Tasks with SQLite: Inserting, Deleting and Updating a task.

**Textbooks**


1. Jochen H. Schiller, "Mobile Communications", Addison-Wesley and imprint of Pearson Education Ltd., 2003. ( Units I)
2. Donn Felker and Joshua Dobbs, "Android Application Development – for Dummies", Wiley Publishing Inc., 2011. (Units II,III,IV,V)


**Reference books**


1. Jerome (J.F.) DiMarzio, "Android – A Programmer's Guide", Tata McGraw-Hill Publication, 2008.

**Semester II** **Hours/Week: 3**

**Core Course (P19CS12P) MOBILE APPLICATION LAB** C**redit: 3**

## COURSE OBJECTIVES

- ✓ Develop simple applications using Android
- ✓ Create the Mobile Applications using different controls in Android.
- ✓ To understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- ✓ To understand how to work with various mobile application development frameworks.
- ✓ To learn the basic and important design concepts and issues of development of mobile applications.
- ✓ To understand the capabilities and limitations of mobile devices.

**Course Outcomes**:

Upon Completion of the course, the students will be able to:

**CO1 :** Develop mobile applications using GUI and Layouts.

**CO2 :** Develop mobile applications using Event Listener.

**CO3 :** Develop mobile applications using list of controls and menus.

**CO4 :** Analyze and discover own mobile app for simple needs.

## LIST OF PROGRAMS:

1. Write an Android Program to Demonstrate Alert Dialog Box
2. Build an Android Program to Build a Simple Android Application
3. Create an Android Program to Demonstrate Activity Life Cycle
4. Simulate an Android Program to Perform all Operations using Calculators
5. Implement an Android Program to Change the Image Displayed on the Screen
6. Build an Android Program to Create Multiple Activities within an Application
7. Prepare an Android Program to Demonstrate Action Button by Implementing on Click Listener
8. Develop an Android Program to Demonstrate the Sound Button Application
9. Write an Android Program to Demonstrate the use of Scroll View
10. Build an Android Program to Demonstrate Radio Group Application
11. Design an Android Program to Set the Wallpaper of Your Device using Bitmap Class
12. Create an Android Program to Demonstrate the Menu Application

**Semester II** **Hours/Week: 6**
**Elective Course-II (P19CS11E) MOBILE COMMUNICATION** **Credit: 5**

**Course Objectives (COs)**
The student should be made to:

- Understand the basic concepts of mobile computing
- Understand Wireless LAN, Bluetooth and WiFi Technologies
- Be familiar with the network protocol stack
- Learn the basics of mobile telecommunication system
- Be exposed to Ad-Hoc networks

**Prerequisites:**
Concept of networking

**Course Outcomes:**

At the end of the course, the student should be able to:

| | |
|---|---|
| CO1: Explain the basics of mobile telecommunication system | Understand |
| CO2: Illustrate the generations of telecommunication systems in wireless network | Analyze |
| CO3: Understand the architecture of Wireless LAN technologies | Understand |
| CO4: Determine the functionality of network layer and Identify a Routing protocol for a given Ad hoc networks | Apply |
| CO5: Explain the functionality of Transport and Application layer | Apply |

**SYLLABUS**

**UNIT I: INTRODUCTION-** Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies-MAC Protocols – SDMA- TDMA- FDMA- CDMA

**UNIT II : MOBILE TELECOMMUNICATION SYSTEM** GSM – Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security –GPRS- UMTS- Architecture

**UNIT III : WIRELESS NETWORKS -**Wireless LANs and PANs – IEEE 802.11 Standard – Architecture – Services – Blue Tooth- Wi-Fi – WiMAX

**UNIT IV: MOBILE NETWORK LAYER** Mobile IP – DHCP – AdHoc– Proactive and Reactive Routing Protocols – Multicast RoutingVehicular Ad Hoc networks ( VANET) – MANET Vs VANET – Security

**UNIT V : MOBILE TRANSPORT AND APPLICATION LAYER** Mobile TCP– WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML

**TEXT BOOKS:**


1. Jochen Schiller, ―Mobile Communications‖, PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, ―Fundamentals of Mobile Computing‖, PHI Learning Pvt.Ltd, New Delhi – 2012

**Semester II** **Hours/Week: 6**

**Elective Course-II (P19CS11E) MOBILE COMPUTING** C**redit: 5**

**Preamble**

- ✓ This course provides knowledge and skill on recent technologies in native mobile computing frameworks such as WLN, Bluetooth.

**Course Outcomes**

CO1: To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture Understand
CO2: To have an exposure about wireless protocols -WLN, Bluetooth, WAP Apply
CO3: To Know the Network, Transport Functionalities of Mobile communication. Understand
CO4: To deploy knowledge about Mobile Application Development Platform Apply
CO5: To explain about basic components needed for Mobile App Development Analyze

**UNIT I : WIRELESS COMMUNICATION FUNDAMENTALS, ARCHITECTURE**

Frequency Spectrum- Multiplexing- Spread spectrum-GSM vs CDMA - -Comparison of 2G , 3G, 4G - GSM Architecture-Entities-Call Routing- Address and identifiers- GSM Protocol architecture- Mobility Management-Frequency Allocation- Security –GPRS Architecture (entity and Protocol).

**UNIT II: MOBILE WIRELESS SHORT RANGE NETWORKS**

Introduction-WLAN Equipment-WLAN Topologies-WLAN Technologies-IEEE 802.11Architecture-WLAN MAC-Security of WLAN, Power Management-Standards- WAP Architecture- Bluetooth enabled Devices Network-Layers in Bluetooth Protocol-Security in Bluetooth- IrDA- ZigBee.

**UNIT III: MOBILE IP NETWORK LAYER, TRANSPORT LAYER**

IP and Mobile IP Network Layer- Packet delivery and Handover Management-LocationManagement- Registration- Tunneling and Encapsulation-Route Optimization-MobileTransport Layer-Conventional TCP/IP Transport Layer Protocol-Indirect, Snooping, MobileTCP.

**UNIT IV MOBILE APPLICATION DEVELOPMENT USING ANDROID**

Mobile Applications Development - Understanding the Android Software Stack – Android Application Architecture –The Android Application Life Cycle – The Activity Life CycleCreating Android Activity -Views- Layout -Creating User Interfaces with basic views-linkingactivities with Intents.

**UNIT V MOBILE APPLICATION DEVELOPMENT USING ANDROID**

Services-Broadcast Receivers – Adapters – Data Storage, Retrieval and Sharing.-Location based services- Development of simple mobile applications .

**Text Books:**


1. Barry A. Burd ,"Android Application Development For Dummies All in One", Wiley, 2015.
2. Ed Burnette,"Hello, Android: Introducing Google"s Mobile Development Platform" third edition" Pragmatic Programmers,2012.


**REFERENCES:**


1. Asoke K Talukder, Hasan Ahmed,Roopa R Yavagal "Mobile Computing", TMG,2nd Edition Aug – 2010.
2. Jochen Schillar "Mobile Communications" Pearson Education second Edition.
3. Jerome(J.F) DiMarzio "Android A programmer"s Guide" TMG 2010 Edition.
4. Maritn Sauter, ―From GSM to LTE: An Introduction to Mobile Networks and Mobile Broadband‖, John Wiley and Sons, 2011 .

**Semester III** **Hours/Week: 6**

**Core Course (P19CS13)** **PYTHON PROGRAMMING** **Credit: 4**

**Preamble**

This course aims at facilitating the student to understand the basic concepts of algorithmic problem solving, developing python programs using conditional, loops, functions and data structures, tuples and dictionaries.

**Prerequisite**

Basic programming using C and C++

**Course Outcomes**

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

CO1: Use the basic concepts of python and develop simple programs Understand

CO2: Use python interpreter and interactive mode. Understand and Apply

CO3: Apply conditional statements to develop simple programs Apply

CO4: Use the concepts of list, tuples and dictionaries Understand

CO5: use and apply the concepts of files, modules and packages. Understand and Apply

**UNIT I**

Welcome to Python - What is Python – History of Python – Features of Python – Installing Python – Running Python - Comments - Operators - Variables and Assignment - Python Objects – Standard Types - Other Built-in Types - Internal Types - Standard Type Operators - Standard Type Built-in Functions - Categorizing the Standard Types - Unsupported Types

**UNIT II**

Introduction to Numbers – Integers - Floating Point Real Numbers - Complex Numbers – Operators -Built-in Functions -Sequences – Strings - Strings and Operators - String-only Operators - Built-in Functions - String Built-in Methods - Special Features of Strings

**UNIT III**

Lists – Operators - Built-in Functions - List Type Built-in Methods - Special Features of Lists - Tuples - Tuple Operators and Built-in Functions - Special Features of Tuples - Conditionals and Loops – if statement - else statement - else if statement - while statement - for statement - break statement - continue statement - pass statement - else statement

**UNIT IV**

Regular Expressions – Introduction – Special symbols and characters for Regular Expressions – Regular Expressions and Python – Network Programming – Introduction – Network programming in Python – Sockets : Communication end points

**UNIT V**

GUI Programming with TKinter – Introduction TKinter and Python Programming – Tkinter examples – Related modules and other GUIs – Web programming – Web surfing with Python – Advanced web clients.

**Text Books**

1. Chun, J Wesley, CORE Python Programming, 2 nd Edition, Pearson, 2007 Reprint 2010. UNIT I : Chapter 1, 2, 4 UNIT II : Chapter 5, 6 UNIT III : Chapter 6, 8 UNIT IV : Chapter 15, 16 UNIT V : Chapter 18, 19

**Reference Book**

1.Jeffrey Elkner, Chris Meyers Allen Downey, Learning with Python, Dreamtech Press, 2015

**Semester III** **Hours/Week: 3**

**Core Course (P19CS14P)** **PYTHON PROGRAMMING LAB** **Credit: 3**

**Preamble**

To enable the students to understand and create programs on string functions, class, method and object and to train them to write a program thereby to develop various applications using python programming techniques.

**Prerequisite**

Basic programming concepts of C
Object Oriented Programming using C++

**Course Outcomes**

| | |
|---|---|
| CO1: Writing basic programs to make familiar with python structure | Apply |
| CO2: Applying simple concepts in the python programming | Apply |
| CO3: Creating programs using control statements and branching statements | Apply |
| CO4: Understanding the Object Oriented Programming Concepts in python | Apply |
| CO5: Writing programming for error identification using Exception handling | Apply |
| CO4: Creating a program for using data structures in python | Apply |

**List of Programs**

1. Arithmetic operations.
2. Control structures.
3. Switch statement.
4. String functions.
5. Calendar functions.
6. Exception handling.
7. List.
8. Sequences.
9. Dictionary.
10. Regular expressions – Pattern.

**Semester III** **Hours/Week: 6**

**Core Course (P19CS15) WEB PROGRAMMING** **Credit: 4**

**Preamble**

The course facilitates the students to understand the .Net framework and able to use features including forms and various controls of C# language for developing .Net based applications.

**Prerequisite**

Basic programming concepts of C and Object Oriented Programming using C++.

**Course Outcomes**

| | |
|---|---|
| CO1: Understanding the .NET framework | Understand |
| CO2: Apply the general programming structure of C# in developing software solutions based on user requirements | Apply |
| CO3: Develop windows application and web applications in .NET framework analysing user Requirements | Analyze |
| CO4: Designing of document with GUI applications in .NET programming | Apply |
| CO5: Exploring the database operations using ADO.Net | Apply |
| CO5: Creating web application using C#.Net. | Apply |

**Unit I:**

Introducing C# and the .NET platform: The philosophy of .Net - Introducing the building blocks of the .Net platform (CLR, CLS and CTS) - .Net assemblies – Common type system - Namespaces/types distinction.

**Unit II:**

Core C# Programming Constructs: System.Environment class – System.Console class - String-Data type Conversion - C# iteration constructs-Decision Constructs - methods - arrays-structure - understanding values types and reference types - C# nullable.

**Unit III:**

Object Oriented Programming with C#: Introducing the C# class type - understanding constructor - this keyword - static keyword - defining pillars of OOP - C# access modifiers-inheritance and polymorphism-understanding exception handling-understanding object lifetime - working with interfaces – delegates – events - Introducing LINQ.

**Unit IV:**

Windows Forms: windows forms fundamentals-windows MDI forms-Handling events-Adding Controls to forms. Windows Controls: Textboxes – labels – Linkablebutton – checkboxes – radiobuttons – ListBoxes – CheckedListBoxes – ComboBoxes - PictureBox – ImageList – DateTimePicker – ListView – Richtextbox – Toolbars - TabControl-MenuStrip. Advanced Window Programming: File Handling.

**Unit V:**

DataAccess with ADO.NET:ADO.Net Architecture – Advantages - ADO.Net Objects. Handling Databases in code: Connection class-Command class – DataAdapter – DatasetClass - DataReader class - DataTable Class - DataRow, DataColumn classes – Datarelation Class. Handling Data Manipulation in code: Record navigation-record updation - inserting record - deleting record.

**Text Books:**

1. Andrew Troelson, “C# 2010 and .Net Platform”, A press, 6 th Edition, 2010 (Unit I, II,III) 2. J. G. R. Sathiaseelan and N. Sasikaladevi, “Programming with C#.Net“, Pearson Education, 1 st Edition, 2009 (Unit-IV& V)

**Reference Book:**

1. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw Hill Publications, 2004.

**Semester III** **Hours/Week: 3**
**Core Course (P19CS16P) WEB PROGRAMMING LAB Credit: 3**

**Preamble**

To enable the students to develop simple applications in ASP.Net using C# and design web based application using ADO.Net with C#.

**Prerequisite**

Basic programming concepts of C
Object Oriented Programming using C++

**Course Outcomes**

| | |
|---|---|
| CO1: Creating projects using disconnected and connected environments | Apply |
| CO2: Understanding various view controls to display records | Apply |
| CO3: Generating the crystal reports from the database | Apply |
| CO4: Designing webpage using various controls and security features | Apply |
| CO5: Exploring Mobile web application developments | Apply |
| CO6: Developing web service with ASP.Net | Apply |

**List of Programs**

1. Create a table and insert a few records using Disconnected Access.
2. Develop a project to update and delete few records using Disconnected Access.
3. Develop a project to view the records using GridView, DetailsView, FormView Controls.
4. Develop a project to generate a crystal report from an existing database.
5. Design a web page that makes uses of Ad Rotator Control.
6. Design a web page involving Multi View or Wizard Control.
7. Make use of Image Control involving two hot spots in a web page.
8. Design a simple web site that makes use of Master Pages.
9. Establish the security features in a simple web site with five pages.
10. Use state management concepts in a mobile web application.
11. Develop a web service that has an ASP.Net client.
12. Develop a web service to fetch a data from a table and send it across to the client.

**Semester III** **Hours/Week:6**

**ElectiveCourse-III (P19CS17E) ARTIFICIAL INTELLIGENCE Credit:5**

**Preamble**

This course aims at facilitating the student to understand and describe artificial intelligence techniques, knowledge representation, automated planning and agent systems, machine learning, and probabilistic reasoning.

**Prerequisite**

Basic programming with knowledge in Algorithm

**Course Outcomes**

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

CO1: Understand artificial intelligence and AI problem solving techniques. Understand

CO2: Explore logic for solving various AI problems. Apply

CO3: grasp the techniques of knowledge representation in machine and advanced techniques (Fuzzy logic) Apply

CO4: Understanding the basic knowledge of Expert system Understand

CO5: Ability to apply the knowledge of Expert system development process and Tools Understand and Apply

**UNIT I** :

The AI problems – AI techniques – problems, problems space & search – Defining the problem as a state Search – Production systems – problem characteristics – heuristic search techniques – Generate & test – Hill climbing – Best first search. Problem reduction – constraint satisfaction – means – ends analysis.

**UNIT II** :

Game playing : Mini – max procedure – Adding Alpha – Beta cutoffs – Additional refinements – Searching AND/OR Graphs – Iterative deepening. Using Predicate Logic – Representing simple facts & logic – Representing instance & IS a Relationships – Computable functions & Predicates – Use of the predicate calculus in AI – Resolution – natural deduction.

**UNIT III:**

Representing knowledge using Rules – Procedural verses declarative knowledge logic programming – forward versus backward reasoning – Resolving within AND/OR Graphs matching – control knowledge – symbolic Reasoning under uncertainity – non – monotonic reasoning – Implementation Issues – Augmenting a problem solver - Implementation of depth first & breadth first search. Statistical reasoning – Bayee's theorem – Certainity factors & Rule based Systems – Bayesian Networks – Dempstor– Shafer theory – Fuzzy logic.

**UNIT IV** :

Expert Systems – Architectural Components – Explanation facilities – knowledge acquisition.

**UNIT V** :

Expert System Development process – Non – formal representation of knowledge – semantic Networks – Frames – Scripts – Production Systems –Expert Systems tools.

**Text Books:**

1. Elaine Rich & Kevin Kaight, **Artificial Intelligence**, Tata McGraw Hill, Second Edition, 1991.

**UNIT I :** Chapter I : Sections 1.1, 1.3, Chapter II : Sections 2.1-2.3 Chapter III : Sections 3.1-3.6

**UNIT II** : Chapter XII: Sections 12.2-12.5, Chapter V : Sections 5.1-5.5

**UNIT III** : Chapter VI : Sections 6.1-6.5, Chapter VII : Sections 7.1,7.3-7.6

2. David W. Roltson**, Principles of Artificial Intelligence & Expert Systems Development**, McGraw Hill, 1988.

**UNIT IV** : Chapter I : Sections 1.1, 1.6, Chapter VII : Sections 7.1-7.7 ,Chapter IX : Sections 9.1-9.9

**UNIT V** : Chapter VIII : Sections 8.1-8.8, Chapter IV : Sections 4.1-4.4, Chapter X : Sections 10.1-10.7

**Reference Books:**


1. Data W. Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI, 2009.
2. Stuart Russell and Peter Norvig, Artificial Intelligence A Modern Approach, Second Edition, Pearson Education Series, 2003.
3. Keith Darlington, The essence of Expert Systems, Pearson First Impression, 2011.

**Semester III** **EMBEDDED SYSTEMS** **Hours/Week:6**
**Elective Course-III (P19CS17E)** C**redit:5**

**Preamble**

Embedded system tools and products are evolving rapidly. This course deals with various approaches to building embedded systems. It introduces unified view of hardware and software. The aim of this course is to make the students aware of the various applications of embedded systems.

**Course Outcomes**

At the end of the course student will be able to:

| | |
|---|---|
| CO1: Understand basic concepts in the embedded computing systems area | Understand |
| CO2: Determine the optimal composition and characteristics of an embedded system | Analyze |
| CO3: Design and program an embedded system at the basic level | Apply |
| CO4: Develop hardware-software complex with the use of the National Instruments products. | Apply |

**Unit I:**

An overview of embedded systems: Introduction to embedded systems, Categories and requirements of embedded systems, Challenges and issues related to embedded software development, Hardware/Software co-design, Introduction to IC technology, Introduction to design technology

**Unit II:**

Embedded Software development: Concepts of concurrency, processes, threads, mutual exclusion and inter-process communication, Models and languages for embedded software, Synchronous approach to embedded system design, Scheduling paradigms, Scheduling algorithms, Introduction to RTOS, Basic design using RTOS.

**Unit III:**

Embedded C Language: Real time methods, Mixing C and Assembly, Standard I/O functions, Preprocessor directives, Study of C compilers and IDE, Programming the target device

**Unit IV**:

Hardware for embedded systems: Various interface standards, Various methods of interfacing, Parallel I/O interface, Blind counting synchronization and Gadfly Busy waiting, parallel port interfacing with switches, keypads and display units, Memory and high speed interfacing, Interfacing of data acquisition systems, Interfacing of controllers, Serial communication interface, Implementation of above concepts using C language.

**Unit V**:

Study of ATMEL RISC Processor: Architecture, Memory, Reset and interrupt, functions, Parallel I/O ports, Timers/Counters, Serial communication, Analog interfaces, Implementation of above concepts using C language, Implementation of above concepts using C language.

**Text Books:**


1. Raj Kamal, ìEmbedded Systemsî, TMH
2. David E. Simon, ìAn Embedded Software Primer ", Pearson Education
3. 3. Muhammad Ali Mazidi and Janice Gillispie Mazidi, ìThe 8051Microcontroller and Embedded Systems", Pearson Education.


**References:**


1. Frank Vahid, Tony Givargis, ìEmbedded System Design: A Unified Hardware/Software Introduction", John Wiley.
2. Craig Hollabaugh, ìEmbedded Linux", Pearson Education.

**Semester III** **AGENT BASED LEARNING** **Hours/Week:6**
**Elective Course-III (P19CS17E)** **Credit:5**

**Preamble**

The course gives a comprehensive understanding on software agents.

**Prerequisite**

Basic knowledge of software engineering.

**Course Outcomes**

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

| | |
|---|---|
| **CO1**: To learn basic characteristics of the agents | Understand |
| **CO2:** Understanding the design and implementation of Agents | Understand |
| **CO3:** The implementation described in the architecture level. | Analyze |
| **CO4:** To appreciate the Overview of Agent Oriented Programming. | Understand |
| **CO5:** To understand Mobile Agent Paradigm | Understand |

**UNIT I – INTRODUCTION**

Introduction about Agents - Interacting with Agents – How Might people interact with Agents - Agent from Direct Manipulation to Delegation - Interface Agent Metaphor with Character.

**UNIT II – AGENT DESIGN AND COORDINATION**

Designing Agents - Direct Manipulation versus Agent Path to Predictable- Agents for Information Sharing and Coordination.

**UNIT III – AGENT IMPLEMENTATION**

Agents that Reduce Work Information Overhead - Agents without Programming Language - Life like Computer character - S/W Agents for cooperative Learning - Architecture of Intelligent Agents

**UNIT IV - INFORMATION INTEGRATION**

Overview of Agent Oriented Programming - Agent Communication Language - Agent Based Framework of Interoperability - Agents for Information Gathering - Open Agent Architecture – Communicative Action for Artificial Agent.

**UNIT V – MOBILE AGENT**

Mobile Agent Paradigm - Mobile Agent Concepts -Mobile Agent Technology - Case Study: Tele Script, Agent Tel.

**REFERENCES:**


1. Jeffrey M.Bradshaw, “Software Agents”, MIT Press, 2000.
2. William R. Cockayne, Michael Zyda, “Mobile Agents”, Prentice Hall, 1998.
3. Russel & Norvig, “Artificial Intelligence: A Modern Approach”, Prentice Hall, 2nd Edition, 2002.
4. Joseph P.Bigus & Jennifer Bigus, “Constructing Intelligent agents with Java: A Programmer's Wiley; 1 edition, 1998.
5. Guide to Smarter Applications ”, Wiley, 1997.

**Semester III** **DIGITAL IMAGE PROCESSING** **Hours/Week:6**
**ElectiveCourse-IV (P19CS18E)** C**redit:5**

**Preamble**

The student should be made to learn digital image fundamentals. Be exposed to simple image processing techniques like image compression and segmentation techniques and learn to represent image in form of features.

**Prerequisite**

Basic knowledge of computer graphics.

**Course Outcomes**

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

CO1: Understand the problem and application of digital image processing. Understand

CO2: Explore knowledge about image transformations. Understand and Apply

CO3: Get aware about enhancement methods Understand

CO5: Understand various image filtering concepts Apply

CO5: Know about various image data compression and reconstruction techniques. Apply

**UNIT I:-**Digital Image Fundamentals: Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels.

**UNIT II :-**Image Enhancement: Spatial Domain: Gray level transformations – Histogram processing: Histogram Equalization, Histogram matching– Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform:One-dimensional Fourier Transform and it's inverse – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

**UNIT III :-**Image Restoration And Segmentation: Restoration in the presence of noise only spatial filtering: Mean Filters – Order Statistics – Adaptive filters .Periodic noise Reduction by frequency domain filtering: Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering.

**UNIT IV :-**Image Segmentation: Edge detection, Edge linking via Hough transform – Thresholding:Foundation,Role of illumination, Basic global Thresholding, Basic Adaptive Thresholding, Optimal global and Adaptive Thresholding - Region based segmentation – Region growing – Region splitting and Merging – Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

**UNIT V :-**Image Compression**:** Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

**TEXTBOOKS:**

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson, Second Edition, 2004.

UNIT -1: 1.1,1. 2, 1.4, 1.5, 2.1, 2.3-2.5

UNIT-2: 3.2,3.3.1,3.3.2,3.5,3.6,3.7.1,3.7.3,4.2.1,4.3.1,4.3.2,4.3.3,4.4.1,4.4.2,4.4.3

UNIT-3: 5.3,5.4,5.7,5.8

2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson 2002.

UNIT 4-:10.1.3,10.2.1,10.2.2,10.3.1,10.3.2,10.3.3,10.3.4,10.3.5,10.4.1-10.4.3,10.2.1,10.5.3

3.Dr.V.Duraisamy,Dr.V.Somasundareswari,D.Jeyakumari.,'Digital Image Processing', Anuradha Publications,2014.

UNIT-5:7.4.2,7.4.3,7.4.6,7.4.7,7.5.2,7.6,7.7,7.8

**REFERENCES**

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.

2. D,E. Dudgeon and RM. Mersereau, , Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.

**Semester III** **DISTRIBUTED OPERATING SYSTEMS** **Hours/Week: 6**
**Elective Course (P19CS18E)** **Credits : 5**

**Preamble**

This course is designed to examine the fundamental principles of distributed systems, and provide students hands-on experience in developing distributed protocols. This course will address distributed systems in a broader sense. Emphasis will be placed on communication, process, naming, synchronization, consistency and replication, and fault tolerance.

**Prerequisite**

Basic Knowledge on Operating Systems.

**Course Outcomes**

**CO 1:** Understanding about LAN, WAN and different communication protocols — Understand
**CO 2:** Apply encoding and decoding methods and handling of failures — Apply
**CO 3:** Understanding shared memory and approaches in handling of deadlock and mutual exclusions — Understand
**CO 4:** Analyze the various file models, transactions and design principles — Analyze
**CO 5:** Understanding of potential attacks, digital signatures and cryptography — Understand

**Unit I**

Fundamentals: What is Distributed Operating System – Evolution of Distributed Computing System – Distributed Computing System Models – Why are Distributed Computing Systems gaining popularity – What is a Distributed Computing System – Issues in Designing Distributed Computing System – Introduction to Distributed Computing Environment. Introduction to Computer Networks – Network types – LAN –WAN – Communication protocols – Internetworking – ATM Technology.

**Unit II**

Message Passing: Introduction – Desirable features – Issues in PC Message Passing – Synchronization – Buffering – Multi-datagram Messages – Encoding and Decoding – Process Addressing – Failure Handling – Group Communication.

**Unit III**

Distributed Shard Memory: Introduction – General Architecture of DSM system – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory – Consistency Models – Replacement Strategy – Thrashing – Other Approaches to DSM – Heterogeneous DSM – Advantages Synchronization: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithm.

**Unit IV**

Distributed File System: Introduction – Desirable features – File Models – File Accessing Models – File Sharing Semantics – File Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles.

**Unit V**

Security: Introduction – Potential Attacks to Computer System – Cryptography – Authentication – Access Control – Digital Signatures – Design Principles.

**Text Book:**

1. Distributed Operating Systems – Concepts and Design, Pradeep K Sinha, PHI, 2003

**References:**

1. Distributed Operating Systems 1e, Andrew S Tanenbaum, PHI.

**Semester III** **MULTIMEDIA SYSTEMS** **Hours/Week: 6**
**Elective Course-IV (P19CS18E)** **Credit:5**

**Course Outcomes**

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

CO1: To learn Multimedia basics like multimedia software, hardware and Applications — Understand

CO2: Understanding the multimedia information systems. — Understand and Apply

CO3: Explore audio & video representation techniques and image compression methods. — Analyze

CO4: To appreciate the use of multimedia communication system. — Understand

CO5: To apply multimedia network system and development process — Apply

**Unit 1:**

Definitions – CD-ROM and the Multimedia highway- where to use multimedia- Introduction to Making Multimedia: The stages of a project- what you need- Multimedia skills and Training: The terms – Macintosh and windows production platforms: Macintosh Versus PC – The Macintosh and Windows Computers- Hardware Peripherals: connection- Memory and storage Devices – Input Devices- Output Hardware- Communication Devices.

**Unit-2:**

Basic Tools: Text Editing and Word Processing Tools – OCR Software- Painting and Drawing Tools – 3-D Modeling and Animation Tools – Image – Editing Tools – Sound Editing Tools – Animation, Video and Digital Movies Tools – Helpful Accessories – Making Instant Multimedia : Linking Multimedia Object – Office suites- Word Processors – spread sheets – Databases- presentation Tools. Multimedia Authoring Tools : Types of Authoring Tools – card and page Based Authoring Tools- Icon – Based Authorised Tools – Time Based Authoring Tools – Object – Oriented Authoring Tools – Cross – Platform Authoring Notes.

**Unit 3:**

Text: The Power of Meaning – About Fonts and Faces –Using Text in Multimedia – Computers and Text – Font Editing and Design Tools – Hypermedia and Hypertext- Sound: The Power of Sound – Multimedia System Sounds- MIDI Versus Digital Audio – Digital Audio – Making MIDI Audio – Audio file formats – Working with sound on the Macintosh – Notation Interchange File Format (NIFF) – Adding Sound to your multimedia project – Towards professional sound – The Red Books standard production tips.

**Unit-4:**

Images: Making Still Images – color- Image File formats. Animation: The Power of motion – Principles of Animation - Making Animation That Work – Video : Using video – How video works – Broadcast Video Standards – Integrating Computers and Television – shooting and Editing Video – Video Tips – Recording Formats – Digital video.

**Unit-5 :**

Planning and Costing : Project planning – Estimating – RFPs and Bid proposals – Designing and producing : Designing – Producing – Content and Talent : Acquiring Content – Using content created by others – Using Contents created for a project – Using Talent – Delivering : Testing – preparing for Delivery – Delivering on CD-ROM – Compact Disc Technology – Wrapping It Up – Delivering on the World Wide Web.

**Text Books:**


1. Tay Vaughan - 1999– Multimedia : Making it work – 4th Edition – TMH Edition.
2. Walterworth john A– 1991- Multimedia Technologies and Application - Ellis Horwood Ltd. – London.
3. John F koegel Buford – Multimedia Systems – Addison Wesley – First Indian Reprint.

**Semester IV** **BIG DATA ANALYTICS** **Hours/Week: 6**
**Core Course (P19CS19)** **Credit: 4**

**Preamble**

This course is designed to introduce the basics of data analytics and apply them in the real time analysis of data.

The course is intended to facilitate the students to apply statistical methods of exploring data and introduce machine learning methods for data analytics.

**COURSE OUTCOMES:**

The students will be able to:

| | |
|---|---|
| CO 1: Identify Big Data and its Business Implications. | Understand |
| CO 2: List the components of Hadoop and Hadoop Eco-System | Understand |
| CO 3: Access and Process Data on Distributed File System | Apply |
| CO 4: Analyze Infosphere BigInsights Big Data Recommendations. | Analyze |
| CO 5: Apply Machine Learning Techniques using R. | Apply |

**Unit I:**

Big Data: From the Business Perspective: What is Big Data? – Characteristics of Big Data - Data in Warehouse and Data in Hadoop. Why is Big Data Important? – When to consider a Big Data Solution- Big Data Use Cases: Patterns for Big Data Deployment.

**Unit II:**

Big Data: From the Technology Perspective: The History of Hadoop - Components of Hadoop – Application Development in Hadoop- Getting Your Data into Hadoop- Other Hadoop Components.

**Unit III:**

Storing Data in Hadoop: HDFS –HBase- combining HDFS and HBase for effective datastorage using Apache Avro - Managing metadata with HCatalog.

**Unit IV:**

Processing your data with Map Reduce: Getting to know Map Reduce - Your first MapReduce Application - Designing Map Reduce Implementations. Building Reliable MapReduce Application: Local Application Testing with Eclipse – Using logging for Hadoop Testing – Reporting Metrics with job counters – Defensive programming in Map Reduce.

**Unit V:**

Customizing MapReduce execution – Controlling MapReduce Execution with Input format - Reading Data your way with custom Record Reader- Organizing Output data with Custom Output Format – Writing Data your way with custom Record Writer- Optimizing Your MapReduce Execution with Combiner- Controlling Reduce Execution with Partitioner – Using Non-Java code with Hadoop.

**Text Books**


1. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch,George Lapis , "Understanding Big Data: Anaytics for Enterprise Class Hadoop and Streaming Data",McGraw-Hill, 2012.(Units I & II)
2. Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Jhon Wiley & Sons, 2013(Units: III,IV & V).


**Reference Book:**


1. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics For Enterprise Class Hadoop and Streaming Data",McGrawHill Publishing,2012.

**Semester IV** **NETWORK SECURITY AND CRYPTOGRAPHY** **Hours/Week:6**
**Core Course (P19CS20)** **Credits: 5**

**Preamble:**

To understand how the data send securely by using different encryption/decryption techniques and also it gives knowledge about the network security practices like authentication-Mail,Firewall works.

**Prerequisites**

Computer networks

**Course Outcomes:**

| | |
|---|---|
| CO 1:Understand the importance of security attacks and service mechanism | Understand |
| CO 2:Explain basic structure of DES and AES | Understand |
| CO 3: To apply importance of Cryptography algorithms. | Apply |
| CO 4: Explain Kerbores, Symmetric Key Agreement, PGP,S/MIME. | Understand |
| CO 5: Understand the SSL Architecture, Hash Algorithm | Understand |

**Unit I**

Overview-Symmetric Ciphers:The OSI security architecture-Security attacks-security services-security mechanism-A model for Network security- Symmetric Cipher Model Classical Encryption Techniques
Cryptography-Cryptanalysis and Brute-Force Attack- Substitution Techniques-Caesar Cipher-Monoalphabetic Ciphers-Playfair Cipher-Hill Cipher-Polyalphabetic Ciphers-One-Time Pad- Transposition Techniques- Rotor Machines- Steganography

**Unit II**

Symmetric Ciphers: Block ciphers and the Data Encryption Standards - Traditional Block Cipher -- The Data Encryption Standard _The DES Example-The Nature of the DES Algorithm-The strength of DES-Block Cipher Design PrinciplesPrinciples of Public-Key Cryptosystems - The RSA Algorithm

**Unit III**

Network Security Practices: Applications of Cryptographic Hash Functions Message Authentication Digital Signatures Other Applications - Two Simple Hash Functions - Requirements and Security Security Requirements for Cryptographic Hash Functions Brute-Force Attacks Cryptanalysis - Hash Functions Based on Cipher Block Chaining - Electronic Mail Security - Pretty Good Privacy - S/MIME

**Unit IV**

Network Security Practices: IP Security Overview Applications of IPsec Benefits of IPsec Routing Applications IPsec Documents IPsec Services Transport and Tunnel Modes - IP Security Policy Security Associations Security Association Database Security Policy Database IP Traffic Processing - Encapsulating Security Payload ESP Format Encryption and Authentication Algorithms Padding Anti-Replay Service Transport and Tunnel Modes - Combining Security Associations Authentication Plus Confidentiality Basic Combinations of Security Associations - Internet Key Exchange Key Determination Protocol Header and Payload Formats -Web Security Considerations-Secure Sockets Layer-Transport Layer Security-HTTPS-Secure Shell (SSH

**Unit V**

Malicious Software - Types of Malicious Software - Propagation – Infected Content - Viruses - Propagation – Vulnerability Exploit - Worms - Propagation – Social Engineering – SPAM, Trojans - Payload – System Corruption - Payload – Attack Agent – Zombie, Bots - Payload – Information Theft – Keyloggers, Phishing, Spyware - Payload – Stealthing – Backdoors, Rootkits - Countermeasures - Distributed Denial of Service Attacks - Recommended Reading - Key Terms, Review Questions, and Problems Chapter -- Intruders – Intrution detection-- Password Management - Recommended Reading - Firewalls - The Need for Firewalls - Firewall Characteristics - Types of Firewalls - Firewall Basing - Firewall Location and Configurations

**Text Book:**

1. William Stallings, "Cryptography and Network Security-Principles and Practices", Prentice-Hall, Forth Edition, 2003
   Unit 1:chapters 1.2-1.6,2.1-2.5
   Unit 2:chapters 3.1-3.5,9.1-9.2
   Unit 3:chapters 11.1-11.5, 19.1-19.2
   Unit 4:chapters 20.1-20.6,17.1-17.5
   Unit 5:chapters 21.1-21.10,22.1-22.3,23.1-23.5

**Reference Books:**

1. Johannes A. Buchaman , "Introduction to cryptography", Springer-Verlag.
2. Atulkahate ," Cryptography and Network Security", TMH.

**Semester IV** **SOFTWARE TESTING** **Hours/Week:6**
**Core Course (P19CS21)** C**redit:4**

**Preamble:**

This course aims at facilitating the student to learn the concepts and principles of SQA standards tools for SQA.

**Prerequisite:**

Object Oriented Modelling and Design Patterns and Software Engineering

**COURSE OUTCOMES**

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

| | | |
|---|---|---|
| CO1: | Explain the concepts and the processes for software quality and testing | Understand |
| CO2 | Design test cases using Black box testing techniques | Apply |
| CO3 | Identify the test cases from Source code using testing techniques | Apply |
| CO4 | Know about user acceptance testing and generate test cases for it | Analyze |
| CO5 | Examine the test adequacy criteria to complete the testing process | Analyze |
| CO6 | Develop test cases and test suite using automated testing tools | Apply |

**Unit I:**

Principles of Testing – Software Development Life Cycle Models.-Phases of software project-Quality,Quality assurance, Quality control-Testing ,verification,validation-Proess model to Represent dfferent Phase-Lifecycle models.

**Unit II:**

White Box Testing-static testing-structural testing-Challenges in whitebox testing-Integration Testing- Integration Testing as a Type of Testing-Integration testing as a phase of testing-Scenario testing-Defect Bash-System and acceptance testing-system testing overview-Why is system testing Done?-Functional versus Non-functional Testing-Functional system testing-Non functional Testing-Acceptance testing

**Unit III:**

Testing Fundamentals & Specialized Testing: Performance Testing-Factors governing performance testing-Methodology for performance testing—Tools for performance testing-process for performance testing-Regression testingTypes of regression testing-when to do regression testing-How to do regression testing-Testing of Object Oriented Systems-Intro-Primer of objected oriented software-Differences in OO systems-Usability and Accessibility Testing.

**Unit IV:**

Test Planning-testing management-Test process-Test Reporting-Recommending Product release

**Unit V:**

Software Test Automation-What is Test Automation?-Terms used in Automation-Skills needed for Automation-What to Automate,scope of automation-Design and architecture of Automation-Generic requirements Test Tool\framework-Process model for automation-Selecting a Test Tool-Automation for extreme programming model-Challenges in Automation -Test Metrics and Measurements-What is Metrics and Measurements-Why metrics in Testing?-Types of Metrics-project Metrics-Progress Metrics-Productivity Metrics

**Text Book:**

1. Software Testing -Srinivasan Desikan, Gopalaswamy Ramesh, Pearson Education 2006.

Unit1:1.1,2.1,2.3,2.3,2.4,2.5

Unit2:3.1,3.2,3.3,3.4,5.1,5.2,5.3,5.4,5.5,6.1,6.2,6.3,6.4,6.5,6.6

Unit 3:7.1,7.27.3,7.4,7.5,8.1,8.2,8.3,8.4,11.1,11.2,11.3,12.1to 12.10

Unit4:15.1,15.2,15.3,15.4,15.5,

Unit5:16.1,16.2,16.3,16.4,16.5,16.6,16,7,16.8,16.9,16.10,17.1,17.2,17.3,17.4,17.5,17.6

**Reference Books:**

1. Introducing Software testing-Louis Tamres, Addison Wesley Publications, First Edition.

2. Software testing, Ron Patten, SAMS Techmedia, Indian Edition 2001.

3. Software Quality-Producing Practical, Consistent Software-Mordechai

**Semester IV** **AGILE SOFTWARE PROCESS** **Hours/Week:6**

**Core Course (P19CS21)** C**redit:4**

**Preamble:**

This course imparts knowledge to students in the basic concepts of agile Software Process, methodology and its development

**Perquisite:**

Software engineering

**COURSE OUTCOMES**

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

| | | |
|---|---|---|
| CO1: | Understand the basic concepts of Agile Software Process | Understand |
| CO2: | Comprehend various Agile Methodologies | Analyze |
| CO3: | Understand agile software development practices | Understand |
| CO4: | Demonstrate Agile development and testing techniques | Apply |
| CO5: | Know the benefits and pitfalls of working in an Agile team | Apply |

**UNIT I - AGILE METHODOLOGY**

Theories for Agile management – agile software development – traditional model vs. agile model - classification of agile methods – agile manifesto and principles – agile project management – agile team interactions – ethics in agile teams - agility in design, testing – agile documentations – agile drivers, capabilities and values.

**UNIT II - AGILE PROCESSES**

Lean production - SCRUM, Crystal, Feature Driven Development, Adaptive Software Development, and Extreme Programming: Method overview – lifecycle – work products, roles and practices.

**UNIT III - AGILITY AND KNOWLEDGE MANAGEMENT**

Agile information systems – agile decision making - Earl_s schools of KM – institutional knowledge evolution cycle – development, acquisition, refinement, distribution, deployment , leveraging – KM in software engineering – managing software knowledge – challenges of migrating to agile methodologies – agile knowledge sharing – role of story-cards – Story-card Maturity Model (SMM).

**UNIT IV - AGILITY AND REQUIREMENTS ENGINEERING**

Impact of agile processes in RE – current agile practices – variance – overview of RE using agile – managing unstable requirements – requirements elicitation – agile requirements abstraction model – requirements management in agile environment, agile requirements prioritization – agile requirements modeling and generation – concurrency in agile requirements generation.

**UNIT V - AGILITY AND QUALITY ASSURANCE**

Agile Interaction Design - Agile product development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile approach to Quality Assurance - Test Driven Development – Pair programming: Issues and Challenges - Agile approach to Global Software Development.

**REFERENCES:**


1. Craig Larman, ―Agile and Iterative Development: A manager_s Guide‖, Addison-Wesley, 2004
2. David J. Anderson; Eli Schragenheim, ―Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results‖, Prentice Hall, 2003
3. Dingsoyr, Torgeir, Dyba, Tore, Moe, Nils Brede (Eds.), ―Agile Software Development, Current Research and Future Directions‖, Springer-Verlag Berlin Heidelberg, 2010
4. Hazza& Dubinsky, ―Agile Software Engineering, Series: Undergraduate Topics in Computer Science‖, Springer, VIII edition, 2009.

**Semester IV** **SOFTWARE PROJECT MANAGEMENT** **Hours/Week:6**
**Core Course (P19CS21)** **Credit:4**

**Preamble**:

This course imparts knowledge to students in the basic concepts of agile Software Process, methodology and its development

**PREREQUISITE**

Software engineering

**COURSE OUTCOMES**

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

| | |
|---|---|
| CO 1: Understand various Management concepts. | Understand |
| CO 2: Understand various types of software models | Understand |
| CO 3: Apply the project scheduling activities | Apply |
| CO 4: Understand the various types of risk. | Understand |
| CO 5: Analyze the concept of Risk Management. | Analyze |

**Unit I:**

Introduction – Importance of Software Project Management – Project – Software project Vs Other types of Project – Contract Management and Technical Project Management – Activities covered by Software Project Management – Plans, Methods and methodologies – Categorizing Software Projects – Setting Objectives – Stake holders - Business Case – Requirement specification – Management control. Programme management and project evaluation: Introduction – Programme management – Managing the allocation of resources within programmes – Strategic Programme management – Creating a programme – Aids to Programme management – Benefits Management – Evaluation of individual projects – Technical Assessment – Cost Benefit Analysis – Cash Flow forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

**Unit II:**

Selection of an appropriate project approach: Introduction – Choosing technologies – Technical plan contents list – Choice of process models – Structure Vs Speed of delivery – The Waterfall model – The V-Process Model – The Spiral Model – Software prototyping – Other ways of categorizing prototypes – Incremental Delivery- Dynamic Systems Development method – Extreme programming – Managing iterative process – Selecting the most appropriate process model. Software Cost Estimation: Introduction – Where are estimates done? – Problems with over and under estimates – Basis for software estimating – Software effort estimation techniques – Expert Judgement – Estimating by analogy – Albrecht function point analysis – Function points Mark II - COSMIC Full function points – A Procedure code oriented approach – COCOMO: a Parametric model

**Unit III:**

Activity Planning: An Introduction – Objectives of Activity Planning – When to plan – Project Schedules – Projects & Activities – Sequencing and scheduling activities – Network

planning models – Formulating a network model – Adding the time dimension – The forward pass – The backward pass – Identifying the critical path – Activity float – Shortening the project duration – Identifying critical activities – Activity on arrow networks. Risk Management: Introduction – Risk – Categories of Risk – A framework for dealing with this – Risk Identification – Risk Assessment – Risk Planning – Risk Management – Evaluating risks to the schedule – Applying the PERT Technique – Mote Carlo simulation – Critical chain concepts.

**Unit IV:**

Resource Allocation: Introduction – The Nature of Resource – Identifying resource requirements – Scheduling resources – Creating Critical paths – Counting the cost – Being specific – Publishing the resource schedule – Cost Schedule – The Scheduling Sequence. Monitoring and Control: Introduction – Creating the framework – Collecting the data – Visualizing Progress – Cost Monitoring – Earned Value Analysis – Prioritizing monitoring – Getting the project back to target – Change control.

**Unit V:**

Managing Contracts: Introduction – ISO 12207 approach to the acquisition and supply of software – The supply process – Type of contract – Stages in Contract placement – Typical terms of a contract – Contract Management – Acceptance. Managing people and Organizing terms: Introduction – Understanding Behavior – Organizational Behavior: a background – Selecting the right person for the job – Instruction in the best methods – Motivation – The Oldham-Hackman job characteristics model – Working in groups – Working in groups – Becoming a team – Decision making – Leadership Organizational Structures – Dispersed and Virtual team – The influence of culture – Stress – Health & Safety.

**Text Book:**

1. Software Project Management, Author: Bob Hughes and mike Cotterell, Tata McGrawhill Fourth edition.

**References:**

1. Software Project Management, A Concise Study, S.A.Kelkar, PHI.
2. Software Project Management, Robert Bruce measure for improving performance, PHI Kelsey, Ph.D.

**Semester IV** **Hours/Week: 12**

**Project Work (P19CSP22) Internship** **Credit: 5**

- Individual Student Project