

M.Sc. COMPUTER SCIENCE (2017-2018)

S. No	Semester	Category	Course code	Course Title	Maximum marks			Minimum marks for pass			Hours week	Credits
					CIA	E.E	TOTAL	CIA	E.E	TOTAL		
1	I	Core	17P1CSC1	Mathematical Foundations of Computer Science	25	75	100	10	30	50	6	6
2		Core	17P1CSC2	Java Programming	25	75	100	10	30	50	6	6
3		Core	17P1CSC3	.Net framework and C# Programming	25	75	100	10	30	50	6	5
4		Core-PL	17P1CSCP1	Java Programming Lab	40	60	100	16	24	50	3	2
5		Core-PL	17P1CSCP2	C# Programming Lab	40	60	100	16	24	50	3	2
6		Major Elective-I	17P1CSEL1A 17P1CSEL1B 17P1CSEL1C	Advanced Software Engineering Design and Analysis of Algorithm Object Oriented System Development	25	75	100	10	30	50	6	4
7	II	Core	17P2CSC4	Cloud Based Web Services	25	75	100	10	30	50	4	5
8		Core	17P2CSC5	Distributed Programming using J2EE	25	75	100	10	30	50	5	5
9		Core	17P2CSC6	Cross Platform-Mobile Applications Development	25	75	100	10	30	50	5	5
10		Core	17P2CSC7	Big Data Analytics	25	75	100	10	30	50	5	5
11		Core-PL	17P2CSCP3	Distributed Programming using J2EE Lab	40	60	100	16	24	50	3	2
12		Core-PL	17P2CSCP4	Cross Platform-Mobile Applications Development Lab	40	60	100	16	24	50	3	2
13		Major Elective-II	17P2CSEL2A 17P2CSEL2B 17P2CSEL2C	PIC Microcontroller And Applications Ubiquitous Computing Wireless and Mobile Networks	25	75	100	10	30	50	5	4
14	III	Core	17P3CSC8	Compiler Design	25	75	100	10	30	50	6	6
15		Core	17P3CSC9	Human Computer Interaction	25	75	100	10	30	50	5	5
16		Core	17P3CSC10	Internet of Things	25	75	100	10	30	50	5	5
17		Core	17P3CSC11	Soft Computing	25	75	100	10	30	50	5	5
18		Core	17P3CSCP5	PIC Programming Lab	40	60	100	16	24	50	3	3
19		EDC	17P3CSEDC	M-Commerce	25	75	100	10	30	50	4	-
20			Communicative Skills	-	-	-	-	-	-	2		
21	IV	Major Elective-III	17P4CSEL3A 17P4CSEL3B 17P4CSEL3C	Data Analytics Lab Haskell Lab Python Lab	40	60	100	16	24	50	6	4
22		Core-PL	17P4CSCP6	Object Oriented System Development Lab	40	60	100	16	24	50	4	2
23			17P4CSPR	Project	40	60	100	16	24	50	-	5
			17P4CSCN	Comprehension	-	100	100	-	-	50	4	2
Total					2300						120	90

M.Sc. COMPUTER SCIENCE - 2017-2018

Paper Code	Total No. Of Papers	Total Marks	Total Credits	Classification
Core	17	1700	72	✓
Elective	03	300	12	✓
E.D.C	01	100	-	✓
Project	01	100	04	X
Comprehension	01	100	02	✓
Soft skill using language lab	-	-	-	X
Total	23	2300	90	

**A.VEERIYA VANDAYAR MEMORIAL SRI PUSHPAM COLLEGE
(AUTONOMOUS),
POONDI, THANJAVUR DIST.**

**Question Pattern for UG and PG Programmes for students to be
admitted during 2017 – 2018 and afterwards.**

Total Marks : 75

QUESTION PATTERN

**SECTION – A
(Question 1 to 10)**

10 x 2 = 20 Marks

1. Short Answer Questions.
2. Two Questions from each unit (All are answerable)

**SECTION – B
(Question 11 to 15)**

5 x 5 = 25 Marks

1. 5 Paragraph type questions with "either / or" type choice.
2. One question from each unit of the Syllabus.
3. Answer all the questions.

**SECTION – C
(Question 16 to 20)**

3 x 10 = 30 Marks

1. 5 Essay type questions – any three are answerable.
2. One questions from each unit of the Syllabus.

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
I	17P1CSC1	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	6	6

Objective

- ❖ To know about Mathematical techniques required for computer science.
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Unit I

Hrs 18

Statements and Notation – Connectives – Negation – Conjunction – Disjunction - Statements formulas and Truth tables-Conditional and Biconditional - Well formed formulas – Tautologies -Equivalence of formulas - Two state devices and statement logic-Disjunctive Normal Forms-Conjunctive normal forms-Principal Disjunctive normal forms-Principal Conjunctive Normal forms -Rules of inference

Unit II

Hrs 18

Matrices - Various types of matrices - Operations on matrices - Multiplication of matrices -Adjoint and Inverse of a matrices - Characteristic roots and Characteristic Equation of a matrices.

Unit III

Hrs 18

An Introduction to Description Logics-From networks to Description Logics- Knowledge representation in Description Logics- Description Logics systems - Applications developed with Description Logics systems-Relationship to other fields of Computer Science - Basic Description Logics

Unit IV

Hrs 18

Introduction - Definition of the basic formalism–Reasoning algorithms– Language extensions - Complexity of Reasoning– Introduction- OR- branching: finding a model - AND- branching: finding a clash – Combining sources of complexity- Reasoning in the presence of axioms –Undecidability - Reasoning about individuals in ABoxes-A list of complexity results for subsumption and satisfiability– Relationships with other Formalisms.

Unit V

Hrs 18

AI knowledge representation formalisms - Logical formalisms - Database models Expressive Description Logics- Introduction - Correspondence between Description Logics and Propositional Dynamic Logics - Functional restrictions - Qualified number restrictions- Objects- Fixpoint constructs - Relations of arbitrary arity - Finite model reasoning - Undecidability results - Extensions to Description Logics – Introduction- Language extensions- Non-standard inference problems.

Text books

1. Discrete mathematical structure with applications of computer science-P.Tremblay R.Manohar-McGraw Hill Publishing Company limited, 2003
2. An Introduction to matrices – S.C.Gupta-Sultan chand and son’s publication.
3. THE DESCRIPTION LOGIC HANDBOOK:-Theory, implementation, and applications- Edited by Franz Baader, Deborah L. McGuinness, Daniele Nardi, Peter F. Patel-Schneider.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
I	17P1CSC2	JAVA Programming	6	6

Objective

To provide an exposure on network programming in Java, how to interface with swing, the basic database connectivity, how to develop client-server programming model using servlets and JSP and also deals with component programming using Java beans.

UNIT- I

Hrs 18

Networking Basics - Socket Programming - Proxy server - TCP/IP Sockets - Net address- datagrams.

UNIT- II

Hrs 18

Introducing Swing: swing- components and containers - the swing packages - Painting in a Swing - Exploring Swing: JLabel and ImageIcon - JTextField - The Swing Buttons - Jtabbed - Pane - Jscroll Pane - Jlist - JComboBox - Trees- Jtable.

UNIT- III

Hrs 18

Java Database Connectivity: JDBC Architecture - Installing the ODBC Driver - Connecting to a Database - Structured Query language. JDBC programming concept: Database URL— Executing the action commands - Query with JDBC - Populating a Database - Executing Queries - Metadata - Scrollable and Updatable Result Sets.

UNIT- IV

Hrs 18

Introduction to Servlets- Servlets: Java Servlets: Servlet Life Cycle – Generic and HTTP Servlet - A simple Servlets - The servlet API - Servlet Package - Handling HTTP Request and Response – Servlet with Database Connectivity- Session Tracking: Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking class.

UNIT- V

Hrs 18

Bean Development Kit - Jar Files - Introspection - Design Pattern for properties, events and methods - Constrained Properties - Persistence – Customizers.

Books for Study:

1. Herbert Schildt, " **The Complete Reference Java**", Tata McGraw Hill Publishing Company Limited, Edition 7, 2007, ISBN: 9780070636774.
2. Cays Horstmann and Gary Cornell, "**Core Java**", Volume II, Pearson Edition, 2001, ISBN: 978-0137081899 and 978-0137081608

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
I	17P1CSC3	.NET FRAMEWORK AND C# PROGRAMMING	6	5

Objective

- To understand Programming techniques in c#.
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UNIT – I

Hrs 18

The NET Architecture:

The Vision and goals of .NET – The Building blocks of .NET – An overview of .NET framework: The NET Evolution – Design goals of the .NET framework – The .NET framework Architecture – An overview of .NET application.

UNIT – II

Hrs 18

Class overview:

Introduction to C# - Data types – Operators – Flow Control – Methods and Parameters – Fields – Instance Methods.

UNIT – III

Hrs 18

Advanced of Class:

Access Modifier – Static – Extension Methods – Nested Class – Partial Class – Inheritance – Interface – Value Types.

UNIT – IV

Hrs 18

Exception Handling – Generics (Basic, Methods) – Delegates and Lambda Expressions – Events Delegates & Lambda Expressions

UNIT – V

Hrs 18

Building Custom collections – More collection interfaces – Primary collections class - Multithreading (Basic, Working with System. Threading, Asynchronous Tasks – Cancelling a Task, Thread Synchronization)

Reference Book

Essential C# 6.0, 5th Edition - **Mark Michaelis & Eric Lippert**

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
I	17P1CSCP1	Java Programming LAB	3	2

OBJECTIVES

1. Java program to demonstrate the use of Java Swing components, namely, buttons, text boxes, lists/combos, menus etc
2. Java program to store, delete and update data in a database with the support of JDBC-ODBC connectivity
3. Java program with Servlets to create a dynamic HTML form to accept and display user name and password with the help of 'get()' and 'post()' methods
4. Java Servlet program for 'auto refreshing' the webpage after given period of time
5. Java Servlet program to demonstrate the use of cookies
6. Java Servlet program to demonstrate the use of session
7. Java program with Servlets to store only valid data in a database with the support of JDBC-ODBC connectivity

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
I	17P1CSCP2	C # PROGRAMMING LAB	3	2

Objective

- To understand Programming techniques in c#.

Programs

1. C# program for Ascending & Descending order.
2. C# Program for Matrix Multiplication.
3. C# program for stack and queue collections.
4. C# Program to perform various string operations.
5. Write a program in C# Sharp to find the factorial of a given number using recursion.
6. Writing a C# program using Extension Methods to generate Random File Nameconcept into Date Time class, FileCopy concept into the DirectoryInfo class.
7. Writing a C# Program to find the sum of Number using Delegates to print each step
8. Writing a C# program to change Background and Foreground of the colour using Events in C# (One event change background colour, one event change foreground colour), both events should be call every 3 seconds
9. Writing a C# program Copy one folder into another folder using Task functionality
10. Writing a C# program create a "FileCopy command" using coping file via Command line arguments

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
I	17P1CSEL1A	Major Elective – I ADVANCED SOFTWARE ENGINEERING	6	4

Objective

* To Understand advances in Development software

UNIT I

Hrs 15

A Generic view of Process: Layered Technology-Process Framework-Capability Maturity Model Integration-Process Patterns-Process Assessment-Personal and Team Process Models-Process Technology-Product and Process. **Process Models:** Waterfall Models-Incremental Process Model-Evolutionary Process Model-Specialized Process Model-Unified Process.

UNIT II

Hrs 20

Requirement Engineering: Tasks-Initiating Requirement Engineering Process-Eliciting Requirements-Developing Use case-Building Analysis Model-Negotiating Requirements-Validating Requirements. **Building Analysis Model:** Requirement Analysis –Analysis Modeling Approaches-Data Modeling Concepts-Object Oriented Analysis-Scenario Based Modeling-Flow Oriented- Class Based –Behavioral Model.

UNIT III

Hrs 15

Design Engineering: Context of Software Engineering –Design Process and Design Quality-Design Concepts-Design model-Pattern Based Design. **Architectural Design:** Software Architecture-Data Design-Architectural Styles and Pattern-Architectural Design-Alternate Architectural Design-Mapping Data Flow. **User Interface Design:** Golden Rules-User Interface Analysis and Design-Interface Analysis-Interface Design- Design Evaluation.

UNIT IV

Hrs 20

Testing Strategies: Strategic Approach-Strategic Issues-Strategic for Conventional Software-Strategic for Object Oriented Software-Validation Testing-System Testing-Art of Debugging. **Testing Tactics:** Testing fundamentals-Black box Testing-White Box Testing-Basis Path Testing-Control Structure Testing-Object Oriented Testing-Testing Methods Applicable-Interclass Test Case Design-Testing for Specialized Environments-Testing Patterns.

UNIT V

Hrs 20

Project Management: Management Spectrum – People –Product-Process-Project-W5HH Principle-Critical Practices. **Quality Management:** Quality Concepts-Software quality Assurance-Software Reviews-Technical Reviews –Statistical SQA-Software Reliability-ISO 9000 Quality Standards-SQA Plan. **Change Management:** Software Configuration management-SCM Repository-SCM Process-Configuration Management for Web Engineering.

References:

1. Software Engineering (Sixth Edition) by ROGER S. PRESSMAN, McGraw-Hill International Edition, 2005.
2. Richard E.Fairley, "Software Engineering Concepts", McGraw-Hill Book Company – 1985.

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
I	17P1CSEL1B	Major Elective – I DESIGN AND ANALYSIS OF ALGORITHM	6	4

UNIT I

Hrs 18

Algorithm Analysis – Time Space Tradeoff – Asymptotic Notations – Conditional asymptotic notation – Removing condition from the conditional asymptotic notation – Properties of big-Oh notation – Recurrence equations – Solving recurrence equations – Analysis of linear search.

UNIT II

Hrs 18

Divide and Conquer: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort – Greedy Algorithms: General Method – Container Loading – Knapsack Problem.

UNIT III

Hrs 18

Dynamic Programming: General Method – Multistage Graphs – All-Pair shortest paths – Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem .

UNIT IV

Hrs 18

Backtracking: General Method – 8 Queens problem – sum of subsets – graph coloring – Hamiltonian problem – knapsack problem.

UNIT V

Hrs 18

Graph Traversals – Connected Components – Spanning Trees – Biconnected components – Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem – Introduction to NP-Hard and NP-Completeness.

TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007. (For Units II to V)
2. K.S. Easwarakumar, Object Oriented Data Structures using C++, Vikas Publishing House pvt. Ltd., 2000 (For Unit I)

REFERENCES:

1. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India Pvt. Ltd, 2003.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 1999.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
I	17P1CSEL1C	Major Elective -I Object Oriented System Development	6	4

Objective

- ❖ To understand object oriented analysis and design techniques.
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UNIT- I

Hrs 18

An Overview of Object Oriented Systems Development - Object Basics - Object Oriented Systems Development Life Cycle.

UNIT- II

Hrs 18

Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns-Frameworks - Unified Approach - Unified Modeling Language - Use case - class diagram - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram.

UNIT- III

Hrs 18

Identifying use cases - Object Analysis - Classification – Identifying Object relationships - Attributes and Methods.

UNIT- IV

Hrs 18

Design axioms - Designing Classes - Access Layer - Object Storage - Object Interoperability.

UNIT- V

Hrs 18

Designing Interface Objects - Software Quality Assurance – System Usability - Measuring User Satisfaction

BOOKS FOR STUDY:

1. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 1999

REFERENCES:

1. Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw-Hill, 2003.
2. James Rumbaugh, Ivar Jacobson, Grady Booch "The Unified Modeling Language Reference Manual", Addison Wesley, 1999.
3. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, "UML Toolkit", OMG Press Wiley Publishing Inc., 2004.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
II	17P2CSC4	Core- CLOUD BASED WEB SERVICES	4	5

Objective

*To understand various services of web

UNIT I

Hrs 15

Introduction to Web Services – XML Fundamentals - Client/Server, CORBA, JAVA RMI, Micro Soft DCOM, MOM - Challenges in Distributed Computing - Components of Webservices – SOAP – WSDL – UDDI – SOAP Sever.

UNIT II

Hrs 15

Cloud components - Cloud architecture - Cloud delivery model – SPI framework, SPI evolution, SPI vs. traditional IT Model - Cloud deployment model - Virtualization and Cloud Computing – Web services through Cloud – Scientific Applications: Health care ECG analysis in the cloud – Business Application in the cloud

UNIT III

Hrs 15

Web Services Interoperability – Means of ensuring Interoperability, Overview of .NET and J2EE. Calling a Web Service by Using a Proxy - Creating a Simple web service - Creating and Calling a Web Service by Using Visual Studio .NET.

UNIT IV

Hrs 15

The J2EE Web Service APIs - SOA support in J2EE – SOAP web service example in java using eclipse - RESTful webservices - Building webservices with JAX-WS – Building RESTful webservices with JAX-WS- **Web Services Security** – XML security frame work, XML encryption, XML digital signature

UNIT V

Hrs 15

XKMS structure, guidelines for signing XML documents. XML Serialization in the .NET Framework.

Text book : Compiled and edited by T.S.Baskaran, Dept of Computer Science,A.V.V.M Sri Pushpam college.

“Mastering Cloud Computing” – Rajkumar Buyya , Christian Vecchiola , S.Tamarai Selvi TATA McGraw- Hill , New Delhi - 2010

REFERENCE BOOKS

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter TATA McGraw- Hill , New Delhi - 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller-Que 2008
3. Developing Java Web Services, R.Nagappan, R.Skoczylas, R.P. Sriganesh, Wiley India, rp – 2008.
4. Developing Enterprise Web Services, S.Chatterjee, J.Webber, Pearson Education, 2008.
5. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
6. Building Web Services with Java, 2nd Edition, S. Graham and others, Pearson Edn., 2008.
7. Java Web Services, D.A. Chappell & T. Jewell, O’Reilly,SPD.
8. J2EE Web Services, Richard Monson-Haefel, Pearson Education.
9. Java Web Services Programming, R.Mogha,V.V.Preetham, Wiley India Pvt.Ltd.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
II	17P2CSC5	DISTRIBUTED PROGRAMMING USING J2EE	5	5

Objective:

To impart knowledge about the distributed environment, its architecture, application development with RMI, Java Servlets, Java Server Pages, Struts and EJB using J2EE technologies.

Unit – I

Hrs 15

Distributed Hardware Architecture: Evolution of Personal Computer – PC to PC Communication – Local Area Network – File Server Architecture – Client-Server Architecture – Database Server Architecture – Corporate Network – Intranet – Wide Area Network – Internet. Distributed Software Architecture: Mainframe – File Server - Client-Server Architecture: Single-two tier-three tier-N-tier Architecture–Distributed Application.

Unit – II:

Hrs 20

Distributed Computing using RMI: Introduction - RMI Architecture – RMI Exceptions – Developing Applications with RMI –RMI with Database Connectivity. Evolution of the Web Application--Overview of the HTTP - JSP: JSP Overview– JSP syntax and semantics- Expressions.

Unit – III:

Hrs 20

Java Server Pages: JSP Basic Concepts – JSP Elements – Expressions – Scriptlets – Request and Response Objects – Redirection and Forwarding –JSP with Database Connectivity - Session Tracking: Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking Class

Unit IV:

Hrs 20

The Struts Framework: Introduction - J2EE Platform: J2EE Architecture – Containers – J2EE Technologies: Component – Service – Communication Technologies – Developing J2EE Application- EJB Architecture and Design: Introduction to EJB – The EJB Container and its Services

Unit – V:

Hrs 20

Working with EJB – Session Bean and Business Logic – Entity Bean and Persistence.

Books for Study:

1. Ivan Bayross, “ **Web Enabled Commercial Applications Development using Java 2**”, Edition 2000, BPB Publications.
2. Jason Hunter with William Crawford, “**Java Servlet Programming**”, Shroff Publishers & Distributors Pvt. Ltd
3. Phil Hanna, “**JSP 2.0 The Complete Reference**”, Tata McGraw Hill Publishing Company Limited.
4. James Holmes,“**Struts :The Complete Reference**”, Second Edition, Tata McGraw Hill Publishing Company Limited..
5. Subrahmanyam Allamaraju, “**Professional Java Server Programming – J2EE Edition Volume 1**”, Shroff Publishers & Distributors Pvt. Ltd..

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
II	17P2CSC6	Cross Platform – Mobile Applications Development	5	5

Unit I

Mobile Development Using Xamarin

Hrs 15

What is Xamarin – What’s new: Mobile Development Techniques – Mobile UI – Xamarin Forms Custom Renderers – Building Mobile User Interfaces – Xamarin Forms Architecture – Platform UI Specification Approach – Xamarin Forms or a Platform-Specific UI.

Unit II

Xamarin Views

Hrs 20

Xamarin Forms - Creating Xamarin Forms Solution –Adding Xamain.Forms views – UI Design Using Layouts – Xamarin Forms Layouts – Android Layout – iOS Layout

Unit III

Hrs 20

Xamarin Controls

Xamain. Forms Views – Android controls – iOS controls – Making a Scrollable List – Data Adapters – Xamarin. Forms List view – Android List view – iOS Table View

Unit IV

Hrs 20

Navigation, Database & Custom Renderers

Navigation Patterns – Xamarin. Forms Navigation – android Navigation – iOS Navigation – Data Access with SQLite and Data Binding - Custom Renderers – Preparing custom renderers – Creating Custom renderers – android, iOS, Windows phone custom renderers –

Unit V

Hrs 20

Cross – Platform Architecture

Cross platform Architecture – Shared code and Platform specific code – Core Library – PCL – Dependency Injection.

Text book:

Xamarin Mobile Application Development: Cross-Platform C# and Xamarin. Forms Fundamentals 2015 by Dan Hermes, A press

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
II	17P2CSC7	BIG DATA ANALYTICS	5	5

Objectives:

1. To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map- Reduce.
3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
4. To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Unit I : Introduction to Big Data, Hadoop and NoSQL Hrs 15

Introduction to Big Data, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach, Case Study of Big Data Solutions - What is Hadoop? Core Hadoop Components; Hadoop Ecosystem; Physical Architecture; Hadoop limitations - What is NoSQL? NoSQL business drivers - NoSQL case studies - NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Bigtable) stores, Document stores, Variations of NoSQL architectural patterns - Using NoSQL to manage big data: What is a big data NoSQL solution? - Understanding the types of big data problems - Analyzing big data with a shared-nothing architecture - Choosing distribution models: master-slave versus peer-to-peer - Four ways that NoSQL systems handle big data problems

Unit II: MapReduce and the New Software Stack Hrs 15

Distributed File Systems : Physical Organization of Compute Nodes, Large-Scale File-System Organization - **MapReduce:** The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of MapReduce Execution, Coping With Node Failures - **Algorithms Using MapReduce:** Matrix-Vector Multiplication by MapReduce , Relational-Algebra Operations, Computing Selections by MapReduce, Computing Projections by MapReduce, Union, Intersection, and Difference by MapReduce, Computing Natural Join by MapReduce, Grouping and Aggregation by MapReduce, Matrix Multiplication, Matrix Multiplication with One MapReduce Step.

Unit III: Finding Similar Items and Mining Data Streams Hrs 15

Applications of Near-Neighbor Search, Jaccard Similarity of Sets, Similarity of Documents, Collaborative Filtering as a Similar-Sets Problem - **Distance Measures:** Definition of a Distance Measure, Euclidean Distances, Jaccard Distance, Cosine Distance, Edit Distance, Hamming Distance - **The Stream Data Model:** A Data-Stream-Management System, Examples of Stream Sources, Stream Query, Issues in Stream Processing - **Sampling Data in a Stream :** Obtaining a Representative Sample , The General Sampling Problem, Varying the Sample Size - **Filtering Streams:** The Bloom Filter, Analysis - **Counting Distinct Elements in a Stream:** The Count-Distinct Problem, The Flajolet-Martin Algorithm, Combining Estimates, Space Requirements - **Counting Ones in a Window:** The Cost of Exact Counts, The Datar-Gionis-Indyk-Motwani Algorithm, Query Answering in the DGIM Algorithm, Decaying Windows.

Unit IV: Link Analysis and Frequent Itemsets Hrs 15

Page Rank Definition, Structure of the web, dead ends, Using Page rank in a search engine, Efficient computation of Page Rank: Page Rank Iteration Using MapReduce, Use of Combiners to Consolidate the Result Vector - Topic sensitive Page

Rank, link Spam, Hubs and Authorities - **Handling Larger Datasets in Main Memory:** Algorithm of Park, Chen, and Yu, The Multistage Algorithm, The Multihash Algorithm - **The SON Algorithm and MapReduce - Counting Frequent Items in a Stream:** Sampling Methods for Streams, Frequent Itemsets in Decaying Windows

Unit V: Clustering, Recommendation Systems and Mining

Social-Network Graphs

Hrs 15

CURE Algorithm - Stream-Computing - A Stream-Clustering Algorithm - Initializing & Merging Buckets - Answering Queries - A Model for Recommendation Systems - Content-Based Recommendations - Collaborative Filtering - Social Networks as Graphs - Clustering of Social-Network Graphs - Direct Discovery of Communities - SimRank - Counting triangles using Map-Reduce

Text Books:

1. Anand Rajaraman and Jeff Ullman "Mining of Massive Datasets", Cambridge University Press,
2. Alex Holmes "Hadoop in Practice", Manning Press, Dreamtech Press.
3. Dan McCreary and Ann Kelly "Making Sense of NoSQL" - A guide for managers and the rest of us, Manning Press.
4. Study Material for "Big Data Analytics" based on Stanford Info-Lab Manual, Compiled by ANURADHA BHATIA, Mumbai University.

References:

1. Bill Franks , "Taming The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics", Wiley
2. Chuck Lam, "Hadoop in Action", Dreamtech Press

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	17P2CSCP3	DISTRIBUTED PROGRAMMING USING J2EE LAB	3	2

Objectives:

- To learn the usage and implementation of distributed application development packages.
 1. Distributed applications using RMI
 - a. Simple RMI application
 - b. RMI application with a server and more than one clients
 - c. RMI application with Database Connectivity
 2. JSP program to implement form data validation to accept correct data
 3. JSP script to demonstrate the use of <jsp:include> by displaying an external webpage and <jsp:plugin> to run an applet
 4. JSP program for demonstrating creation and accessing Java Beans
 5. Enterprise Java Beans
 - a. Session Bean
 - i. Stateless Session Bean
 - ii. Stateful Session Bean
 - b. Entity Bean
 - i. Container Managed Persistence
 - ii. Bean Managed Persistence

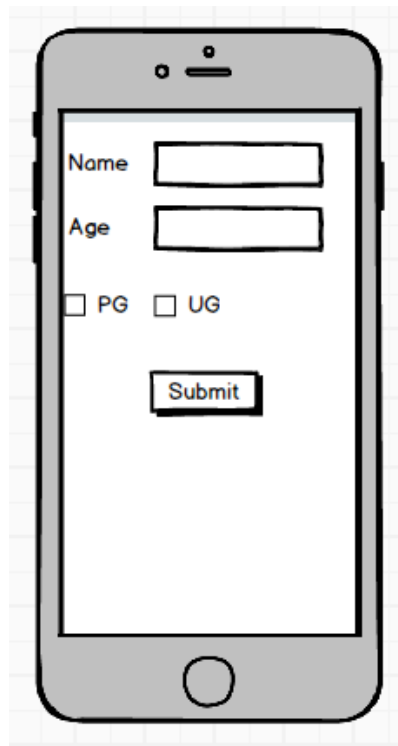
Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
II	17P2CSCP4	Cross Platform - Mobile Applications Development LAB	3	2

OBJECTIVES

- Building mobile applications.
- Availing variety of mobile brands and models for testing objectives in same location.
- Pushing the innovation in mobile applications.

Perform the experiments in J2ME / Android SDK framework

1. Timer: Create a Page, change the background and Foreground colour randomly using Xamarin Timer
2. Platform Specific: Create a form like below based on the platform change the Font Name, Font Size and display the form information in the Message Box.



3. Zoom: Using Pinch gesture class to Zoom the image in Xamarin Forms.
4. Animation: Create a button, using button click event animate images in Xamarin Forms.
5. Dependency Service: Using Dependency Service find the sum of a number, which enters by the user in the Xamarin Forms.
6. Android DB: Store & Retrieve the Form data into the SQLite.
7. Windows Phone DB: Store & Retrieve the Form data into the SQLite.
8. Navigation: Implementing Navigation using Pushing and Popping and Handling the Back button.
9. Master Detail Page: Create Navigation drawer using the MasterDetailPage.
10. Tabbed Page: Using Tabbed page load different page based on Tab click, one tab form should be implemented Popup menu handling.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
II	17P2CSEL2A	Major Elective – II PIC MICROCONTROLLER AND APPLICATIONS	5	4

Objectives

- To understand the function of RISC architecture and On-Chip peripherals of PIC microcontroller.

Unit -I PIC Architecture

Hrs 15

Overview of the PIC 18 family – The WREG in the PIC – The PIC file register – Using instructions with the default access bank – PIC status register – data formats and directives- program counter and ROM space – RISC architecture in the PIC

Unit -II Instructions of PIC

Hrs 15

Branch, Call and Time Delay Loop – I/O port programming – Arithmetic, logic instructions and programs

Unit -III PIC programming in C

Hrs 15

Data types and time delays in C – I/O programming in C – Logic operations in C – Data conversion – Programming Timers 0 and 1 – Counter Programming – Programming timers 0 and 1 in C- Programming timers 2 and 3.

Unit -IV PIC18 Serial Port and Interrupt Programming

Hrs 15

Serial Port: Basics of Serial Communication – Serial Port Programming in Assembly and C. PIC interrupts- Programming Timer Interrupts – External Hardware Interrupts – Serial Communication Interrupts - Interrupt Priority

Unit -V Interfacing

Hrs 15

LCD and Key board interfacing – ADC, DAC and sensor interfacing – SPI protocol - DS1306 RTC Interfacing –DC motor interfacing- Stepper motor.

Book for Study

- Muhammad Ali Mazidi, RolindD.Mckinlay, Danny Causey, "PIC Microcontroller and Embedded Systems Using Assembly and C for PIC 18", Pearson, 2012.

Book for Reference

- Ramesh Gaonkar, "Fundamentals of Microcontrollers and Applications in Embedded Systems", Penram International Publishing Pvt. Ltd.
- Han-Way Huang, "PIC Microcontroller an Introduction to Software and Hardware Interfacing", Delmar Cengage Learning, New Delhi,2012.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	17P2CSEL2B	Major Elective – II UBIQUITOUS COMPUTING	5	4

Objectives

- To understand the advances in pervasive computing.

Unit – I

Hrs 15

An Introduction to Ubiquitous Computing: Founding Contributions to Ubiquitous Computing - Ubiquitous Computing in U.S. Universities - Ubiquitous Computing in European Laboratories and Universities - Modern Directions in Ubiquitous Computing - The Research Community Embraces Ubiquitous Computing - The Future of Ubiquitous Computing

Unit – II

Hrs 15

Ubiquitous Computing Systems: Ubicomp Systems Topics and Challenges - Creating Ubicomp Systems-Implementing Ubicomp Systems-Evaluating and Documenting Ubicomp Systems.

Unit – III

Hrs 15

Privacy in Ubiquitous Computing: Understanding Privacy - Technical Solutions for Ubicomp Privacy - Address Privacy. Ubiquitous Computing Field Studies : Three Common Types of Field Studies - Study Design - Participants- Data Analysis - Steps to a Successful Study

Unit – IV

Hrs 15

Ethnography in Ubiquitous Computing - From Ethnography to Design - Design-Oriented Ethnography in Practice. From GUI to UUI: Interfaces for Ubiquitous Computing: Interaction Design-Classes of User Interface-Input Technologies.

Unit – V

Hrs 15

Location in Ubiquitous Computing: Characterizing Location Technologies - Location Systems. Context-Aware Computing: Context-Aware Applications - Designing and Implementing Context-Aware Applications - Issues to Consider when Building Context-Aware Applications- Challenges in Writing Academic Papers on Context Awareness

Reference:

1. Ubiquitous Computing Fundamentals - Edited by John Krumm Microsoft Corporation Redmond, Washington, U.S.A.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	17P2CSEL2C	Major Elective – II Wireless and Mobile Networks	5	4

Objectives:

- Understand the basic concepts of Personal Communication Services(PCS) principles and fundamentals.
- Be exposed to the required Operations Mobility Management and handoff Management.
- Learn the design of the IS-41,CDPA.
- Be familiar with GSM networks functionalities.

UNIT I: Network Planning

Hrs 15

Introduction – wireless network Topologies – Cellular Topology – Cell Fundamentals – Signal -to-Interference Radio Calculation-Network Planning for CDMA Systems.

UNIT II: Wireless Network Operation

Hrs 15

Introduction – Mobility Management – Radio Resources and Power Management – Security in Wireless Networks

UNIT III: Wireless WANS

Hrs 15

what is GSM – Mechanisms to Support a Mobile Environment – Communication in Infrastruc-ture – CDMA – IMT-2000 – GPRS and Higher Data rates – short Message service in GSM – Mobile Application Protocols

UNIT IV: Local Broadband and Adhoc networks

Hrs 15

IEEE 802.11 – PHY layer – MAC Sublayer -Wireless ATM – HIPERLAN – HYPERLAN-2 – IEEE 802.15 WPAN–HomeRF–Bluetooth–Interference between Bluetooth and 802.11

UNIT V: Wireless Geolocation System

Hrs 15

What is wireless Geolocation – Wireless geolocation System Architecture – Technologies for Wireless Geolocation – Geolocation standards for E-911 Services – Performance Measures for geolocation Systems.

Book for Study:

1.Kaveh Palavan, Prashant Krishnamoorthy, **Principles of Wireless Networks**, Eastern Economy Edition,2002, ISBN- 81-203-2380-7 (Chapter 5,6,7,8,9,11,12,13,14 only), ISBN: 978-0-470-69708-5

Books for Refernces:

1. Jochen Schiller, **Mobile Communications**, Second Edition, Pearson Education, Ltd., 2003 ISBN81-2. 297-0350-5.
T.S. Rappaport, **Wireless Communications: Principles and Practice** , Second Edition, Prentice Hall, 2002,ISBN: 9780130422323.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
III	17P3CSC8	Core – COMPILER DESIGN	6	6

Objective

* To Understand design principles of compiler.

Unit I

Hrs 18

Introduction to Compilers: Compilers and Translators, Structure of a Compiler, Compiler Writing tools, Programming Languages, High Level Programming Languages, Definitions of Programming Languages, Lexical and syntactic structure of a Language- Finite Automata and Lexical analysis, Role of a lexical analyzer, Regular expressions, Finite Automata, Minimizing the number of syntactic specification of Programming languages.

Unit II

Hrs 18

Context free grammars, derivations and parse tree, capabilities of context free grammars- Basic Parsing techniques: Shift reproduce parsing- Operator precedence parsing- Top down Parsing- Predictive Parsers – Automatic Constructions of efficient Parsers. LR Parser- Constructing SLR- Canonical LR and LALR Parsing tables- Using Ambiguous Grammars- Automatic Parser Generator- Implementation of LR Parsing Tables.

Unit III

Hrs 18

Syntax Directed Translation: Schemes- Implementation- Intermediate Code- Postfix Notation- Parse Tree and Syntax Trees- Three Address Code- Quadruples and Triples- Translation of Assignment Statements- Boolean Expression- postfix Translations- Translation with a Top- Down Parser.

Unit IV

Hrs 18

Symbol Tables, Contents data Structures, representing scope information. Runtime Storage Administration, Implementation and Storage allocation of simple stack allocation schemes and block structured languages, Error detection and recovery, Lexical Phase Errors, Syntactic Phase errors, Semantic errors.

Unit V

Hrs 18

Introduction to Code Optimization, Principle Sources of Optimization, Loop Optimization, DAG Representation of basic blocks, Global data flow Analysis, Code generation, Problems in Code Generation Register allocation and Assignment, Code Generation from DAG's, Peephole Optimization.

Reference:

1. Alfred V.Aho and Jeffrey D.Ullman, "Principles of Compiler Design", Addison Wesley, Narosa publishing House, 1999.

General References:

1. Gray Cornell and Cay S.Horstman, Core Java Vol1 and 2, Sun Microsystems Press, 1999.
2. Stephen Asbury, ScottR. Weiner, Wiley, Developing Java Enterprise Applications, 1998.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
III	17P3CSC9	HUMAN COMPUTER INTERACTION	5	5

Objective

- ❖ To Understand the concepts and techniques for effective interaction between Human and Computers

Unit I:

Hrs 15

Cognitive Psychology and Computer Science - Capabilities of Human-Computer Interaction (HCI)-Goals of Human-Computer Interaction (HCI)-Roles of Human, Computer and Interaction in HCI - Basic User Interfaces- Advanced User Interfaces-Justification of Interdisciplinary Nature-Standard Framework of HCI-HCI Design Principles-Interface Levels in HCI- Steps in Designing HCI Applications -Graphical User Interface Design -Popular HCI Tools - Architecture of HCI Systems - Advances in HCI - Overview-HCI Sample Exercises **Usability Engineering** -Introduction-HCI and Usability Engineering-Usability Engineering Attributes -Process of Usability-Need for Prototyping.

Unit II

Hrs 15

Modelling of Understanding Process – Introduction- Goals, Operators, Methods and Selection Rules (GOMS) - Cognitive Complexity Theory (CCT) - Adaptive Control of Thought-Rational (ACT-R)-State, Operator, and Result (SOAR)-Belief-Desire-Intention (BDI)-ICARUS-Connectionist Learning with Adaptive Rule Induction On-line (CLARION)-Subsumption Architecture -**Spoken Dialogue System**- Introduction - Factors Defining Dialogue System-General Architecture of a Spoken Dialogue System- Dialogue Management (DM) Strategies -Computational Models for Dialogue Management-Statistical Approaches to Dialogue Management - Learning Automata as Reinforcement Learners-Case Study: Learning Dialogue Strategy Using Interconnected Learning Automata -Software and Toolkits for Spoken Dialogue Systems Development.

Unit III

Hrs 15

Recommender Systems- Introduction- HCI Study Based on Personalisation - Personalisation in Recommender Systems -Relation between Information Filtering and Recommender Systems -Application Areas of Recommender Systems-Recommender System Field as an Interdisciplinary Area of Research -Phases of Recommender Systems -User Profiling Approaches-Classification of Recommendation Techniques - Advantages and Disadvantages of Recommender System Approaches -Need of Software Agent-based Approach in Recommender Systems -Evaluating Recommender Systems -Integrated Framework for Recommender Systems -Case Study: Music Recommender System .

Unit IV

Hrs 15

Advanced Visualisation Methods- Ontology Definition - Ontology Visualisation Method -Space Dimensions of Ontology Visualisation -Ontology Languages-Ontology Visualisation Tools -Ontology Reasoning – Reasoner Case Study 1: Teaching Ontology with C Programming Language-Case Study 2: Activity for Ontology Creation with a Case of a Software Company Scenario-Case Study 3: Activity for History Ontology Creation.

Unit V

Hrs 15

Ambient Intelligence: The New Dimension of Human-Computer Interaction - Introduction - Ambient Intelligence Definition-Context-aware Systems and Human-Computer Interaction -Middleware - Modelling Data for AmI Environment - Development of Context-awareness Feature in Smart Class Room— A Case Study - Context-aware Agents for Developing AmI Applications—A Case Study.

Text book:

1. K. Meena, R. Sivakumar, "Human-Computer Interaction", PHP Learning Private limited Delhi-110092, 2015.

Reference:

1."Alan Dix, Janet Finlay, Gregory D.Abowd, Russell Beale", "Human-Computer Interaction", 3rd Edition, Pearson publications, 2008.

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
II	17P3CSC10	Major Elective – II Internet-of-Things	5	5

OBJECTIVES:

- To Understand the concepts and techniques of IoT.

UNIT I

Hrs 15

Internet of Things Strategic Research and Innovation Agenda: Internet of Things Vision – Internet of Common Definition – IoT Strategic Research and Innovation Directions – IoT Strategic Research and Innovation Directions – IoT Application and Use Case Scenarios – IoT Functional View – Application Areas – IoT Smart-X Applications – Smart Cities – Smart Energy and the Smart Grid – Smart Mobility and Transport – Smart Home , Smart Buildings and Infrastructure – Smart Factory and Smart manufacturing – Smart Health – Food and Water Tracking and Security – Participatory Sensing – Smart Logistics and Retail

UNIT II

Hrs 15

Internet of Things and Related Future Internet Technologies: Cloud Computing –IoT and Semantic Technologies – Networks and Communication – Networking Technology – Communication Technology – Processes – Adaptive and Event-Driven Processes – Processes Dealing with Unreliable Data – Processes dealing with unreliable resources – Highly Distributed Processes – Data Management – Data Collection and Analysis (DCA) – Big Data – Semantic Sensor Networks and Semantic – Annotation of data – Virtual Sensors –Security , Privacy & Trust – Trust for IoT – Security for IoT – Privacy for IoT – Device Level Energy Issues –Low Power Communication – Energy Harvesting – Future Trends and Recommendations – Related Standardization – The Role of Standardization Activities – Current Situation – Area for Additional Consideration – Interoperability in the Internet-of –Things – IoT Protocols Convergence – Message Queue Telemetry Transport (MQTT) – Constrained Applications Protocol (CoAP) – Advanced Message Queuing Protocol (AMQP) – Java Message Service API (JMS) – Data Distribution Service (DDS) – Representational State Transfer (RESET) – Extensible Messaging and Presence Protocol (XMPP)

UNIT III

Hrs 15

Internet of Things Global Standardisation – State of Play: Introduction – General –IoT Vision –IoT Drivers –IoT Definition – IoT Standardisation Landscape – CEN\ISO and CENELEC/IEC – ETSI – IEEE – IETF – ITU-T – OASIS – OGC – oneM2M – GS1 – IERC Research Projects Positions – BETaaS – Advisory Board Experts Position – IoT6 Position.

UNIT IV

Hrs 15

Dynamic Context-Aware Scalable and Trust-Based IoT Security, Privacy

Framework: Introduction – Background Work – Main Concept and Motivation of the Framework – Identity Management – Size and Heterogeneity of the System – Anonymization of user Data and Metadata - Action's Control – Privacy by Design Context Awareness – summary – A policy-based framework for Security and Privacy in Internet of Things – Deployment in a Scenario – Policies and Context Switching – Framework Architecture and Enforcement – Conclusion and Future Developments – Acknowledgments.

UNIT V

Hrs 15

Scalable Integration Framework for Heterogeneous Smart Object ,

Applications and Services: Introduction – IPv6 Potential – IoT6 – IPv6 for IoT – Adapting IPv6 to IoT Requirements – IoT6 Architecture- DigCovery – IoT6 Integration with the Cloud and EPICS – Enabling Heterogeneous Integration – IoT6 Smart Office Use-case – Scalability Perspective.

Text Book:

Internet of Things – From Research and Innovation to Market Deployment by Ovidiu Vermesan and Peter Friess River Publications, 2014.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
III	17P3CSC11	SOFT COMPUTING	5	5

Objective

To Understand Artificial Intelligence, Neural network and Fuzzy system concepts.

UNIT – I

Hrs 15

Problems, Problem Spaces and Search: Defining the Problem as a State Space Search- Production Systems – Problem Characteristics- Production System characteristics- Issues in the Design of Search Programs- Additional Problems. **Heuristic Search Techniques:** Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means-Ends Analysis.

UNIT - II

Hrs 15

Knowledge Representation Issues: Representing and Mappings – Approach to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem. **Using Predicate Logic:** Representing Simple Facts in Logic – Representing Instance and Isa Relationships – Computable Functions and Predictions – Resolution. **Representing Knowledge using Rules:** Procedural versus Declarative knowledge – Logic Programming – Logic Programming – Forward versus Backward Reasoning-Matching.

UNIT - III

Hrs 15

Artificial Neural Networks: Concepts –Neural Attributes –Modeling-basic model of a Neuron-Learning in Artificial Neural Networks-Characteristics of ANNs-Important ANNs Parameter-Artificial Neural Network Topology-Learning Algorithm-Discrimination ability-ANN adaptability-The Stability-Plasticity Dilemma. **Neural Network Paradigms:** McCulloch-Pitts Model-The Perceptron.

UNIT - IV

Hrs 15

ADALINE and MADALINE Models:-Winner-Takes-All Learning Algorithm-Back-Propagation Learning Algorithm-Cerebellum Model Articulation controller(CMAC)-Adaptive Resonance Theory(ART) Paradigm-Hopfield Model-Competitive Learning Model-Memory Type Paradigms-Linear Associative Memory (LAM) – Real Time Models – Linear Vector Quantization(LVQ) Self-Organizing Map(SOM) Probabilistic Neural Network(PNN) – Radial Basis Function(RBF) – Time –Delay Neural Net(TDNN) Cognitron and Necognitron Models- Simulated Annealing – Boltzmann Machine- Other Paradigm.

UNIT - V

Hrs 15

FUZZY LOGIC: Propositional Logic – The Membership function – Fuzzy logic – Fuzzy Rule Generation – Defuzzication of Fuzzy Logic – Time- Dependent Fuzzy Logic – Temporal Fuzzy Logic(TFL) - Applying Temporal Fuzzy Operators – Defuzzification of Temporal Fuzzy Logic – Example: Applicability of TFL in Communications Systems- Fuzzy Neural Networks – Fuzzy Artificial Neural Network(FANN) Fuzzy Neural Example- Neuro-Fuzzy Control- Fuzzy Neural Net –A Reality? **Applications:** Signal Processing –Image Data Processing – Communication Systems-Intelligent Control- Optimization Techniques-Other Applications – Tools and Companies.

Text Book:

1. Stamatios V.KartaLopoulos, "understanding Neural Networks and Fuzzy logic". Prentice –Hall of India Private Limited, New Delhi, 2000.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence" Second Edition, Tata McGraw – Hill publishing Computing ltd. NewDelhi,1999.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
III	17P3CSCP5	PIC Programming Lab	3	3

Objective

- ❖ To gain knowledge of the PIC processor

-
- 1. I/O PORT PROGRAMMING-LED BLINKING**
 - 2. LCD INTERFACING**
 - 3. STEPPER MOTOR INTERFACING**
 - 4. STUDY OF ANALOG TO DIGITAL CONVERTER PROGRAMMING**
 - 5. TIMER PROGRAMMING- (TIMER0,TIMER1,TIMER2,TIMER3)**
 - 6. COUNTER PROGRAMMING**
 - 7. COMPARE MODE PROGRAMMING**
 - 8. CAPTURE MODE PROGRAMMING**
 - 9. PWM PROGRAMMING**
 - 10.TIMER PROGRAMMING USING INTERRUPTS**
 - 11.SERIAL COMMUNICATION- USART- POLLING AND INTERRUPTS**
 - 12.KEYPAD INTERFACING**
 - 13.INTERFACING OF DIGITAL TO ANALOG CONVERTER**
 - 14.ADC – TEMPERATURE MEASUREMENT USING LM35**
 - 15.OBJECT COUNTING USING IR sensor**
 - 16.SPI programming**

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
IV	17P4CSCP6	Major Elective – III OBJECT ORIENTED SYSTEM DEVELOPMENT LAB	4	2

OBJECTIVES

- Introduction to UML notations and diagrams.
- Hands on exposure of “Visual Paradigm software for UML” involving analysis and design with UML diagrams.
 1. use case, class diagrams in online ticket reservation systems
 2. use case, class diagrams in hotel reservation systems
 3. use case, class diagrams in student information system
 4. use case, class diagrams in sales & marketing system
 5. use case, class diagrams in banking system and inventory tracking system.
 6. Behavioural diagrams for application systems
 7. state chart diagram for application systems
 8. component diagrams for systems
 9. deployment diagrams for systems – Test cases, integration test cases for systems

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
IV	17P4CSEL3A	Major Elective – III Data Analytics Lab	6	4

1. Study of Hadoop ecosystem
2. Programming exercises on Hadoop
3. Programming exercises in No SQL
4. Implementing simple algorithms in Map- Reduce (3) - Matrix multiplication, Aggregates, joins, sorting, searching etc.
5. Implementing any one Frequent Itemset algorithm using Map-Reduce
6. Implementing any one Clustering algorithm using Map-Reduce
7. Implementing any one data streaming algorithm using Map-Reduce
8. Mini Project: One real life large data application to be implemented (Use standard Datasets available on the web)
 - a. Twitter data analysis
 - b. Fraud Detection
 - c. Text Mining etc.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
IV	17P4CSEL3B	Major Elective – III HASKELL LAB	6	4

Objectives

- **To have a practical experience in Haskell programming.**

- 1. *TODO program***
- 2. *Rudimentary TSV to CSV***
- 3. *Calendar***
- 4. *Decode RNA***
- 5. *Bedtime story generator***
- 6. *Matrix Multiplication***

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
IV	17P4CSEL3C	Major Elective – III PYTHON Lab	6	4

Objectives

- To have a practical experience in Python programming.
- To learn simple application development

1. Basic Syntax & Operators
2. Decision Making
3. Loops
4. Data Structures
5. Functions
6. Strings
7. Modules
8. Exception Handling
9. Class and Objects
10. Inheritance
11. Operator Overloading
12. General Problems

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
IV	17P4CSPR	Core – PROJECT	3 Months	5

Main Project

Objective

- ❖ To master technical and Software development Skills.

Students have to undergo Industrial Software Development projects using recent technologies.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
		Core Option - SECURITY PRACTICE	6	5

COURSE OBJECTIVES

- Understand the concepts and models of security in computing. Understand the cryptographic techniques used.
- Explain the security standards followed at the network level and at the application level.
- Estimate the level of security risk faced by an organization and the counter measures to handle the risk.
- Learn secured software development.

UNIT I

SECURITY – OVERVIEW - The Threat Environment – attackers and attacks – Security Planning and Policy – risk analysis – governance frameworks.

UNIT II

CRYPTOGRAPHY- Elements of cryptography – ciphers – encryption systems – symmetric / asymmetric - DES, AES, RSA – key management – authentication – cryptographic systems - standards – secure networks VPNs, SSL/TLS, IPSec, LAN security.

UNIT III

ACCESS CONTROL - Physical access control – access cards – authentication mechanisms – directory servers – Firewalls – packet filtering – stateful packet inspection – NAT – IDS – Firewall architectures.

UNIT IV

HOST AND DATA SECURITY- Host Hardening – OS hardening – managing vulnerabilities, permissions - data protection – Application security – issues – e-commerce security – e-mail security - Incident and Disaster Response

UNIT V

SECURE CODING - OWASP/SANS Top Vulnerabilities - Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries anonical Data Format - Command Injection - Redirection - Inference – Application Controls - C Secured Software Development Life Cycle - Testing, Maintenance and Operation - Evaluation of Security Systems.

REFERENCE BOOKS:

1. Raymond R. Panko, "Corporate computer and network security", Second edition, Pearson, 2012.
2. Wade Trappe, Lawrence C Washington, "Introduction to Cryptography with Coding and Theory", Second Edition, Pearson, 2007.
3. Matt Bishop, "Computer Security: Art and Science", Pearson, 2003.
4. Charles Pfleeger, Shari Lawrence Pfleeger, Devin N Paul, "Security in Coding", Pearson, 2007.
5. Wenbo Mao, "Modern Cryptography Theory and Practice", Pearson, 2004.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
		Core Option- SECURITY LAB	6	5

COURSE OBJECTIVES

- Understand the application number theory in security. Study the symmetric key and public key algorithms. Understand the compression techniques for security.

EXPERIMENTS IN THE FOLLOWING TOPICS:

1. Write programs to implement the following number theory concept Prime and Relatively Prime Numbers Arithmetic Modulo 8 and Multiplication Modulo 8 Fermat's Theorem and Euler's Totient Function
2. Write programs to implement the following cryptography algorithms Playfair cipher and Hill cipher
Simplified DES algorithm
RSA algorithm
3. Write programs to implement the following hash a MD5
SHA-1
4. Write programs to implement the following Authentication Digital Signature and Digital Certificate
Kerberos System X.509
5. Write a program to implement Hacking windows. BIOS Passwords.
Windows login password Internet explorer users Changing windows visuals
Accessing restricted drives.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
		Core Option - ETHICAL HACKING & CYBER FORENSICS	6	5

COURSE OBJECTIVES

- To understand the hacking techniques of computer forensics.
- To learn about data recovery methods.
- To identify the threats in computer forensics.

UNIT I

ETHICAL HACKING - Foundation for Ethical Hacking-Ethical Hacking in Motion-Hacking Network Hosts-Hacking Operating Systems-Hacking Applications.

UNIT II

TYPES OF COMPUTER FORENSICS - Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services.

UNIT III

DATA RECOVERY - Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication.

UNIT IV

ELECTRONIC EVIDENCE - Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks.

UNIT V

THREATS - Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.

REFERENCE BOOKS:

1. John R. Vacca, "Computer Forensics", Firewall Media, 2004.
2. Kevin Beaver, "Hacking For Dummies", John Wiley & Sons, 2012.
3. Chad Steel, "Windows Forensics", Wiley India, 2006.
4. Majid Yar, "Cybercrime and Society", Sage Publications, 2006.
Robert M Slade, "Software Forensics", Tata McGrawHill, 2004.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		Core Option - RESOURCE MANAGEMENT TECHNIQUES	6	5

COURSE OBJECTIVES

- Understand the Linear Programming models.
- To understand assignment and transportation problem.
- To understand the concepts of project scheduling.

UNIT I

LINEAR PROGRAMMING MODELS - Mathematical Formulation - Graphical Solution of linear programming models - Simplex method - Artificial variable Techniques- Variants of Simplex method.

UNIT II

TRANSPORTATION AND ASSIGNMENT MODELS - Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution - optimum solution - degeneracy - Mathematical formulation of assignment models - Hungarian Algorithm - Variants of the Assignment problem.

UNIT III

INTEGER PROGRAMMING MODELS - Formulation - Gomory's IPP method - Gomory's mixed integer method - Branch and bound technique.

UNIT IV

SCHEDULING BY PERT AND CPM - Network Construction - Critical Path Method - Project Evaluation and Review Technique - Resource Analysis in Network Scheduling.

UNIT V

QUEUEING MODELS - Characteristics of Queuing Models - Poisson Queues - (M / M / 1) : (FIFO / ∞ / ∞), (M / M / 1) : (FIFO/N/ ∞), (M / M / C) : (FIFO / ∞ / ∞), (M / M / C) : (FIFO / N / ∞) models.

REFERENCE BOOKS:

1. Taha H.A., "Operations Research: An Introduction" 7th Edition, Pearson Education, 2008.
2. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005.
3. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Company Ltd, New Delhi, 3rd Edition , 2003.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		Core Option - Rapid Application Development using Python	6	5

Objectives:

This course aims to give a broad idea about Python Programming Language and its feature and its applications to RAD programming.

Unit-I:

Introduction – history of Python – features – Python Interpreter - Basic Syntax - Constants –Variable - Operators and Expressions – Strings

Unit-II:

Control Statements – if – while - for - continue – break statements – Data Structures- Lists –Tuples – Dictionary – Sequence - Reference Data types.

Unit-III:

Functions – Parameters – Arguments – return statement - Modules – Import Statement - Files I/O.

Unit-IV:

Object Oriented Methodology – Classes and Object – methods – Inheritance – Exceptions – errors – raising exception - Library Functions

Unit-V:

Applications of Python Programming - Scientific Programming – Web Programming - Graphics/Image Processing – Network Programming.

Books for Study:

1. Swaroop C H, "**A Byte of Python**" , 2003-2005 , Under Creative Commons Attribution-NonCommercial-ShareAlike License 2.0.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "**How to Think Like a Computer Scientist:**

Learning with Python", Green Tea Press, 2002.,ISBN-10: 0971677506; ISBN-13:978-0971677500 .

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		Core Option - Haskell Programming	6	5

Objectives :

To make students to have a depth knowledge in Haskell programming

Unit I:

Getting Started – Lists – Strings and Characters – Type System – Function Application – Writing Simple functions – Understanding evaluations – Defining new Data types – Algebraic data types – Pattern matching.

Unit – II:

Functional Programming – Infix functions – Working with Lists – Think about loops – Lambda functions – Writing a Library – Working with JSON data- Anatomy of Haskell module – Pointing JSON Data.

Unit – III:

Using Type Classes – Built in Type Class – Type Classes at work – I/O – Classic I/O – Working with files – Lazy I/O – I/O Monad – Buffering.

Unit – IV:

File processing – Regular Expressions – Pattern matching – Writing Lazy Function – I/O case study – Find – Naïve finding system – Predicates.

Unit – V:

Data Structures – Association Lists – maps – Monads – Monad type class using new monad – State Monad.

Book for Study:

1. "**Real World Haskell**", O'Reilly, ISBN:0596514980 9780596514983