M.Sc Computer Science
Course Pattern- 2016

Sem.	Code	Course	Hrs	Crs
I	14SCS1101	Programming in Java	5	4
	16SCS1102	Database Systems	5	4
	16PCS1101	Mathematical Foundations	5	4
	16PCS1102	Advanced Microprocessors & Microcontrollers	5	4
	16PCS1103	Software Lab-I (Java)	3	2
	16PCS1104	Software Lab-II (RDBMS & Microprocessor Simulator)	3	2
	16PCS1201 A	Core Elective I: Parallel Processing	4	4
	16PCS1201 B	Core Elective I: Data Structures and Algorithms Design Methods		
		Total for Semester I	30	24
II	16PCS2105	*Online Course* : Programming with ASP.NET	5	4
	16PCS2106	Data Warehousing and Data Mining	5	4
	16PCS2107	Software Lab – III (ASP.NET)	3	2
	16PCS2108	Software Lab– IV (Data Mining and Data Structures)	3	2
	16PCS2202 A	Core Elective II: Compiler Design OR	4	4
	16PCS2202 B	Core Elective II: Ethical Hacking OR		
	16PCS2109	Self-paced Learning: Computer Networks	-	2
	14PSS2401	IDC: Soft Skills	4	4
	16PCS2401	IDC (WS): Pervasive and Ad hoc Networks	4	4
	16PIT2401	IDC (WS): Computer Generated Imagery		
	14PCA2401	IDC (WS): LAMP		
	16PMA2401	IDC (WS): Data Analysis using R-Language		
	16PCS2110	Technical Aptitude	2	1
		Total for Semester II	***30***	***27***
III	16PCS3111	*Online Course* : *BIG DATA ANALYTICS*	5	4
	16PCS3112	Distributed Technologies	5	4
	16PCS3113	Android Programming	5	4
	16PCS3114	Software Lab–V (J2EE & PHP)	3	2
	16PCS3115	Software Lab–VI (Android)	3	2
	16PCS3203 A	Core Elective III: Networks Security OR	4	4
	16PCS3203 B	Core Elective III: XML and Web Services		
	16PCS3402	IDC(BS) : Advances in Computer Science	4	4
	16PCS3116	Mini Project(II Semester Vacation)	-	8
	16PCS3117	Comprehensive Examination	-	2
		Library	1	-
		Total for Semester III	***30***	***34***
	16PCS4118	Project Dissertation and Viva Voce	30	20
		Total for Semester IV	***30***	***20***
	16PCW4501	SHEPHERD & Gender Studies	-	5
		Total for All Semesters	***120***	***110***

Sem. I **Hours/Week: 5**
14SCS1101 **Credits: 4**

PROGRAMMING IN JAVA

Assurance of Learning:

- Develop solutions for a range of problems using object-oriented programming.
- Solve simple problems using the fundamental syntax and semantics of the Java programming language
- Use the Java event-handling model to respond to events arising from the GUI components
- Understand and implement advanced concepts of java like thread, JDBC, Networking, RMI.

Unit I **12 Hrs**

FUNDAMENTAL PROGRAMMING STRUCTURES IN JAVA: Data Types - Variables - Operators - Strings - Control flow - Arrays. **OBJECTS AND CLASSES:** Introduction to Object-Oriented Programming - Predefined Classes - Defining Your Own Classes - Static Fields and Methods - Methods Parameters - Object Constructions - Packages.

Unit II **12 Hrs**

INHERITANCE: Classes, Super classes and Subclasses – Object - The Cosmic Superclass - Generic Array List - Object Wrappers and Auto boxing. **INTERFACES AND INNER CLASSES:** Interfaces - Object Cloning - Interfaces and Call backs - Inner classes. **EVENT HANDLING:** Basic of Event Handling - AWT Event Hierarchy - Semantic and Low Level Events in the AWT - Low Level Event Types - Actions - Multicasting.

Unit III **12 Hrs**

USER INTERFACES COMPONENTS WITH SWING: The Model-View-Controller Design Pattern - Layout Management - Text Input - Choice Components - Menus - Sophisticated Layout Management - Dialog Boxes. **DEPLOYING APPLETS AND APPLICATIONS:** Applet Basics - Applet HTML Tags and Attributes. **EXCEPTION AND DEBUGGING:** Dealing with Errors - Catching Exceptions. **STREAMS AND FILES:** Streams - Complete Stream Zoo - Use of Streams - File Management.

Unit IV **12 Hrs**

MULTITHREADING: Threads - Thread Properties - Interrupting Threads - Thread Priorities - Synchronization. **NETWORKING:** Connecting to a Server - Implementing Server - Sending E-Mail - URL Connections.

Unit V **12 Hrs**

DATABASE CONNECTIVITY: JDBC - Structured Query Language - Installing JDBC - Basic JDBC Programming Concepts - Populating a Database - Executing Queries**.** **JAVA BEANS:** Need for Beans - Bean-Writing Process - BDK and the Bean Box - Building an Image Viewer Application via Beans - Naming Patterns for Beans Properties and events - Bean Property Types.

Text Books

1. Cay S. Horstmann and Gary Cornell, Core Java2 Volume I - Fundamentals, Pearson Edn in South Asia, 7th Ed., 2007. Units: I, II & III

2. Cay S. Horstmann and Gary Cornell, Core Java2 Volume II - Advanced Features, Pearson Education Asia Pvt. Ltd, 2000. Units: IV & V

Books for Reference

1. Herbert Schildt, Java 2: Complete Reference, Tata McGraw Hill, 5th Ed., 2009.
2. Deitel & Deitel, Java How to Program, PHI, 8th Ed.
3. Kogent Learning Solution, Java 6 Programming Black Book, Dreamtech Press, 2007.

Sem. I **Hours/Week: 5**
16SCS1102 **Credits: 4**

DATABASE SYSTEMS

Assurance of Learning:

- Understand relational database theory and be able to use a relational database management system.
- Be able to use advanced SQL to create, manipulate, and query databases.
- Be able to apply proper techniques, such as normalization, in designing a database.
- Be able to use several commercially available database management systems such as PL/SQL and Parallel data base systems

Unit I **12 Hrs**

INTRODUCTION TO DBS: Basic Concepts and Definitions - Data Dictionary- Database System - DBA - Database Languages - Database System Architecture: Schemas, Sub-schemas and Instances - Three-level Architecture - Data Independence - Mappings -Data Models - Types – ER Model - Specialization and Generalization **. RELATIONAL ALGEBRA AND CALCULUS:** Structure - Relational Algebra - Relational Calculus.

Unit II **12 Hrs**

RELATIONAL QUERY LANGUAGES: Introduction - Codd's Rules -Information System Based Language - Structured Query Language (SQL) -Embedded SQL.

Unit III **12 Hrs**

NORMALIZATION: Introduction to Database Design - Functional Dependency and Decomposition - Normalization - Normal Forms - BCNF - Multi-valued and Join Dependencies.

Unit IV **12 Hrs**

PL/SQL: History - Fundamentals -Data types - Operators - Control Structures - Nested Blocks - SQL in PL/SQL - Data Manipulation - Transaction Control Statements - PL/SQL Cursors and Exceptions. **NAMED BLOCKS:** Procedures - Functions - Packages -Triggers.

Unit V **12 Hrs**

TRANSACTION PROCESSING AND CONCURRENCY CONTROL: Database Recovery System - Database Security. **PARALLEL DATABASE SYSTEMS:** Introduction to Parallel Databases - Architecture - Key Elements of Parallel Database Processing - Distributed Databases - Architecture - Distributed Database design.

Text Books

1. S K Singh, "Database Systems Concepts, Design and Applications", Pearson Education, 2006. Units: I, II, III and V.
2. Nilesh Shah, "Database Systems using ORACLE", Prentice Hall of India, 2005. Unit: IV

Books for Reference

1. Abraham Silberschatz, " Database Systems", McGraw Hill International, 1997.
2. CJ Date, "An Introduction to Database Systems", 6th Ed., Addison Wesley Publishing Company, New York, 1995.

Sem. I **Hours/Week: 5**
16PCS1101 **Credits: 4**

MATHEMATICAL FOUNDATIONS

Assurance of Learning:

- Able to understand the basics of operation research techniques.
- Able to solve the recurrence relation.
- Able to apply the concepts of coding theory and how to measure the hamming distance.
- Able to understand the basic rules of logic.

Unit I **13 Hrs**

MATHEMATICAL LOGIC: Propositions - Precedence Rules for Operators – Truth tables -Tautologies- Contradiction - Laws of Equivalence -Substitution Rules – Evaluation of Constant Proposition theorem - Well Defined Formula – Duality Law

Unit II **13 Hrs**

RECURSION AND RECURRENCE RELATION: The Many Faces of Recursion- Sequences – Recurrence Relation- Some Common Recurrence Relation.

Unit III **13 Hrs**

OPERATIONS RESEARCH: Introduction - Basics of OR - OR & Decision Making - Linear Programming- Mathematical Formulation- Graphical Solution - Canonical & Standard Forms of LPP.

Unit IV **13 Hrs**

SIMPLEX METHOD: Simplex Method – Big M method – Assignment model **TRANSPORTATION PROBLEM:** North West Corner method – Least cost method – VAM method.

Unit V **13 Hrs**

CODING THEORY: Introduction – Cryptography- Caesar Cypher Coding- Matrix Encoding- Scrambled Codes- Hamming Metric- Hamming Distance- Error Detecting Capability of an Encoding.

Text Books

1. David Gries, "The Science of Programming", Narosa Pub. House, New Delhi, 1993. Unit: I.
2. Alan Doerr, Kenneth Levasseur, "Applied Discrete Structure for Computer Science", Galgotia Pub., New Delhi, 1995, (Chapters: 8.1-8.4) Unit- II.
3. Manmohan & Gupta, "Operations Research", Sultan Chand Publishers, New Delhi, 2002. Unit: III
4. KantiSwarup, Gupta, ManMohan,"Operations Research", 7th Ed., 1994. Unit: IV
5. James L. Fisher, "Application Oriented Algebra", Dun Donnelly Pub., 1977. (Chapter 9.1 - 9.5 Only). Unit V

Sem. I **Hours/Week: 5**
16PCS1102 **Credits: 4**

ADVANCED MICROPROCESSORS & MICROCONTROLLERS

Assurance of Learning:

- Understand the architecture of 8086
- Write simple 8086 programs
- Compare the architectures of 286 to Pentium
- Understand the need and use of 8051

Unit I **13 Hrs**

8086 ARCHITECTURE: PIN Diagrams - Timing Diagrams - Register Organization of 8086 - Architecture - Instruction Set of 8086. **MICROPROCESSOR WITH MEMORY MANAGEMENT AND PROTECTION:** Features of 80286 - Internal Architecture - Register Organization - Internal Block Diagram - Interrupts - Real and Protected Virtual Addressing - Interfacing Memory and I/O Devices with 80286 - Addressing Modes - Math Coprocessor.

Unit II **13 Hrs**

BEGINNING OF 32-BIT MICROPROCESSORS: Architecture of 80386 - Register Organization - Addressing Modes of 80386 - Data Types - Concepts of Addressing in Real and Protected Modes - Segmentation and Paging - Conversion of a Linear Address to a Physical Address - Features of 80486 - Architecture and Register Organization of 80486.

Unit III **13 Hrs**

PROCESSORS OF NEW MILLENNIUM: Salient Features of Pentium 4 - Modules of Pentium 4 Architecture: Front End Module, Out of Order Execution Engine, Execution Module, Memory Subsystem Module - Superscalar Execution - Pipelining -Hyper Threading in Pentium - RISC Processors: Basic Features and Advantages only.

Unit IV **13 Hrs**

MICROCONTROLLERS: Architecture of 8051 - Register set - Memory and I/ O Addressing - Interrupts - Six Addressing Modes - Ports of 8051 and their Operation - Architecture of 16-bit Microcontroller 80196.

Unit V **13 Hrs**

EMBEDDED SYSTEMS AND REAL TIME OPERATING SYSTEMS (RTOS): Introduction to Multitasking - Simple Embedded Multitasking Systems - RTOS - Tasks in RTOS - Scheduling of Tasks - Resource Protection by Semaphore Concept - Examples of Applications: Temperature Monitor (Tasks, Programming, Hardware Requirements, Dealing with Numbers) - A Model Train Controller.

Text Books

1. A.K.Ray&K.M.Bhurchandi, “Advanced Microprocessors and Peripherals”, TMH,

2nd Ed., 2007. Units: I, II & III
2. Rajiv Kapadia, “8051 Microcontroller & Embedded Systems”, Jaico Publishing House, 2006. Units: IV & V

Books for Reference

1. Tim Wilmshurst, “An Introduction to the Design of Small Scale Embedded Systems”, Palgrave Publishers, 2004.
2. Muhammad Ali Mazidi et al., “The 8051 Microcontroller and Embedded Systems” Pearson Education, 2nd Ed., 2006.

Sem. I **Hours/Week: 3**
16PCS1103 **Credits: 2**

Software Lab-I
JAVA

1. Classes & Objects
2. Packages & Interfaces
3. Inheritance
4. Exception Handling
5. Multithreading
6. Applet
7. Swing
8. Event Handling Mechanisms
9. Streams and Files
10. Networking
11. JDBC
12. Java Beans

Sem. I **Hours/Week: 3**
16PCS1104 **Credits: 2**

Software Lab-II
RDBMS & MICROPROCESSOR SIMULATOR

SQL

1. Simple Queries using DDL, DML, DCL
2. Functions and Set operations
3. Views and Joins
4. Nested queries

PL/SQL

5. Cursors
6. Procedures and Functions
7. Packages and Trigger

MICROPROCESSOR

8. Simple programs
9. Transferring data from one memory block to another memory block.
10. String Manipulation.
11. Arithmetic Operations of 16-bit numbers.
12. Sum of series.

Sem. I **Hours/Week: 4**
16PCS1201A **Credits: 4**

Core Elective-I: PARALLEL PROCESSING

Assurance of Learning:

- To study the various Parallel computer Architecture
- To impart the knowledge in theories of parallel computing,
- To understand the basics of interconnection networks and applications of cost effective computer systems.

UNIT I **13 Hrs**

Introduction to Parallel Processing: Evolution of Computer Systems – Parallelism in Uniprocessor Systems – Parallel Computer Structures – Architectural Classification Schemes – Parallel Processing Applications.

UNIT II **13 Hrs**

Memory and Input-Output Subsystems: Hierarchical Memory Structure – Virtual Memory System – Memory Allocation and Management – Cache Memories and Management – Input-Output Subsystems.

UNIT III **13 Hrs**

Principles of Pipelining and Vector Processing: Pipelining: An Overlapped Parallelism – Instruction and Arithmetic Pipelines – Principles of Designing Pipelined Processors – Vector Processing Requirements.

UNIT IV **13 Hrs**

Vectorization and Optimization methods: Parallel Languages for Vector Processing – Design of Vectorizing Compiler – Optimization of Vector Functions – SIMD Array Processors – SIMD Interconnection Networks – Associative Array Processing.

UNIT V **13 Hrs**

Multiprocessors Architecture and Programming: Functional Structures – Interconnection Networks - Parallel Memory Organizations – Multiprocessor Operating Systems – Language Features to Exploit Parallelism – Multiprocessor Scheduling Strategies.

Text Book

Kai Hwang and Faye A. Briggs, “Computer Architecture and Parallel Processing”, McGraw Hill International Edition, New Delhi, 1985. Chapters : 1, 2, 3, 4.5.1 – 4.5.3, 5.1, 5.2, 5.4, 6.3, 7.1, 7.2.1, 7.2.2, 7.2.3, 7.3.1, 7.3.3, 7.4, 7.5.1, 8.3

Books for References

1. Richard Kain, “Advanced Computer Architecture” , PHI, New Delhi, 1999. 2. V. Rajaraman and C. Siva Ram Murthy, “Parallel Computers, Architecture and Programming”, PHI, New Delhi, 2000.

Sem. I **Hours/Week: 4**

16PCS1201B **Credits: 4**

Core Elective-I:
DATA STRUCTURES AND ALGORITHM DESIGN METHODS

Assurance of Learning:

- Learn the fundamentals of data structures with their implementation and its applications
- Learn to design and analysis of algorithms and in various algorithm design strategies
- Give importance to find the complexity (order) of algorithms

Unit I **10 Hrs**

LINEAR DATA STRUCTURES: Concepts Of Non-Primitive Data Structures - Storage Structure For Arrays - Stacks - Operations On Stacks - Queues - Priority Queues.

Unit II **10 Hrs**

LINKED LINEAR LISTS: Operations On Linked Linear Lists - Circularly Linked Lists - Doubly Linked Linear Lists. **NON-LINEAR DATA STRUCTURE:** Trees - Binary Trees – Tree Traversal - Operations On Binary Trees - AVL Trees - Storage Representation And Manipulations Of Binary Trees.

Unit III **10 Hrs**

ALGORITHMS: Algorithm Specification - Pseudo Code Conventions, Recursive Algorithms. **DIVIDE AND CONQUER**: General Method - Sequential Search - Binary Search - Finding The Maximum And Minimum - Merge Sort- Quick Sort- Insertion Sort - Selection Sort.

Unit IV **8 Hrs**

GREEDY METHOD: General Method - Knapsack problem - Job Sequencing With Deadlines - Optimal Merge Patterns – Spanning Tree - Minimum Cost Spanning Trees. **ALGORITHM DESIGN METHODS**: Sub goals - Hill Climbing and Working Backward - Heuristics - Backtrack Programming - Branch and Bound.

Unit V **12 Hrs**

DYNAMIC PROGRAMMING: General Method - Multistage Graphs – Single-Source Shortest Paths: General Weights - All Pair Shortest Path - Optimal Binary Search Trees - 0/1 Knapsack - Traveling Salesperson Problem.

Text Books

1. Jean-Paul Tremblay and Paul G.Sorenson, “An introduction to data structures with applications”, 2nd Ed, Tata McGraw Hill Publishing Company Limited, New Delhi, 1995. Units I and II

2.Ellis Horowitz, Sartaj Sahni, “Fundamentals of Computer Algorithms”, Galgotia Publications, New Delhi, 2007.
Units III, IVa and V

3.S.E. Goodman and S.T. Hedetniemi, “Introduction to the Design and Analysis of Algorithms”, Tata McGraw Hill, International Edition, 1987.
Unit: IVb

Books for Reference

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer algorithms", Galgotia Publications Pvt. Ltd., New Delhi, 2004.

2. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, "Data Structures and Algorithms" Addison Wesley, United States, 1987.

Sem. II **Hours/Week: 5**
16PCS2105 **Credits: 4**

Online Course: PROGRAMMING WITH ASP.NET

Objective : 1. Understand the concept and architecture of ASP.NET
2. Create rich GUI web applications using Visual Studio.NET
3. Learn and implement new features in ASP.NET

Total Hours : 60 Hours (Discussion – 40 + Outside – 20)

Intended for : Any PG students with Computer Science Background

Prerequisite : Students should know fundamentals of HTML Programming and perform CRUD operations in SQL Server database

Course Content : http://mail.sjctni.edu:8085/moodle/
E-Contents will be available under Course Available → M.Sc. Computer Science folder

Module Description	Discussion Hours	Outside Hours	Module Objective	Learning Outcome
Module I – .NET Basics - .NET Framework - Common Language Runtime (CLR) - Base Class Library - Common Type System (CTS) - Intermediate Language - Assemblies - Namespaces - Visual Studio IDE	6	2	Understand the .NET framework and its various components.	a) Learn various components of .NET framework b) Learn how to use Visual Studio IDE
Module II – ASP.NET Web Applications - Components of ASP.NET Application - ASP.NET Page Processing	9	5	Understand ASP.NET Page processing, various server controls, validation controls and users controls used in web applications	a) Learn to apply various server controls and validation controls in web applications b) Learn to use State management Master Pages and caching

- Server Controls, Validation Controls and User Controls - State Management - Master Pages - Caching - Configuration				techniques in web applications
Module III – ADO.NET - Introduction to ADO.NET - Data Access Components - Data Binding - Data Controls - Data Access using LINQ	9	5	Understand database connectivity mechanism in ASP.NET and will learn how to implement CRUD operations in ASP.NET.	a) Learn to how perform CRUD operations in SQL Server database b) Learn bind and perform advanced data access operations using data controls c) Learn to perform data access using LINQ
Module IV - Security and Deployment - Authentication - Authorization - Code Access Security - Debugging Web Application using Visual Studio - Managing Website with IIS Manager - Deploying a Simple Website	6	4	Understand how security concepts are implemented in ASP.NET and Deploy a simple website	a) Learn Security concepts in ASP.NET b) Learn to deploy a simple ASP.NET website
Module V – Core Development - MVC Framework - AJAX - Silverlight - Web Services	10	4	Understand core development concepts like MVC, AJAX, Silverlight and Web Services	a) Learn to implement a simple project in MVC framework b) Learn to create and consume a simple web service

Evaluation

Formative Evaluation - 100 Marks

Module	Case Studies (Marks)	Single Page Report (Marks)	E-Content Presentation (Marks)
Module1	10	3	5
Module 2	10	3	5
Module 3	10	3	5
Module 4	15	3	5
Module 5	15	3	5

1) All the components will be conducted by the staff member assigned for the Programme
2) Single Page Report will be submitted via Moodle
3) E-Content will be presented during the discussion hours

Summative Evaluation – 100 Marks

1) Testing with multiple choice objective questions
2) Each module will have 20 questions
3) After completing each module, the students are allowed to go for next module.
4) Passing minimum for each module is 50%
5) Within a week time he has to reappear to finish the respective module to proceed to the next module

Sem. II **Hours/Week: 5**
16PCS2106 **Credits: 4**

DATA WAREHOUSING AND DATA MINING

Assurance of Learning:

- Ability to understand data warehousing concepts and ETL processing.
- Understand various data preprocessing techniques such as data cleaning, integration, reduction, and transformation.
- Skill to identify and understand the association rule mining
- Clarity in classification, clustering techniques and knowledge of application in WEKA

Unit I **12 Hrs**

DATA WAREHOUSE: Definition Of Data Warehouse – Differences Between Operational Database Systems And Data Warehouses – Separate Data Warehouse – Multitier Architecture – Data Warehouse Models – ETL. **DATA WAREHOUSE MODELING:** A Multi-Dimensional Data Model - Stars, Snowflakes and Fact Constellations – OLAP Operations. **DATA WAREHOUSE IMPLEMENTATION**: OLAP Server Architectures.

Unit II **12 Hrs**

INTRODUCTION TO DATA MINING: Need For Data Mining - Steps In KDD - Kinds Of Data – Kinds Of Patterns – Technologies – Types Of Applications Targeted – Major Issues. **DATA PREPROCESSING:** An Overview – Data Cleaning – Data Integration – Data Reduction – Data Transformation And Data Discretization.

Unit III **12 Hrs**

MINING FREQUENT PATTERNS, ASSOCIATIONS, AND CORRELATIONS: Basic Concepts. FREQUENT ITEM SET MINING METHODS: Apriori Algorithm-Generating Association Rules From Frequent Item Sets – Improving The Efficiency Of Apriori – Pattern Evaluation Methods. **CLASSIFICATION**: Basic Concepts. **DECISION TREE**: Decision Tree Induction – Attribute Selection Measures.

Unit IV **12 Hrs**

BAYES CLASSIFICATION METHODS: Bayes' theorem – Naïve Bayesian Classification. **RULE-BASED CLASSIFICATION**: Using If-then Rules For Classification. **MODEL EVALUATION AND SELECTION**: Metrics For Evaluating Classifier Performance – Holdout Method And Random Sub Sampling – Cross Validation – Bootstrap.

Unit V **12 Hrs**

CLUSTER ANALYSIS: Overview Of Basic Clustering Methods. **PARTITIONING METHODS**: K-means – K-medoids. **HIERARCHICAL METHODS**: Agglomerative Versus Divisive Hierarchical Clustering – Distance Measures In Algorithmic Methods. **DENSITY-BASED METHODS**: DBSCAN. **GRID-BASED METHODS**: STING. **EVALUATION OF CLUSTERING**: Measuring Clustering Quality.

Text Books

1. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers an imprint of Elsevier, 3rd Ed, 2012.

Books for Reference

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers an imprint of Elsevier, 2nd Ed, 2006.
2. G.K. Gupta, “Introduction to Data mining with Case Studies”, PHI Learning Pvt. Ltd., 2006.
3. Margret H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education, 2003.

Sem. II **Hours/Week: 3**
16PCS2107 **Credits: 2**

Software Lab – III: ASP.NET

1. Form Design using Web Controls
2. Validation Controls
3. State Management
4. Advance ASP.NET Controls
5. Data Access using ADO.NET
6. Data Binding and Data Controls
7. AJAX
8. LINQ and SilverLight
9. Simple MVC Project
10. Simple Web Service

Sem. II **Hours/Week: 3**
16PCS2108 **Credits: 2**

Software Lab - IV: DATA MINING AND DATA STRUCTURES

DATA MINING

1. Data pre-processing – Supervised and Unsupervised Filters

2. Feature Selection – Filter, Wrapper

3. Association Rule Mining – Apriori Algorithm

4. Classification - Multilayer Perceptron and Decision Tree

5. Clustering - Simple KMeans, Hierarchical cluster and EM

DATA STRUCTURES

6. Stack
7. Queue
8. Linked List
9. Searching
10. Sorting

Sem. II **Hours/Week: 4**
16PCS2202A **Credits: 4**

COMPILER DESIGN

Assurance of Learning:

- Apply skills and familiarity which are applicable to a broad range of computer applications.
- Design and develop a comprehensive Compiler for a given language
- Implement various parsing, conversion, optimization and code generation algorithms for the design of a compiler.

Unit I **13 Hrs**

INTRODUCTION: Different Phases of Compiler - Finite State Automation and Lexical analysis - A Simple Approach to the Design of Lexical Analyzers - Regular Expressions - A Language for Specifying Lexical Analyzers.

Unit II **13 Hrs**

SYNTAX SPECIFICATION: Context Free Grammars - Parsers - Derivation and Parse trees - Shift Reduce Parsing - Operator Precedence Parsing - Top-Down Parsing - Predictive Parsers.

Unit III **13 Hrs**

CODE GENERATION: Intermediate Code Generation - Translation - Implementation of Syntax - Directed Translators - Intermediate Code – Postfix Notation - Parse Trees and Syntax Trees - Three Address Codes, Quadruples and Triples.

Unit IV **13 Hrs**

SYMBOL TABLES: Contents of a Symbol Table - Data Structures for Symbol Tables - Implementation of a Simple Stack Allocation Scheme - Implementation of Block Structured Languages - Storage Allocation in Block Structured Languages - Errors - Lexical Phase Error.

Unit V **13 Hrs**

CODE OPTIMIZATION AND CODE GENERATION: Elementary Code Optimization technique - Loop Optimization - DAG Representation of Basic Blocks - Value Numbers and Algebraic Laws - Object Programs - Problems in Code Generation - A Machine Model - A Simple Code Generator.

Text Book

1. Alfred V. Aho, Jeffery D.Ullman, “Principles of Compiler Design”, Narosa, New Delhi 2002. Ch:1.1-1.11,3.1-3.7,4.1,4.2,5.1-5.5,7.1-7.6,9.1,9.2,10.1,10.2,11.1,11.2,12.1-12.4,15.1-15.4

Books for Reference

1. Dick Grune, Henri E. Bal, CerielJ.H.Jacobs, Koen G. Langondeon, “Modern Compiler Design”, Wiley, Singapore, 2003.
2. Louden K., “Compiler Construction, Principles and Practice”, Thomson, New Delhi, 2003.

Sem. II **Hours/Week: 4**
16PCS2202B **Credits: 4**

Core Elective-II: ETHICAL HACKING

Assurance of Learning:

- Defend hacking attacks and protect data assets
- Defend a computer against a variety of security attacks using various tools
- Practice and use safe techniques on the World Wide Web.

Unit I **12Hrs**

INTRODUCTION TO HACKING: Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Footprinting – Information Gathering Methodology – Footprinting Tools – WHOIS Tools – DNS Information Tools – Locating the Network Range – Meta Search Engines

Unit II **12Hrs**

INTRODUCTION TO SCANNING: Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools

Unit III **12Hrs**

CRACKING PASSWORDS: Password Cracking Websites – Password Guessing – Password - Cracking Tools – Password Cracking - Counter measures – Escalating Privileges –Executing Applications - Keyloggers and Spyware.

Unit IV **12Hrs**

PROGRAMMING FUNDAMENTALS: C Language – Html – Perl – Windows OS Vulnerabilities – Tools For Identifying Vulnerabilities – Countermeasures – Linux OS Vulnerabilities – Tools For Identifying Vulnerabilities – Countermeasures.

Unit V **12Hrs**

SECURITY ASSESSMENTS: Types of Penetration Testing- Phases of Penetration Testing – Tools – Choosing Different Types of Pen-Test Tools – Penetration Testing Tools.

Text Book

1. Ec-Council, “Ethical Hacking and Countermeasures: Attack Phases”, Delmar Cengage Learning,2009.

Books for Reference

1. Michael T. Simpson, Kent Backman, James E. Corley, “Hands-On Ethical Hacking and Network Defense”, Cengage Learning, 2012.

2. Patrick Engebretson, “The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy”, Syngress Media, Second Revised Edition, 2013.

Sem. II
16PCS2109 **Credits: 2**

Self-paced Learning:
COMPUTER NETWORKS

Assurance of Learning:

- Define the services, functions, and inter-relationship of different layers in network models
- Describe how modules in different layers inter-operate and analyze their enactment.
- Learn various protocols used in communication.

Unit I

INTRODUCTION: Data Communications - Networks - The Internet – Protocols and Standards - Network Models - Layered Tasks - The OSI Model – Layers in the OSI Model - TCP/IP Protocol Suite – Addressing.

Unit II

PHYSICAL LAYER and MEDIA: Analog and Digital - Analog to Digital Conversion - Transmission Modes - Digital to Analog Conversion - Multiplexing - Transmission Media - Guided Media - Unguided Media - Switching – Circuit **S**witched Networks - Datagram Networks - Virtual Circuit Networks

Unit III

DATA LINK LAYER: Error Detection and Correction – Block Coding - Cyclic codes - Checksum - Data Link Control- Framing - Flow and error control - Protocols - Noiseless Channels - Noisy Channels -Point to Point Protocol - Channelization - IEEE 802.11 - Bluetooth - Cellular Telephony - Satellite Networks.

Unit IV

NETWORK LAYER: IPV4 Addresses - IPV6 Addresses - Internetworking - IPV4 - IPV6 - Transition from IPv4 to IPv6 - Address mapping - ICMP – IGMP - Delivery - Forwarding - Unicast Routing Protocols - Multicast Routing Protocols.

Unit V

TRANSPORT LAYER: Process to Process Delivery - UDP - TCP - SCTP - Data Traffic - Congestion - Congestion Control - Quality of Service. **APPLICATION LAYER:** Name Space - Domain Name Space – Remote Logging - Email & File Transfer.

Text Book

1. Behrouz A.Forouzan, “Data Communications and Networking”, Tata McGraw Hill Publishing Company Limited, 4th Edition , New York, 2009.

Books for Reference

1. Andrew S. Tanenbaum, “Computer Networks”, Pearson Education, Fifth Edition, New Delhi, 2011**.**
2. William Stallings, “Data and Computer Communication”, Dorling Kindersley Pvt. Ltd., India, Ninth Edition, 2014.

Sem. II **Hours/Week: 4**
14PSS2401 **Credits: 4**

IDC-1:
SOFT SKILLS

Objective

Introducing learners to the relevant soft skills at the territory level in order to make them gain competitive advantage both professionally and personally.

Module 1: Basics of communication and Effective communication
Basics of communication: Definition of communication, Process of Communication, Barriers of Communication, Non-verbal Communication. Effective communication: Johari Window, The Art of Listening, Kinesthetic, Production of Speech, Organization of Speech, Modes of delivery, Conversation Techniques, Dialogue, Good manners and Etiquettes.

Module II: Resume writing and Interview skills
Resume Writing: What is Resume? Types of Resume? Chronological, Functional and Mixed Resume, Steps in preparation of Resume. Interview Skills: Common interview questions, Attitude, Body Language, The mock interviews, Phone interviews, Behavioral interviews.

Module III: Group discussion and team building
Group Discussion: Group Discussion Basics, GD Topics for Practice, Points for GD Topics, Case-Based and Article based Group Discussions, Points for Case Studies, and Notes on Current Issues for GDS. Team Building: Team Vs Group - synergy, Stages of Team Formation, the Dabbawala. Leadership - Styles, Work ethics. Personal Effectiveness: Personal Effectiveness: Self Discovery, Self Esteem, and Goal setting. Conflict and Stress Management.

Module IV: Numerical Ability
Average, Percentage, Profit and Loss, Simple Interest, Compound Interest, Time and Work, Pipes and Cisterns, Time and Distance, Problems on Trains, Boats and Streams Calendar, Rations and Proportions.

Module V: Test of reasoning
Verbal Reasoning: Series Completion, Analogy, Data Sufficiency, Assertion and Reasoning, Logical Deduction. Non-Verbal Reasoning: Series,Classification

References

1. Aggarwal, R.S. 2010 Quantitative Aptitude, S.Chand & Sons
2. Aggarwal, R.S. 2010. A Modern Approach to Verbal and Non Verbal Reasoning. S.Chand
3. Covey, Stephen. 2004. 7 Habits of Highly effective people, Free Press.
4. Egan, Gerard. 1994. The Skilled Helper (5th Ed). Pacific Grove, Brooks / Cole.
5. Khera, Shiv 2003. You Can Win. Macmillan Books , Revised Edition
6. Murphy, Raymond. 1998. Essential English Grammar. 2nd ed., Cambridge Univ. Press.

7. Prasad, L. M. 2000. Organizational Behaviour, S.Chand
8. Sankaran, K., & Kumar, M. 2010 Group Discussion and Public Speaking. M.I. Pub, Agra, Adams Media.
9. Schuller, Robert. (2010). Positive Attitudes. Jaico Books.
10. Trishna's (2006). How to do well in GDs & Interviews, Trishna Knowledge Systems.
11. Yate, Martin. (2005). Hiring the Best: A Manager's Guide to Effective Interviewing and Recruiting.

Sem. II **Hours / Week: 4**
16PCS2401 **Credits: 4**

IDC (WS):
PERVASIVE AND AD HOC NETWORKS

Assurance of Learning:

- Understand the basics of Mobile Adaptability
- Comprehension of Ad Hoc Networks and their security
- Understanding of Wireless Network Security mechanisms

Unit I **10 Hrs**

MOBLIE COMPUTING: Adaptability - The Key to Mobile Computing - Mechanisms for Adaptation - Development or Incorporation of Adaptations in Applications. **MOBILITY MANAGEMENT:** Concept of Mobility Management - Location Management - Principles and Techniques.

Unit II **10 Hrs**

DATA DISSEMINATION: Mobile Data Caching - Mobile Cache Maintenance Schemes - Moblie Web Caching**. CONTEXT-AWARE COMPUTING:** Ubiquitous of Pervasive Computing - Various Definitions and Types of Contexts - Context Aware Computing & Applications - Middleware Support. **INTRODUCTION TO MOBILE MIDDLEWARE:** Definition of Mobile Middleware - Application - Agents - Service Discovery.

Unit III **10 Hrs**

INTRODUCTION TO AD HOC AND SENSOR NETWORKS: Overview - Properties of an Ad hoc Network -Unique Features of Sensor Networks - Proposed Applications - Challenges - Constrained Resources - Security - Mobility.

Unit IV **10 Hrs**

WIRELESS SECURITY: Traditional Security Issues – Mobile and Wireless Security Issues. - Problems in Ad-hoc Networks**. APPROACHES TO SECURITY:** Limit the Signal -Encryption - Integrity Codes - IPSec – Other Security Related Mechanisms.

Unit V **10 Hrs**

SECURITY IN WPAN: Security in Wireless Personal Area Networks - Basic Idea - Bluetooth Security Modes - Basic Security Mechanisms. **ENCRYPTION:** Authentication - Limitation and Problems. **SECURITY IN WLAN:** Security in Wireless Local Area Networks - Basic Ideas - Wired-Equivalent Privacy (WEP) - WEP Fixes and Best Practices.

Text Books

1. Frank Adelstein, Sandeep K.S., Gupta Golden G. Richard III Loren Schwibert"Fundamentals of Mobile and Pervasive Computing", TMG Ed. Pvt. Ltd.,2005.

Books for Reference

1. Roopa R Yavagal, Hasan Ahmed, Asoke K Talukder, "Mobile Computing: Technology, Applications and Service Creation", 2nd Ed., Tata McGraw Hill Pvt. Ltd., 2010
2. UweHansmann, Martin S. Nicklous, LotharMerk, Thomas Stober, "Principles of Mobile Computing", 2nd Ed., Springer, 2006.

Sem. II **Hours/Week: 4**
16PIT2401 **Credits: 4**

IDC (WS):
COMPUTER GENERATED IMAGERY

Assurance of Learning:

- Understand the basic concepts of computer based media
- Distinguish between 2D and 3D images
- Manipulate images in GIMP
- Create basic 3D animations

Unit I **8Hrs**

INTRODUCING MULTIMEDIA: The Importance of Multimedia – Impact of Multimedia – Configuration of a Multimedia PC – Taxonomy of Multimedia Objects – Multimedia Computer Components – Emerging Technology.

Unit II **8Hrs**

ELEMENTS OF GRAPHIC DESIGN: Point – Line – Shape – Form – Light – Color – Texture – Scale – Movement – Space – Balance – Proportion – Abstraction – Typography.

Unit III **10 Hrs**

2D GRAPHICS WITH GIMP: Basic Computer Graphics – **IMAGE MANIPULATION:** Straightening – Cropping – Scaling – Perspective **FIXING IMAGES:** Assessing Images – Brightness and Darkness - Editing – Color – Brushes – Sharpening – Removing Noise.

Unit IV **12Hrs**

DIGITAL IMAGING PROJECTS: Layers – Adding Text to Images - Filters **–** Cloning **- DIGITAL ART:** Painting in GIMP – Tools – Advantages – Color Basics – Drawing in Gimp – Tools for Drawing – Drawing Freely – Drawing with Selections – Assistive Painting – Problems with Paths – Paths Dialog.

Unit V **12Hrs**

FUNDAMENTALS OF 3D: History of Graphics and Special Effects – 3D Hardware and Software – **POLYGONS:** 2D to 3D transformation – Meshes – Extruding – Edges and Edge Loops – UV coordinates – Aesthetics and Compatibility – **NURBS:** From Straight to Curvy – Nurb Surfaces – Advantages and Disadvantages – **RENDERING**: Image Size and Aspect – Quality and Optimiztion – Antialiasing – Bucket Rendering – Batch Rendering – Network Rendering – Stylized Renders **-** Tools to Use.

Text Books

1. Fred T. Hofstetter, "Multimedia Literacy 3rd Ed", McGraw-Hill International, 2001. Unit: I
2. Richard Poulin, "The Language of Graphic Design - An Illustrated Handbook for Understanding Fundamental Design Principles", Rockport Publishers, 2011. Unit: II
3. Jan Smith, Roman Joost, "GIMP for Absolute Beginners" Apress International, 2012. Units: III & IV

4. Ami Chopine, “3D ART ESSENTIALS The Fundamentals of 3D Modeling, Texturing, and Animation” Focal Press, 2011. Unit: V

Books for Reference

1. Daniel James “Crafting Digital Media: Audacity, Blender, Drupal, GIMP, Scribus, and Other Open Source Tools” Apress International, 2009.
2. John M Blain, “The Complete Guide to Blender Graphics Computer Modeling and Animation”, Taylor & Francis Group, 2012.

Sem. II **Hours/Week: 4**
14PCA2401 **Credits: 4**

IDC-1 (WS): LAMP

Objectives

* The objective of the paper is to enable the students to install and configure as well as to handle the components of the LAMP (Linux, Apache, MySQL, and PHP) infrastructure in an efficient way.

Unit - I (12)

Linux: Introduction - Download and Install - Decisions, Decisions – Linux Partition Sizes - Accounts - Security - Basic UNIX: Shell - Owner, Groups, Permissions, Ownership - Processes - PATH and Environment – Commands Basic File System Essentials - Useful Programs.

Unit - II (12)

Apache Web server: Starting and Stopping and Restarting Apache Configuration - Securing Apache - Create the Web Site-Apache Log Files.

Unit - III (12)

My SQL: Commands - Database Independent Interface - Tables – Loading and Dumping Database.

Unit – IV (12)

PHP: Embedding PHP into HTML -Configuration - Language Syntax: Variables - Data Types - Web variables - Operators - Flow Control Constructs - Writing PHP Papers.

Unit - V (12)

Built in PHP function - Important Functions - Array Functions – String Functions - Other Functions - PHP and MySQL: MySQL Functions.

Books for Study

1. James Lee and Brent Lee “Open Source Development with LAMP - Using Linux , Apache, My SQL ,Perl and PHP”, Pearson Education , 2009.

Books for Reference

1. JsonGerner, Elizabeth Naramore , Morgan Owens and Matt Warden , “Professional LAMP - Using Linux , Apache, My SQL and PHP5 Web development”, Wiley Publisher, 2006.

IDC-II (WS) (OOC):

Data Analysis using R-Language

Sem .II **Hours/Week: 4**
16PMA2401 **Credits: 4**

Learning Assurance:

- To understand the basics of the R Language.
- To appreciate the data frames in R.
- To write programs to solve statistical problems.
- To study the regression in data analysis.
- To draw graphics using R Language.

Unit I: Unveiling R for Data Analysis

An overview of R - Vectors, factors, and univariate time series - Data frames and matrices – Functions, operators, and loops - Graphics in R - Graphical user interfaces to R - Working directories, workspaces, and the search list - R system configuration - Data input and output - Functions and operators – some further details – Factors - Missing values - Matrices and arrays - Manipulations with lists, data frames, matrices, and time series - Classes and methods..

Unit II: Knowing about a data

Styles of data analysis - Revealing views of the data - Data summary - Statistical analysis questions, aims, and strategies - Statistical models - Distributions: models for the random component- Creation of R packages - Document preparation – Sweave() and xtable()

Unit III: inference concepts

Basic concepts of estimation - Confidence intervals and tests of hypotheses - Contingency tables - One-way unstructured comparisons - Response curves - Data with a nested variation structure - Resampling methods for standard errors, tests, and confidence intervals.

Unit IV: Regression with a single predictor & Multiple linear regression

Fitting a line to data - Outliers, influence, and robust regression - Standard errors and confidence intervals - Assessing predictive accuracy - Regression versus qualitative anova comparisons – issues of power

Basic ideas: a book weight example - The interpretation of model coefficients - Multiple regression assumptions, diagnostics, and efficacy measures - A strategy for fitting multiple regression models - Problems with many explanatory variables – Multicollinearity.

Unit V: Graphs in R

Hardcopy graphics devices - Plotting characters, symbols, line types, and colors - Formatting and plotting of text and equations - Multiple graphs on a single graphics page - Lattice graphics and the grid package - An implementation of Wilkinson's Grammar of Graphics - Dynamic graphics – the rgl and rggobi packages

Textbook

1. John Maindonald& W. John Braun**, Data Analysis and Graphics Using R – an Example-Based Approach,** Third Edition, Cambridge University Press, 2010.

References

1. Paul Teetor, R Cookbook, O'Reilly, 2011.
2. www.coursera.org/learn/r-programming

3. www.r-project.org

Sem. III **Hours/Week: 5**

16PCS3111 **Credits: 4**

Online Course: BIG DATA ANALYTICS

Objective : 1. Introduce the students the concepts of big data and various techniques used with big data
2. Teach the students in applying skills and tools to analyse big data.

Total Hours : 60 Hours (Contact – 36 + Outside – 24)

Intended for : Any PG students with Computer Science Background

Prerequisite : Students should know fundamentals of RDBMS, SQL Queries and some basic programming

Course Content : http://mail.sjctni.edu:8085/moodle/
E-Contents will be available under Course Available → M.Sc. Computer Science folder

Module Description	Contact Hours	Out side Hours	Module Objective	Learning Outcome
Module I - Introduction to Big Data - Business Importance of Big Data - Characteristics of Big Data - Big Data Processing - Tools and Techniques for Analysing Big Data - **Demonstration** - Movie Review Analysis	4	2	To understand big data concepts and its importance in business field	c) Understand basics of big data d) Have a clear idea on the various tools and techniques used with big data e) Perform some analysis based on sample dataset
Module II –Hadoop Fundamentals	4	4	To understand Hadoop Framework and try hands on in	c) Understand Hadoop Architecture d) Installing Hadoop

- Hadoop Architecture - Hadoop Installation Prerequisite - Single Node vs Multi Node Installation - Overview of Hadoop Ecosystem - **Demonstration** - Single node Installation			Hadoop single node installation	in Single node e) Understand Hadoop Ecosystem components
Module III – Map Reduce Programming - Map Reduce Architecture - Map Reduce Internals - Map Reduce Phases - Text processing using Python Language - **Demonstration** - Word Count	8	6	To understand various phases of Map Reduce Programming and how to perform Text processing using Python	d) Understand fundamentals of Map reduce programming e) Understand how to process text information f) Execute simple Map Reduce programmes
Module IV- NoSQL - Move to NoSQL from RDBMS - NoSQL Features - Overview of MongoDB - MongoDBvs Other NoSQl databases - **Demonstration:** Working MongoDB with CatLog	10	6	To understand the fundamentals of NoSQL and in particular about MongoDB	c) Understand the nuances of NoSQL databases d) Working with MongoDB
Module V - Data Analytics Using Pig - Introduction to Pig - Pig Data Types - Representing Data in Pig - Pig Queries	10	6	To understand data analysis using Hadoop Ecosystem tool Pig	c) Understand how to analyse data using Pig d) Execute Sample Pig Queries

- **Demonstration:** Pig Installation and executing sample queries				

Case Studies

Module I - Social Media Analytics to analyse sentiments

Module II - Hadoop Single Node Installation

Module III - Log File Analysis

Module IV - Retrieve restaurant data using MongoDB

Module V - Executing Sample Pig queries

Evaluation

Formative Evaluation - 100 Marks

Module	Case Studies (Marks)	Single Page Report (Marks)	E-Content Presentation (Marks)
Module1	10	3	5
Module 2	15	3	5
Module 3	15	3	5
Module 4	10	3	5
Module 5	10	3	5

4) All the components will be conducted by the staff member assigned for the Programme
5) Single Page Report will be submitted via Moodle
6) E-Content will be presented during the discussion hours

Summative Evaluation – 100 Marks

6) Testing with multiple choice objective questions
7) Each module will have 20 questions
8) After completing each module, the students are allowed to go for next module. Passing minimum for each module is 50%
9) Within a week time he has to reappear to finish the respective module to proceed to the next module

Sem. III **Hours/Week: 5**
16PCS3112 **Credits: 4**

DISTRIBUTED TECHNOLOGIES

Assurance of Learning:

- Understand the concept of Internet programing using J2EE
- Able to know about JSP and Enterprise Java Beans
- The ability to understand PHP, MYSQL and AJAX concepts

Unit I **10 Hrs**

J2EE OVERVIEW: J2EE and J2SE- The Birth of J2EE - J2EE. **J2EE MULTITIER ARCHITECTURE:** The Tier - J2EE Multi-Tier Architecture - Client Tier implementation-Classification of Clients -Web Tier implementation. **J2EE BEST PRACTICES:** The Enterprise Application - Session Management-Presentation and Processing Model View Controller. **JAVA REMOTE METHOD INVOCATION:** RMI Concept-Remote Interface-Passing Objects-The RMI Process-Sever side -Client side.

Unit II **16 Hrs**

SERVLET: Java servlets and Common Gateway Interface Programming – Benefits – A Simple Java Servlet – Anatomy of a Java Servlet – Deployment Descriptor –Reading Data from a Client-Reading HTTP Request Headers –Writing HTTP Response Header –Working with Cookies – Tracking Sessions. **JAVA SERVER PAGES:** JSP - JSP Tags - Methods - User Session -Session Objects. **ENTERPRISE JAVA BEANS**: EJB - The EJB container-EJB Classes- EJB Interfaces-Referencing EJB- Relationship Elements -Session Java Bean – Stateless vs Stateful - The JAR file.

UNIT III **13 Hrs**

INTRODUCTION: Brief Introduction to PHP, Apache, MySQL, and Open Source - Pieces of AMP Module - PHP Structure and Syntax. **STRINGS AND ARRAYS:** String Functions-Converting to and from Strings - Formatting Text String -Modifying Data in an Array-Deleting Array Elements- Arrays with Loops - PHP Array Functions - Sorting Arrays - Splitting and Merging Arrays. **CREATING FUNCTIONS:** Passing Functions - Passing Arrays to Functions- Passing by Reference.

UNIT IV **13 Hrs**

USING PHP WITH MYSQL: MySQL Structure and Syntax - Connecting to MySQL Server - Querying the Database. **USING TABLES TO DISPLAY DATA:** Creating a Table - Populating Table - Creating Master/Child Relationship - Form Elements – Session – Cookie. **DATABASE OPERATIONS:** Inserting – Deleting – Editing. **MANIPULATING AND CREATING IMAGES :** Working With GD Library - Upload Images - Converting Image Files Types- Validating User Input. **SENDING EMAILS**: Setting Up PHP to use E-mail – Sending an E-mail - User Logins, Profiles and Personalization.

UNIT V **13 Hrs**

FTP: Working With FTP – Uploading File With FTP – Deleting A File With FTP. **AJAX:** Writing AJAX – Creating XMLHTTPREQUEST Object- Opening The XMLHTTPREQUEST Object- Passing Data To The Server With GET- Passing Data To The Server With POST – Handling XML – Handling XML With PHP.

Text Books

1. Jim Keogh," The Complete Reference J2EE ",Tata McGraw Hill, NewDelhi, 2006. Units: I & II
2. Elizabeth Naramore, Jason Gerner, "Beginning PHP5, Apache, MySQL, with Web Development", Wiley Publishing, Inc., Indianapolis, Indiana, 2005. Units: III (Introduction) & IV
3. Steven Holzner,"The Complete Reference PHP", Tata McGraw Hill Pvt.Ltd., 2008. Units: III (Strings and Arrays - Creating Functions) & V

Books for Reference

1. McGovern," J2EE 1.4 Bible", Wiley, Chennai, India, 2007.
2. Jason Gerner Elizabeth Naramore, Morgan L. Owens, Matt Warden, "Professional Lamp, Linux, MySQL and PHP5 and Web Development", Wiley Publishing, 2006.
3. James Lee, Brent Ware, "Open Source Web Development with LAMP using Linux, Apache, MySQL, PERL and PHP", Pearson, 2003.

Sem. III **Hours/Week: 5**
16PCS3113 **Credits:4**

ANDROID PROGRAMMING

Assurance of Learning:

- Use the development tools in the Android development environment
- To develop their own apps using the major components of Android API
- Use the Java programming language to build Android apps

Unit I **8 Hrs**

MOBILE APPLICATION DEVELOPMENT: Mobile Device Evolution – Smart Phone's- Tablet PC's – Classic MAD Challenges – Mobile Platform – Types of Mobile Platforms(Mobile OS) – Mobile Applications - Cross Platform Mobile Apps Development- Benefits of Cross Platform MAD – Cross Platform System Architecture.

Unit II **13 Hrs**

(a)ANDROID: Introduction to Android – History of Android – Android Architecture – App Architecture – Activities in Depth – Services in Depth– Installing the Android SDK – Installing an Android Platform – Creating an Android Virtual Device – Starting the AVD. **(b) CREATING ANDROID PROJECT**: Starting a New Project in Eclipse - Deconstructing Your Project – Setting up an Emulator – Creating Launch Configuration – Running the Hello Android App – Understanding the Project Structure.

Unit III **13 Hrs**

USER INTERFACE RECIPIES: Customizing the Window – Creating and Displaying Views – Creating Popup Menu Actions – Scrolling Text View Ticker – Animating a View – Creating Draw Tables as Backgrounds – Applying Masks to Images.

Unit IV **14 Hrs**

UNDERSTANDING ANDROID RESOURCES : Understanding Resources - Dimensions - Styles - Themes - Values - Menus – Colors - Working with Resources - Moving Strings into Resources - Making Your Apps Global with Resources. **TURNING YOUR APPLICATION INTO A HOME-SCREEN WIDGET:** Working with App Widgets in Android - Working With Remote Views - Using App Widget Providers - Working With Pending Intents - Understanding the Android Intent System - Understanding Intent Data - Evaluating Intents - Using Pending Intents - Creating the Home-Screen Widget - Implementing the App Widget Provider Communicating with the App widget - Building the App Widget's Layout - Doing Work Inside an App Widget Provider.

Unit V **12 Hrs**

PERSISTING DATA: Persisting Data – Reading and Writing Files – Using Files As Resources - Managing Database – Querying the Database – Backing Up Data – Sharing Your Database – Sharing Your Other Data.

Text Books

1. Yonathan Akilu Redda, “Cross Platform Mobile Applications Development” NTNU, 2012 Unit 1.
2. Dave smith, Jeff Friesen, “Android Recipes Problem Solution Approaches”, Apress, 2011.Units IIa , III, V.
3. Donn Felker, “Android Application Development for dummies”, Wiley Publishing Inc, 2011. Unit IIb, IV.

Books for Reference

1. Jerome J.F DiMarzio,”Android a programmers guide” McGraw-Hill,2008.
2. Wei-Meng Lee, “Beginning Android Application Development” Wrox publications, 2011.

Sem. III **Hours/Week: 3**
16PCS3114 **Credits: 2**

Software Lab-V: J2EE & PHP

J2EE

1. RMI
2. Servlet and Cookies
3. JSP Get and Post methods
4. JSP Session Management
5. EJB: Session Bean

PHP

6. Using Controls and Functions.
7. String Functions and Arrays.
8. Server side Form Validation
9. Message Passing Mechanism between Pages.
10. Display Student Information using MySql Table.
11. File Upload.
12. AJAX

Sem. III **Hours/Week:3**
16PCS3115 **Credits: 2**

Software Lab-VI: ANDROID

1. Layouts
2. Simple Controls
3. Working With Colors
4. Working With Text Using Styles
5. Image Manipulation
6. Menu Creation
7. Implicit Intents
8. Explicit Intents
9. Adding Audio & Video
10. Create An Application Using Links
11. Widgets
12. Data Storing & Retrieving.

Sem. III **Hours/Week: 4**
16PCS3203A **Credits: 4**

Core Elective-III:
NETWORK SECURITY

Assurance of Learning:

- Identify some of the factors driving the need for network security
- Define the terms vulnerability, threat and attack
- Identify physical points of vulnerability in simple networks
- Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems.

Unit I **10 Hrs**

INTRODUCTION: OSI Security Architecture - Security Attacks - Security Services - Security Mechanisms - A Model for Network Security. **CLASSICAL ENCRYPTION TECHNIQUES**: Symmetric Cipher Model - Substitution Techniques - Transposition Techniques - Steganography.

Unit II **10 Hrs**

BLOCK CIPHERS AND DATA ENCRYPTION STANDARD: Block Cipher Principles - The Data Encryption Standard - The Strength of DES. **ADVANCED ENCRYPTION STANDARD:** AES Structure – AES Transformation Functions - AES Key Expansion - AES Implementation. **PUBLIC- KEY CRYPTOGRAPHY AND RSA**: Principles of Public Key Cryptosystems - The RSA Algorithm.

Unit III **10 Hrs**

CRYPTOGRAPHIC HASH FUNCTIONS: Applications of Cryptographic Hash Functions - Simple Hash Functions - Secure Hash Algorithm (SHA). **MESSAGE AUTHENTICATION CODES:** Requirements - Functions - Security - HMAC - Data Authentication Algorithm (DAA) - Cipher-Based Message Authentication Code (CMAC). **DIGITAL SIGNATURES:** Digital Signatures - Digital Signature Standard.

Unit IV **10 Hrs**

KEY MANAGEMENT AND DISTRIBUTION: Symmetric key Distribution Using Symmetric, Asymmetric Encryption - X.509 Certificates. **USER AUTHENTICATION**: Remote User - Authentication Principles - Remote User Authentication using Symmetric, Asymmetric Encryption - Kerberos. **TRANSPORT-LEVEL SECURITY**: Secure Socket Layer - Transport Layer Security - Secure Shell (SSH).

Unit V **10 Hrs**

SYSTEM SECURITY: Intruders - Intrusion Detection - Password Management. **MALICIOUS SOFTWARE:** Viruses and Related Threats - Virus Countermeasures - Distributed Denial of Service Attacks. **FIREWALLS:** Firewall Design Principles - Trusted Systems.

Text Books

1. William Stallings, "Cryptography and Network Security - Principles and Practices", Prentice Hall (Pearson Education), Dorling Kindersley India Pvt. Ltd., 5th Ed., 2011. Units: I, II, III & IV
2. William Stallings, "Cryptography and Network Security - Principles and Practices", Prentice Hall (Pearson Education), New Jersey, U.S.A., 4th Ed., 2006. Unit: V

Books for Reference

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill Publications, NewDelhi, 2008.
2. Jie Wang, "Computer Network Security: Theory and Practice", Springer Publisher, Higher Education Press, 2009.

Sem. III **Hours/Week: 4**
16PCS3203B **Credits: 4**

Core Elective-III:
XML AND WEB SERVICES

Assurance of Learning:

- Analyze structured web document in XML based syntax
- Ability to know the Java API of the semantic web platform
- Identify and select the appropriate framework components in the creation of web service solutions.

Unit I **10 Hrs**

INTRODUCTION TO XML: An Eagle Eye View of XML - XML Definition - Life of an XML Document - Related Technologies**. STRUCTURING THE DATA**: Examining the Data - XMLizing the Data - Advantages of the XML format - Preparing a Style Sheet for Document Display**. ATTRIBUTES, EMPTY TAGS AND XSL:** Attributes - Attributes Vs Elements - Empty Tags. **XSL WELL FORMEDNESS:** Well Formed Rules - XML Documents - Text in XML - Processing Instructions.

Unit II **10 Hrs**

DOCUMENT TYPE DEFINTION: Document Type Definition and Validity - Document Type Declaration - Validation against DTD - Listing Elements - Element Declaration - Comments in DTD - Entities and External DTD Subset - Attribute Declaration in DTD's - Attribute type - Predefine Attribute.

Unit III **10 Hrs**

WEB SERVICES: Concepts of Web Services - SOAP, WSDL, UDDI - Importance of Web Services - Evolution of Web Applications – Distributed Computing Platform - Web Services and Enterprises.

Unit IV **10 Hrs**

BASIC WEB SERVICES STANDARDS, TECHNOLOGIES AND CONCEPTS: SOAP Model - SOAP - SOAP Messages - SOAP Encoding - SOAP RPC - Using Alternative SOAP Encodings - Document, RPC, Literal , Encoded SOAP.

Unit V **10 Hrs**

UDDI: UDDI at a Glance - UDDI Business Registry - Accessing UDDI. **WSDL:** WSDL using SOAP and UDDI.

Text Books

1. Elliotte Rusty Harold, " XML Bible", IDG Books India, New Delhi, 2004.
Unit: I & II
2. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services - An Architect's Guide", PHI, New Delhi, 2003. Units: III, IV and V

Books for Reference

1. Gold forb, “XML hand book”, Pearson Education, New Delhi, 2003.
2. B V Kumar, S V Subramanya, “Web Services: An Introduction”, Tata McGraw Hill Publishing Co., New Delhi, 2006.

Sem. III **Hours/Week: 4**
16PCS3402 **Credits: 4**

IDC (BS) - ADVANCES IN COMPUTER SCIENCE

Assurance of Learning:

- To understand the basic concepts of Cloud Computing
- Differentiates the types of Cloud, its architecture and its applications
- To understand the basic concepts of IoT and its applications

Unit I **10 Hrs**

INTRODUCTION : Cloud Computing at a Glance - Historical Developments – Building Cloud Computing Environments – Computing Platforms and Technologies. **CLOUD COMPUTING ARCHITECTURE :** Cloud Reference Model – Types of Clouds – Economics of the Cloud.

Unit II **10 Hrs**

CLOUD PLATFORMS IN INDUSTRY : Amazon Web Services : Compute Services – Storage Services – Communication Services – Additional Services. Google AppEngine : Architecture and Core Concepts – Application Life Cycle – Cost Model. Microsoft Azure: Azure core Concepts – SQL Azure.

Unit III **10 Hrs**

CLOUD APPLICATIONS : Scientific Applications – Healthcare – Biology – Geoscience – Business and Consumer Applications: CRM and ERP – Productivity – Social Networking – Media Applications. **ADVANCED TOPICS IN CLOUD COMPUTING :** Energy Efficiency in Clouds. **FEDERATED CLOUDS / INTER CLOUD:** Characterisation and Definition – Cloud Federation Stack – Aspects of Interest – Technologies for Cloud Federations.

Unit IV **10 Hrs**

INTERNET OF THINGS: Introduction- Putting the Internet of Things to the Next Level- **Strategic RESEARCH AND INNOVATION AGENDA:** Internet of Things Vision- IoT Strategic Research and Innovation Directions.

Unit V **10 Hrs**

IoT SMART- X APPLICATION: Smart Cities- Smart Energy and Smart Grid - Smart Mobility and Transport - Smart Home, Smart Buildings and Infrastructure- Smart Factory and Smart Manufacturing- Smart Health - Food and Water Tracking Security- Participatory Sensing - Smart Logistics and Retail. **IoT RELATED STANDARDIZATION:** The Role of Standardization Activitie s- Current situation- Areas for additional Consideration- Interoperability in the Internet of Things.

Textbook

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, "Mastering Cloud Computing", McGraw Hill Education (India) Private Limited Publications, First Reprint, 2013.
2. Ovidie Vermesan, Peter Friess, "Internet of Things – From Research and Innovation to Market Deployment" River Publisher, 2014.

Books for Reference

1. Rajkumar Buyya, James Broberg and Andrzej Goscinski, "Cloud Computing Principles and Paradigms", Wiley Publications, 2011

2. Michael Miller, "Cloud Computing Web Based Applications that change the way you work and collaborate online", Pearson Education, 2009.

Sem. III
16PCS3116 **Credit: 8**

MINI PROJECT

Sem. III
16PCS3117 **Credits: 2**

COMPREHENSIVE EXAMINATION

Unit I
JAVA, Database

Unit II
ASP.NET, Software Engineering

UNIT III
Distributed Technologies, ANDROID

Sem. IV **Hours/Week: 30**
16PCS4118 **Credits: 20**

MAJOR PROJECT DISSERTATION AND VIVA VOCE