M.Sc. INFORMATION TECHNOLOGY
Course Pattern – 2016 Set

Sem.	Code	Course	Hrs	Crs
I	16PIT1101	C++ and Data Organization	5	4
	16SCS1102	Database Systems	5	4
	16PIT1102	Cloud Computing	5	4
	16PIT1103	Software Engineering	5	4
	16PIT1104	Software Lab – I: (C++ and Data Organization)	3	2
	16PIT1105	Software Lab – II: (RDBMS)	3	2
	16PIT1201 A	Core Elective I: Multimedia Systems	4	4
	16PIT1201 B	Core Elective I: Linux Administration		
Total for Semester I			30	24
II	16PIT2106	*Online Course:* Web Design and PHP	5	4
	16PIT2107	Java Programming	5	4
	16PIT2108	Software Lab – III: (Web Design and PHP)	3	2
	16PIT2109	Software Lab – IV: (JAVA)	3	2
	16PIT2202 A	Core Elective II: General and Technical Aptitude	4	4
	16PIT2202 B	Core Elective II: Principles of Operating System		
	16PIT2110	Self-paced Learning: Mobile Communications	-	2
	14PSS2401	IDC : Soft Skills	4	4
	16PIT2401	IDC (WS): Computer Generated Imagery	4	4
	16PCS2401	IDC (WS): Pervasive and Ad hoc Networks		
	16PCA2401	IDC (WS): LAMP		
	16PMA2401	IDC (WS): Data Analysis using R-Language		
	16PIT2111	PC Trouble Shooting	2	1
Total for Semester II			30	27
III	16PIT3112	*Online Course: Big Data Analytics*	5	4
	16PIT3113	Programming with ASP.NET	5	4
	16PIT3114	Mobile Application Development using Android	5	4
	16PIT3115	Software Lab – V: (ASP .NET)	3	2
	16PIT3116	Software Lab – VI: (Android)	3	2
	16PIT3203A	Core Elective III: Data warehousing and Data Mining	4	4
	16PIT3203B	Core Elective III: Data Communication Networks		
	16PIT3402	IDC (BS): Business Trends in IT	4	4
	16PIT3117	Mini Project (II Semester Vacation)	-	8
	16PIT3118	Comprehensive Examination	-	2
		Library	1	-
Total for Semester III			30	34
	16PIT4119	Major Project Dissertation and Viva Voce	30	20
Total for Semester IV			30	20
	16PCW4501	SHEPHERD & Gender Studies	-	5
		Total for All Semester	120	110

Sem. I **Hours/Week: 5**
16PIT1101 **Credits: 4**

C++ AND DATA ORGANIZATION

Assurance of Learning:

- Able to use object oriented programming language like C++ and associated libraries to develop object oriented programs.
- Understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using C++ language.
- Understand various data structure such as stacks, queues, trees, to solve various computing problems.
- Able to implement various kinds of searching and sorting techniques, and algorithm design techniques.

Unit I **13 Hrs**

Principles of OOP - Beginning with C++ - Token, Expressions and Control Statements - Functions.

Unit II **13Hrs**

Classes and Objects - Constructor and Destructors - Operator Overloading and Type Conversion-Inheritance.

Unit III **13Hrs**

Polymorphism - Friend Function - Virtual Function - Working with Files - Templates - Exception Handling.

Unit IV **13Hrs**

DATA STRUCTURES: Stack - Queue - Linked List -Evaluation of Expression - Tree - Binary Trees and Traversal **SEARCHING:** Linear - Binary - Hash.

Unit V **13Hrs**

SORTING: Bubble Sort - Insertion Sort - Selection Sort - Heap Sort – Quick Sort. **ALGORITHM DESIGN TECHNIQUES:** Greedy Algorithm (Minimum Spanning Tree), Divide and Conquer (Merge Sort), Dynamic Programming (All Pairs Shortest Path) - Back Tracking (Eight Queens) - Recursion (Tower of Hanoi).

Text Books

1. E.Balagurusamy,"Object Oriented Programming with C++", TATA McGraw Hill Education (India) Pvt Ltd,6th Ed.,New Delhi, 2013.
   Unit: I, II & III.
2. Ellis Horowitz and SartajSahni,"Fundamentals of Data Structures", Galgotia, 2005.
   Unit: IV
3. Nicklaus Wirth,"Alogorithms +Data Structure=Programs", PHI, New Delhi, 2002.
   Unit: V

Books for Reference

1. Robert Lafore,"Object -Oriented Programming in Microsoft C++", Golgotia Publications, New Delhi, 2003.
2. Aho, Hopcropt, Ullman, "Design and Analysis of Computer Algorithms", Pearson Education, New Delhi, 4th Ed., 2009.
3. A.A.Puntambekar ,"Design and Analysis of Algorithms", Technical Publications, 2009

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.
- Able to use SQL commands to create, manipulate, and query databases.
- Able to apply proper techniques, such as normalization, in designing a database.
- Understand and apply the concept of PL/SQL and parallel database 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 & 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**
16PIT1102 **Credits: 4**

CLOUD COMPUTING

Assurance of Learning:

- Compare the strengths and limitations of cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing and apply suitable virtualization concept.
- Ability to discern the appropriate Cloud Provider
- Address the core issues of cloud computing such as security, privacy and interoperability

UNIT I **10 Hrs**

Introduction: Cloud Computing at a Glance - Historical Developments – Building Cloud Computing Environments – Computing Platforms and Technologies. **Virtualization :** Introduction – Characteristics of Virtualized Environments – Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization – Technology Examples.

UNIT II **10 Hrs**

Cloud Computing Architecture: Cloud Reference Model – Types of Clouds – Economics of the Cloud. **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**

Data Intensive Computing :Map-Reduce Programming – Characterizing Data-Intensive Computations – Challenges ahead – Historical Perspective – Technologies for Data-Intensive Computing – Programming Platform. **Cloud Applications:** Scientific Applications – Healthcare – Biology – Geoscience – Business and Consumer Applications: CRM and ERP – Productivity – Social Networking – Media Applications.

UNIT IV **10 Hrs**

Advanced Topics in Cloud Computing: Energy Efficiency in Clouds. **Market Based Management of Clouds:** Market-Oriented Cloud Computing – A Reference Model for MOCC – Technologies and Initiatives supporting MOCC. **Federated Clouds / Inter Cloud:** Characterisation and Definition – Cloud Federation Stack – Aspects of Interest – Technologies for Cloud Federations.

UNIT V **10 Hrs**

Secure Distributed Data Storage in Cloud Computing: Introduction - Cloud Storage: from LANs TO WANs - Technologies for Data Security in Cloud Computing. **Data Security in the Cloud:** An Introduction to the Idea of Data Security - The Current State of Data Security in the Cloud - Homo Sapiens and Digital Information - Cloud Computing and Data Security Risk - Cloud Computing and Identity - The Cloud, Digital Identity, and Data Security - Content Level Security—Pros and Cons

Textbooks

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education (India) Private Limited Publications, First Reprint, 2013.
   UNIT I, II, III and IV
2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, "Cloud Computing -Principles and Paradigms", John Wiley & Sons, Inc. Publications, 2011.
   UNIT V

Books for Reference

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

Sem. I **Hours/Week: 5**
16PIT1103 **Credits: 4**

SOFTWARE ENGINEERING

Assurance of Learning:

- Basic understanding of software engineering, terminologies, various process models.
- Learn the importance of software requirement specification and requirement engineering tasks.
- Understand the relationship between estimation, scheduling and modularity of a software system.
- Understand and apply the concept of software metrics, testing strategies and techniques

Unit I **13Hrs**

SOFTWARE ENGINEERING : Introduction – Some Terminologies – Role of Management in Software Development – SDLC Models – Build and Fix, Waterfall, Prototyping, Iterative Enhancement, Evolutionary Developing, Spiral, RAD Model – Selection of Life Cycle Model.

Unit II **13Hrs**

SOFTWARE REQUIREMENTS ANALYSIS & SPECIFICATIONS: Requirement Engineering - Type of Requirements – Feasibility Studies - Requirement Elicitation Techniques like FAST& QFD- Requirements Analysis using DFD(with case studies) - Data Dictionaries & ER Diagrams, Requirements Documentation - Nature of SRS - Characteristics & Organization of SRS – Example.

Unit II **13Hrs**

SOFTWARE PROJECT PLANNING: Size Estimation models -Cost Estimation Models - COCOMO - Putnam Resource Allocation Model - Risk Management**. SOFTWARE DESIGN**: Modularity - Cohesion & Coupling, Classification of Cohesiveness & Coupling- Function Oriented Design, Object Oriented Design.

Unit IV **13Hrs**

SOFTWARE METRICS: Introduction - Data Structure Metrics- Information Flow Metrics. **SOFTWARE RELIABILITY:** Basic concepts – Software Quality - CMM.

Unit V **13Hrs**

SOFTWARE TESTING: A Strategic Approach to Software Testing – Terminologies - Functional Testing: Boundary Value Analysis - Equivalence Class Testing - Decision Table Testing- Cause Effect Graphing- Structural Testing- Path Testing -Data Flow and Mutation Testing - Unit Testing- Integration and System Testing- Validation Testing – The Art of Debugging- Testing Tools.

Text Book

1. K. K. Aggarwal, Yogesh Singh, "Software Engineering", New Age International Publications, 3rd Ed , New Delhi, 2009.

Books for Reference

1. Ian Sommerville:"Software Engineering", Pearson Education Asia, 6th Ed, 2002.
2. Roger S. Pressman, "Software Engineering. A Practitioner's Approach", 7 th Ed, McGraw Hill, New Delhi 2009

Sem. I **Hours/Week: 3**
16PIT1104 **Credits: 2**

Software Lab-I: C++ AND DATA ORGANIZATION

C++

1. Classes and Objects
2. Constructors and Destructors
3. Operator Overloading
4. Inheritance
5. Polymorphism
6. File I/O Operations

DATA ORGANIZATION

7. Stack Operation
8. Queue Operation
9. Linked List
10. Tree Traversal
11. Sorting
12. Searching

Sem. I **Hours/Week: 3**
16PIT1105 **Credits: 2**

Software Lab-II: RDBMS

SQL
1. Simple Queries using DDL, DML, and DCL
2. SQL Functions
3. SET Operations
4. View and Snapshots
5. Nested Queries

PL/SQL
6. PL/SQL Block
7. Cursors
8. Database Triggers
9. Subprograms and Packages.

FORMS AND REPORTS
10. Designing Oracle Forms with Menus, Buttons and LOVs
11. Master-Detail Form Design.
12. Developing Oracle Reports (Tabular, Master / Detail, Matrix and Mailing label)

Sem.I **Hours/Week: 4**
16PIT1201 A **Credits: 4**

Core Elective –I: MULTIMEDIA SYSTEMS

Assurance of Learning:

- Acquire the basic principles of Multimedia and be able to use a simple project
- Synthesize audio and video media using compression techniques
- Learn with 3D MAX and to implement an Animation
- To develop a project using Sound Forge

Unit I **10 Hrs**

INTRODUCTION TOMULTIMEDIA - Multimedia and Hypermedia – World Wide Web – Multimedia Software Tools. **MULTIMEDIA AUTHORING AND TOOLS:** Editing and Authoring Tools – VRML. **GRAPHICS AND IMAGE DATA REPRESENTATIONS:** Graphics/Image Data Types – Popular File Formats – Color Models in Images and Video.

Unit II **10 Hrs**

MULTIMEDIA DATA COMPRESSION: Image Compression Standards – The JPEG Standard – Bi-level Image Compression Standards. **BASIC VIDEO COMPRESSION TECHNIQUES**: Motion Compensation – Search for Motion Vectors. **MPEGVIDEO CODING I:** MPEG 1 and 2. **MPEG AUDIO COMPRESSION**: Psychoacoustics – Audio Codec's.

Unit III **10 Hrs**

MULTIMEDIA COMMUNICATION AND RETRIEVAL: Computer and Multimedia Networks – Multiplexing Technologies. **MULTIMEDIA NETWORK COMMUNICATIONS AND APPLICATIONS:** Quality of Multimedia Data Transmission – Multimedia over IP – Multimedia over ATM Networks –Transport of MPEG-4 – Media on Demand.

Unit IV **10 Hrs**

WORKING WITH 2D SHAPES: Creating a Line Star and Text – Editing Vertices.**3D MAX:** Interface Elements – Working with Viewports – Managing 3D Max Files. **WORKING WITH OBJECT**S: Modifying the Primitives – Selecting Objects – Transforming Objects **ANIMATIONS IN 3D MAX:** Understanding Frames Key frames and Keys - 3D Max Animation Tools.

Unit V **10 Hrs**

AUDIO EDITING: Creating a Project in Sound Forge – Import a Media File – Extract an Audio File from CD – File Properties. **EDITING IN SOUND FORGE**– Setting Cursor Position – Markers – Previewing Audio with a Pre-roll - Copying – Cutting – Pasting – Overwriting – Mixing – Trimming cropping – Crossfadding- Editing File Attributes. **EFFECTS:** Saving Effect – Recording in Sound Forge.

Text Books

1. Ze-Nian Li Mark S. Drew " Fundamentals of Multimedia ", Pearson Education, 1st Impression, 2004. Units: I, II, III
2. Vikas Gupta "Multimedia and Web Design" Dreamtech Press, 2007. Units: IV, V

Books for Reference

1. Prabhat k. Andleigh, KiranThakrar "Multimedia Systems Design", Prentice Hall of India, 1st Impression, 2004.
2. John F. Koegel Buford "Multimedia Systems", Pearson Education, 1st Impression, 2006

Sem. I **Hours/Week:4**
16PIT1201B **Credits: 4**

Core Elective-I: LINUX ADMINISTRATION

Assurance of Learning:

- Learn how to install Linux Operating System.
- Learn the basic Linux Administration commands.
- Learn how create simple LAN connecting with Linux Server.

Unit I **10Hrs**

LINUX INTRODUCTION AND INSTALLATION: Linux - Advantages -Red Hat Linux-New Features-Installation Procedures and Methods. Using Desktop - GNOME - KDE - Linux Commands. **ACCESSING AND RUNNING APPLICATIONS:** Installing Red Hat Linux Applications - Running Window Application - Running Windows, DOS and Macintosh Applications - Tools for using Internet and Web.

Unit II **10Hrs**

ADMINISTRATION: Understanding System Administration: Root login super user - GUI tools, commands and Log files - Configuring Hardware - File System and Disk Management - Monitoring performances. **SETTING UP AND SUPPORTING USERS**: Creating user accounts - Setting user defaults - Creating Desktops-Modifying and Deleting Accounts.

Unit III **10Hrs**

SECURITY ISSUES: Hacker versus Cracker-Password Protection-Protection from Break-in-Filtering Network Access -Firewalls- Detecting Instructions - Encryption Techniques.

Unit IV **10Hrs**

NETWORKING: Setting up a LAN- LAN- Wireless-LAN- Understanding IP Addresses. **CONNECTING TO INTERNET:** Dialup Connection- Red Hat Linux as a Router-VPN Connection-Red Hat Linux as a Proxy Server-Proxy Clients.

Unit V **10Hrs**

SETTING UP FILE SERVER: Setting up- Netware File Server. SETTING UP A WEB SERVER: Starting Apache Web Server -Configuring Apache Server -Starting and Stopping the Server - Monitoring Activities.

Text Books

1. Christopher Negus "Red Hat Linux 9 Bible ", WILEY - Dreamtech India Pvt. Ltd, New Delhi, 1st Ed., 2003

Book for Reference

1. Thomas Schenk, "Red Hat Linux System Administration", echmedia, New Delhi, 2003.

Sem. II **Hours/Week: 5**
16PIT2106 **Credit: 4**

Online Course: **WEB DESIGN AND PHP**

Objective **:** 1. Introduce the concepts of web design using HTML and CSS to the students
2. Teach the students to develop websites using PHP

Total Hours **:** 60 Hours (Discussion – 36 + Outside – 24)

Intended for : Any PG students with Computer Science Background

Prerequisite **:** Students should know fundamentals of Internet and WWW

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 – HTML - Basic Tags - New Elements in HTML5 - Tables - Form Controls and Validation	6	4	To understand how to design web pages using HTML5 elements	a) Design Web pages b) Learn how to design Web Forms c) Perform basic validations of the frms
Module II – CSS - CSS Introduction - CSS Styling - CSS Box Model - CSS Advanced	6	4	To understand how to apply styling for the web forms	a) Apply Style information to the Web forms b) Apply Advanced CSS concepts like bootstrap and Lightbox
Module III – JavaScript - Basics of JavaScript - DOM - Events and Listeners - JavaScript Libraries	6	4	To understand how to make the web pages interactive and dynamic	a) Learn how to create Dynamic web pages b) Learn how to use jQuery for interactive web pages

- JQuery Basics				
Module IV - PHP - PHP Introduction - PHP Programming Concepts - PHP Functions - Sending Mail using PHP - Image Uploading - Handling Errors	10	7	To understand the fundamentals of PHP programming	a) Understand the nuances of PHP Programming b) Able to know how to send mail ad Image Uploading c) Avoid and Handle errors in PHP pages
Module V – PHP with MySQL - MySQL Structure and Syntax - Connecting to MySQL Server - Querying the database - Creating Master-Child Relationship	8	5	To understand database operations by using MySQL	a) Understand the structure of MySQL database b) Perform Basic database operations

Case Studies

Module I - Web Form Creation
Module II - Web Form with Bootstrap
Module III - Design a WebForm using jQuery
Module IV - PHP Forms, Image Uploading
Module V - CRUD using MySQL

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. Passing minimum for each module is 50%
4) Within a week time he has to reappear to finish the respective module to proceed to the next module

Sem. II **Hours/Week: 5**
16PIT2107 **Credits: 4**

JAVA PROGRAMMING

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 **10Hrs**

CLASSES AND OBJECTS: General Form Of A Class - Creation Of Objects -Usage Of Constructors - 'This' Keyword- Constructor Overloading-Copy Constructors-Static Data Members - Static Methods- Finalize Method. **INHERITANCE AND POLYMORPHISM**: Inheriting Variables In A Class - Inheriting Methods In A Class - Inheritance And Constructors – Abstract Classes - Final Classes.

Unit II **10Hrs**

INTERFACES AND PACKAGES: Interfaces-Structure of An Interface - Implementation Of An Interface –Interface Inheritance. Packages - Placing The Classes In A Package - Package Hierarchy- Access Control Modifiers. **APPLETS**: The Life Cycle Of An Applet - The Applet Class – Development And Execution Of A Simple Applet - Syntax Of Applet Tag- Methods In The Graphic Class.

Unit III **14Hrs**

SWING:JApplet class – Icons – JLabel Control – JOptionPane Class – JTextField Control – JButton Control – JCheckBox Control – JRadioButton Control – Menus. **EXCEPTION HANDLING**: Default Exception Handling - Exception And Error Classes - Catch Block Searching Pattern - 'Throw' Statement - 'Throws' Statement - Custom Exceptions. **I/OSTREAMS**: Text And Binary Formats Of Data - Input Stream And Output Stream Classes - Reader And Writer Classes - Data Output Stream And Data Input Stream Classes.

Unit IV **14 Hrs**

THREADS: Life Cycle Of A Thread – Creating And Running Threads - Method In The Thread Class - Setting The Priority Of A Thread - Synchronization. **NETWORKING:**TCP Server Socket Class - TCP Socket Class.**JAVA DATABASE CONNECTIVITY:** Establishing AConnection – Creation Of Data Tables – Entering Data Into The Tables – Table Updating.

Unit V **12Hrs**

REMOTE METHOD INVOCATION: Remote Interface-Java.Rmi.Server Package – The Naming Class – Creating RMI Client And Server Classes.**SERVLET:**Servlet and Dynamic Webpages –Life Cycle Of A Servlet – A Simple Servlet –Javax.Servlet Package– Retrieving The Values Of Parameters – Cookies – Creating A Cookie And Sending It To The Client – Retrieving The Stored Cookies.

Text Book

1. C. MUTHU, “Programming with JAVA”, Vijay Nicole Imprints Private Limited, 2nd Ed, Chennai, 2011.

Book for Reference

1. Herbert Schildt, “Java 2: Complete Reference”, Tata McGraw Hill, 5thEd., 2009.

Sem. III **Hours/Week: 3**
16PIT2108 **Credit: 2**

Software Lab - III: WEB DESIGN AND PHP

HTML5

1. Working With Basic Tags
2. Usage of New Semantic Elements
3. Create Form Input and Validation
4. Design CSS3 style sheet to define settings for heading, body, table and links
5. Multiple Backgrounds using CSS3

PHP

6. Using Controls and Functions.
7. Passing Variables.
8. String Functions.
9. Arrays.
10. File uploading.
11. Image Manipulation.
12. Develop a College Application Form using MYSQL Table.

Sem. II **Hours/Week: 3**
16PIT2109 **Credits: 2**

Software Lab-IV: JAVA

1. Classes & Objects
2. Inheritance & Polymorphism
3. Packages & Interfaces
4. Applet & Swing
5. Exception Handling
6. I/O Streams
7. Multithreading
8. Networking &JDBC
9. RMI
10. Servlet: Cookies, JDBC

Sem. II **Hours/Week: 4**
16PIT2202A **Credits: 4**

Core Elective II: GENERAL AND TECHNICAL APTITUDE

Assurance of Learning:

- Able to develop the aptitude skills.
- Able to boost the logical thinking by reasoning.
- Examine their technical skills by debugging the programs.
- Able to compete in the competitive exams and interviews

Unit I **10 Hrs**

NUMERICAL APTITUDE: Problems on Numbers and Ages- Ratio And Proportion- Partnership- Chain Rule- Time and Work- Alligation or Mixture- Calendar- Permutation- Combination- Probability.

Unit II **10 Hrs**

LOGICAL REASONING: Analogy-Classification-Series Completion - Coding--Decoding- Blood Relations-Puzzle Test- Direction Sense Test- Logical Venn Diagrams - Data Sufficiency- Assertion and Reason.

Unit III **10 Hrs**

C PROGRAMMING: Basic Programming Concepts in C-Controls and Loops - Functions- Arrays – Strings - Pointers-Structures and Union-File Handling.

Unit IV **10 Hrs**

OOPS: Classes-Objects – Inheritance – Polymorphism – Abstraction. **DATABASE:** Normalization- SQL Queries.

Unit V **10 Hrs**

JAVA PROGRAMMING: Packages and Interface - Exception handling -Abstract Class and Inner Class – Applets - JDBC-Thread.

Text Books

1. Dr.R.S. Aggarwal, "Quantitative Aptitude For Competitive Examinations", 7th Revised Ed,S.Chand and Co.Ltd, New Delhi, Reprint 2012.Unit I.(Section I:7,8,12,14,15,20,27,30,31).
2. Dr.R.S. Aggarwal, "A Modern Approach to Verbal and Non Verbal Reasoning", New Delhi, Milestone Publication, 2010.Unit II.(Chapter I:Section 1,2,3,4,5,6,8,9,16,18).
3. ElaKashyapSharma,"Technical Aptitude For Interviews : Computer Science And IT",PHI learning Pvt Ltd,2014,India.Unit III (Section 3,4,5) Unit IV (Section 2) Unit V (Section 15).
4. S G Ganesh,"Cracking The C, C++ And Java Interview", Tata McGraw Hill Education Pvt Ltd.2009, New Delhi.Unit III (Section 6, 7, 8, 9) Unit IV (Section 1) Unit V (Section 4).
5. Vyom Network (http://www.vyomworld.com), "Technical Aptitude Questions".

Sem. II **Hours/Week: 4**
16PIT2202 B **Credits: 4**

Core Elective II: PRINCIPLES OF OPERATING SYSTEMS

Assurance of Learning:

- Basic understanding of the structures of Operating Systems and its components
- Learn the basic principles used in the Distributed Operating Systems.
- Understand the SHELL commands in Linux Operating System.

Unit I **12 Hrs**

INTRODUCTION: Operating System - Mainframe Systems – Multiprocessor Systems - Distributed Systems - Real Time Systems - Hand Held Systems. **OPERATING SYSTEM STRUCTURES:** System components - System calls - Virtual Machines. PROCESS: Process Concept - Operation on Processes. **CPU SCHEDULING:** Basic concepts - Scheduling Algorithms - Real Time Scheduling.

Unit II **12 Hrs**

PROCESS SYNCHRONIZATION: Background - Critical Selection Problem - Semaphores. **DEADLOCKS:** Methods for Handling Deadlocks – Deadlock Avoidance - Recovery from Deadlock. **MEMORY MANAGEMENT:** Background -Swapping-Paging - Segmentation with Paging. **VIRTUAL MEMORY:** Demand Paging - Page Replacement - Allocation of Frames - Thrashing.

Unit III **12 Hrs**

DISTRIBUTED COMPUTING SYSTEM: Evolution – Models – Distributed Operating System – Issues In Designing - DOS – DCE. **MESSAGE PASSING:** Features of a Good Message Passing – Issues in IPC by Message Passing – Multi datagram Messages –Encoding and Decoding of Message Data – Process Addressing – Failure Handling – Group Communication.

Unit IV **12 Hrs**

REMOTE PROCEDURE CALL: The RPC Model – Transparency Of RPC – RPC Messages – Server Management – Parameter Passing Semantics – Call Semantics – **DISTRIBUTED SHARED MEMORY:** General Architecture of DSM Systems – Design And Implementation Issues of DSM - Structure of Shared Memory Space – Consistency Models – Advantages of DSM.

Unit V **12 Hrs**

LINUX OPERATING SYSTEM: Introduction - GUIs - The Linux Command Line - Virtual Machines - Unix And Linux - The IPOS Cycle - Computer Hardware - Software and Users - Types of Computers. **THE BASH SHELL:** Entering Linux Commands - MAN Pages - Bash Features - Other Shells – Interpreters.

Text Books

1. Abraham Silberschatz, Peter Bear Galvin and Greg Gagne, “Operating System Concepts”, 6th Ed., John Wiley & Sons Inc, 2007.
Units: I, II
2. Pradeep K. Sinha, “Distributed Operating System Concepts and Design ”, PHI, New Delhi, 2007.

Units: III, IV
3. Richard Fox, “Linux With Operating System Concepts” CRC Press Taylor & Francis Group, New York, 2015. Unit: V

Books for Reference

1. Harvey M. Deitel, “An Introduction to Operating System”, Addison Wesley, New York, 1999.
2. Andrew S Tanaenbaum, “Modern Operating System”, PHI, New Delhi, 2001.
3. Machtelt Garrels, “Introduction to Linux”, Third Edition, New Delhi, 2010.

Sem. II
16PIT2110 **Credits: 2**

Self-paced Learning:
MOBILE COMMUNICATIONS

Assurance of Learning:

- Familiarize various generations of mobile communications and the concept of cellular communication, basics of wireless communication
- Knowledge acquired of GSM, IS-95 CDMA mobile communication standard, its architecture, logical channels, advantages and limitations.
- Comprehension of 3G mobile standards and their comparison with 2G technologies.
- Understand multicarrier communication systems and differentiate various Wireless LANs.

Unit I
INTRODUCTION: Applications - A Short History Of Wireless Communication - A Market For Mobile Communications - A Simplified Reference Model. **WIRELESS TRANSMISSION**: Frequencies For Radio Transmission -Signals - Antennas - Signal Propagation – Multiplexing - Modulation - Spread Spectrum - Cellular Systems.

Unit II
MEDIUM ACCESS CONTROL: Motivation for A Specialized MAC - SDMA - FDMA - TDMA – CDMA. **TELECOMMUNICATIONS SYSTEMS**: GSM.

Unit III
SATELLITE SYSTEMS: Applications – Basics – Routing – Localization – Handover. **BROADCAST SYSTEMS**: Cyclical Repetition Of Data - Digital Audio Broadcasting - Multi-Media Object Transfer Protocol - Digital Video Broadcasting - Convergence Of Broadcasting And Mobile Communications.

Unit IV
WIRELESS LAN: Infrared Vs Radio Transmission - Infrastructure And Ad-Hoc Network - HIPERLAN – Bluetooth.

Unit V
SUPPORT FOR MOBILITY: World Wide Web - iMode- Syncml

Text Book

1.Jochen H. Schiller, "Mobile Communications", 2nd Ed, Pearson education limited, 2003.

Book for Reference

1.Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, New York, 2003.

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

IDC: 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**
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**
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**
16PCA2401 **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.

Book for Study

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

Book 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.

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

IDC-II (WS) (OOC):

Data Analysis using R-Language

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. II **Hours / Week: 2**
16PIT2111 **Credits: 1**

PC TROUBLE SHOOTING

Assurance of Learning:

- Install operating systems into partitions
- Troubleshoot problems in Operating System
- Install Network Hardware and Troubleshoot connections

Unit I: Operating System Installation
Unit II: Hardware Assembling
Unit III: Basic Network Configuration

Sem. III **Hours/Week: 5**
16PIT3112 **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	d) Understand basics of big data e) Have a clear idea on the various tools and techniques used with big data f) Perform some analysis based on sample dataset
Module II –Hadoop Fundamentals - Hadoop Architecture	4	4	To understand Hadoop Framework and try hands on in Hadoop single	c) Understand Hadoop Architecture d) Installing Hadoop in Single node

- Hadoop Installation Prerequisite - Single Node vs Multi Node Installation - Overview of Hadoop Ecosystem - **Demonstration** - Single node Installation			node installation	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	c) Understand fundamentals of Map reduce programming d) Understand how to process text information e) 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	d) Understand the nuances of NoSQL databases e) Working with MongoDB
Module V - Data Analytics Using Pig - Introduction to Pig - Pig Data Types - Representing Data in Pig - Pig Queries - **Demonstration:** Pig	10	6	To understand data analysis using Hadoop Ecosystem tool Pig	c) Understand how to analyse data using Pig d) Execute Sample Pig Queries

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

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

Sem. III **Hours/Week: 5**
16PIT3113 **Credits: 4**

PROGRAMMING WITH ASP.NET

Assurance of Learning:

- Able to design, develop and deploy web applications using ASP.NET with Visual Studio.NET.
- Able to create database driven ASP.NET web applications and web services.
- Learn some new concepts like AJAX and LINQ

Unit I **15Hrs**

INTRODUCTION TO ASP.NET: .NET Framework – .NET Base Classes – Creating a Simple Web Application. **WORKING WITH WEB CONTROLS**: Directories, Files and Configuration Files – Pages Events – Intrinsic Objects – Basic Web Controls and its Properties – Event Handling Methods. **INTRODUCTION TO C#:** Variables – Data Types – Boxing and Unboxing – Data Type Conversion – Operators and Expressions – Control Statements.

Unit II **11Hrs**

NAMESPACES AND COMPONENTS: Namespaces – 'Using' Directive – 'alias' directive – Components – Access Specifiers and Modifiers. **STATE MANAGMENT:** Session Object – Application Object – Cache Object – View State – Hidden Fields – Query State.

Unit III **13Hrs**

WORKING WITH DATA: Design goals of ADO.NET – Classes and Objects in ADO.NET – Provider Objects – Consumer Objects – System.Data Namespace – Stored Procedures. **DATA CONTROLS:** Constructing a Master Detail Page – SqlDataSource and ListView – LinqDataSource and ListView.

Unit IV **13Hrs**

ESSENTIAL ASP.NET FEATURES: Navigation – Validation Controls – Master Pages – Menu Control – TreeView Control – Style Sheets – Message Box – AJAX - MVC Framework.

Unit V **13Hrs**

WEB SERVICES: Creating a Web Service – Testing the Web Service – Deploying Web Services – Publishing Web Services – Web Service Discovery – Consuming Web Services.

Text Books

1. C. Muthu, "ASP.NET", Shalom InfoTech Pvt. Ltd., 2013.
   Units: I, II, III & IV
2. MirdulaParihar et al., "ASP.NET BIBLE", Wiley DreamTech India (P) Ltd., 2010.
   Unit: V

Books for Reference

Dave Mercer, "ASP.NET: A Beginners Guide",Tata McGraw Hill, New Delhi, 2010.

Sem. III **Hours/Week: 5**
16PIT3114 **Credits: 4**

MOBILE APPLICATION DEVELOPMENT USING ANDROID

Assurance of Learning:

- Understand the working of the Android development environment
- Understand the programming techniques and tools for apps
- Develop basic to intermediate apps for mobile systems

Unit I **13Hrs**

a) OPERATING SYSTEM: Basic Terminologies- Types - Functions of Operating System - Various Managers - Policies- Handheld Devices-Distributed Operating System.
b) MOBILE APPLICATION DEVELOPMENT: Introduction - Core Concepts – Mobile Application Development –From Desktop Development to Mobile Development – Looking Ahead.

Unit II **13Hrs**

ANDROID: Introduction- What is Android – Android Versions – Features of Android – Architecture of Android – Android Devices in the Market – Obtaining the Required Tools – Eclipse – Android SDK– Android Development Tools – Creating Android Virtual Devices – Anatomy of an Android Applications.

Unit III **13Hrs**

ACTIVITIES AND INTENTS: Understanding Activities - Applying Styles And Themes to Activity - Hiding the Activity Title - Displaying a Dialog Window - Displaying a Progress Dialog - Linking Activities Using Intents - Resolving Intent Filter Collision - Returning Results From an Intent - Passing Data Using an Intent Object - Calling Built-In Applications Using Intents - Understanding the Intent Object - Using Intent Filters - Adding Categories - Displaying Notifications.

Unit IV **13Hrs**

GETTING TO KNOW THE ANDROID USER INTERFACE: Understanding the Components of the Screen – Adapting to Display Orientation – Managing Changes to Screen Orientation – Creating the User Interface Programmatically – Listening For UI Notifications.
DESIGNING YOUR USER INTERFACE USING VIEWS: Basic Views – Text View- Button, Image, Edit Text, Check Box, Toggle Button, Radio Button, and Radio Group – Progress Bar View – Auto Complete Text View.

Unit V **13Hrs**

DATA PERSISTENCE: Saving And Loading User Preferences -Using Get Shared Preferences() - Using Get Preferences() - Persisting Data to Files - Saving to Internal Storage - Saving to External Storage (SD Card) - Choosing the Best Storage Option -Using Static

Resources - Creating and Using Databases - Creating the DB Adapter Helper Class - Using the Database Programmatically -Adding Contacts -Retrieving All the Contacts -Retrieving A Single Contact -Updating A Contact -Deleting A Contact -Upgrading the Database -Bundling the Database With an Application**.**

Text Books

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne "Operating System Concepts", WielyPublishibng Limited 9th edition, 2012.
   Unit: I(a)
2. KohZi Han, SnehaGirishTilak, GopalakrishnanKadambari, Vu Viet QuynhHuong," A Fresh Graduate's Guide to Software Development Tools and Technologies", 2011.
   Unit: I (b)(Chapter 9 – Mobile Platform).
3. Wei -MengLee " Beginning Android Application Development ", Wiley publishing Limited, 2011.
   Units: II, III, IV & V.

Book for Reference

1. Dave smith, Jeff friesen "Android recipes a problem solution approaches" apress, 2011.

Sem. III **Hours/Week: 3**
16PIT3115 **Credits: 2**

Software Lab – V: ASP.NET

1. Form Design using Web Controls
2. Validation Controls
3. Data Access using ADO.NET
4. Master / Detail Data Retrieval
5. LINQ Data source
6. Data Controls
7. Tree View Control
8. State Management
9. Master Pages and Menu Control
10. AJAX
11. Simple MVC Project
12. Simple Web Service

Sem. III **Hours/Week: 3**
16PIT3116 **Credits: 2**

Software Lab-VI: ANDROID

1. Layouts
2. Simple Controls
3. Changing Colours and Backgrounds
4. Manipulating Text
5. Working with Images
6. Menu Creation
7. Implicit Intents
8. Explicit Intents
9. Links
10. Adding Audio & Video
11. Widgets
12. Data Storing &Retrieving

Sem. III **Hours/Week: 4**
16PIT3203 A **Credits: 4**

Core Elective III: 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 and clustering techniques

Unit I **10Hrs**

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 **10Hrs**

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 **10 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 **10 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 **10 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, MichelineKamber 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 MichelineKamber, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers an imprint of Elsevier, 2nd Ed, 2006. Unit: V.

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. III **Hours/Week: 4**

16PIT3203B **Credit: 4**

Core Elective III: DATA COMMUNICATION NETWORKS

Assurance of Learning:

- Understand the Data Communications System and its Components
- Comprehend the workings of the OSI and TCP/IP models
- Familiarize with the basic protocols of computer networks

Unit I **13 HRS**

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 - **PHYSICAL LAYER & MEDIA:** Transmission Modes - Multiplexing - Transmission Media -Guided media - Unguided media - Switching - Circuit switched Networks - Datagram Networks - Virtual Circuit Networks.

Unit II **13 HRS**

DATA LINK LAYER: Error Detection and Correction - Introduction - 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 III **12 HRS**

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 IV **12 HRS**

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.

Unit V **10HRS**

SECURITY: Cryptography- Introduction - Symmetric Key Cryptography - Asymmetric Key Cryptography - **NETWORKING SECURITY:** Security Services - Message Confidentiality - Message Integrity - Message Authentication - Digital Signature - Entity Authentication - Key Management.

Text Books

1. BehrouzA.Forouzan, “Data Communications and Networking”, 4th Ed., Tata McGraw Hill, New York, 2009.

Book for Reference

1. Andrew S. Tanenbaum, “Computer Networks”, 5th Ed., Pearson Education, New Delhi, 2011.

Sem. III **Hours/Week: 4**
16PIT3402 **Credit: 4**

IDC (BS): BUSINESS TRENDS IN IT

Assurance of Learning:

- Able to understand the critical concepts and terminologies in information systems.
- Ability to know the main principles and concepts of the modern e-commerce enterprise management systems.
- Understand the concepts, methodologies, and technologies behind decision support systems, supply chain management and virtual reality concepts

Unit I **10 Hrs**

INTRODUCTION: Business and IT - Information Age - Reality Check - Information System - **INFORMATION TECHNOLOGIES IN THE MODERN ORGANIZATION:** Basic Concepts - Structure and IT Support - IT Support at Different Organization Levels - Managing IT in Organization - IT People and Careers.

Unit II **10 Hrs**

ELECTRONIC COMMERCE: Business - to-Customer Applications - Market Research, Advertising and Customer Service -Business-to-Business and Collaborative Commerce Applications - Innovative Applications of ECommerce - Infrastructure and E-Commerce Support services -Legal and Ethical Issues in E-Commerce.

Unit III **10 Hrs**

COMPUTER-BASED SUPPLY CHAIN MANAGEMENT AND INFORMATION SYSTEMS INTEGRATION: Supply Chains and their Management - Supply Chain Problems and Solution - IT Supply Chain Support and Systems Integration - ERP - E-Commerce and Supply Chain Management - Order Fulfilment in E-Commerce.

Unit IV **10 Hrs**

DATA, KNOWLEDGE AND DECISION SUPPORT: Management and Decision Making - Data Transformation and Management - Decision Support Systems - Enterprise Decision Support - Data and Information Analysis and Mining - Data Visualization Technologies - Knowledge Management and Organizational Knowledge Bases.

Unit V **10 Hrs**

INTELLIGENT SYSTEMS IN BUSINESS: Artificial Intelligence and Intelligent Systems - Expert Systems - Other Intelligent Systems - Intelligent Agents - **VIRTUAL REALITY:** An Emerging Technology - Ethical and Global Issues of Intelligent Systems.

Text Book

1. Turban, Rainer and Potter, "Introduction to Information Technology", 2nd Ed., Wiley India Pvt.Ltd , New Delhi, 2005.

Book for Reference

1. WS Jawadekar, "Management Information System", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1998.

Sem. III
16PIT3117 **Credit: 8**

MINI PROJECT

Sem. III
16PIT3118 **Credit: 2**

COMPREHENSIVE EXAMINATION

Unit I: C++ and Data Structures, Database Systems
Unit II: Software Engineering, ASP.NET
Unit III: JAVA, Data Analytics.

Sem. IV **Hours/Week: 30**
16PIT4119 **Credits: 20**

MAJOR PROJECT DISSERTATION AND VIVA VOCE