

No.	Code	Subject Title	Hrs	CIA	EOSE	Total	Credit
SEMESTER : 1							
1	16P3CS01	DATA ANALYTICS	3	30	70	100	4.0
2	16P3CS02	VISUAL COMPUTING	3	30	70	100	4.0
3	18P3CS03	DATA WAREHOUSING AND MINING	3	30	70	100	4.0
4	18P3CS04	ELECTIVE - I	3	30	70	100	5.0
5	18P3CSPA	PROGRAMMING LAB-I (DATA ANALYTICS)	3	30	70	100	4.0
6	18P3CSPB	PROGRAMMING LAB-II (VISUAL COMPUTING)	3	30	70	100	4.0
SEMESTER : 2							
7	17P3CS05	OPEN SOURCE SCRIPTING TOOLS (PERL & PYTHON)	3	30	70	100	4.0
8	18P3CS06	ANDROID	3	30	70	100	4.0
9	16P3CS07	COMPILER DESIGN	3	30	70	100	4.0
10	18P3CS08	ELECTIVE-II	3	30	70	100	5.0
11	16P3CSPC	PROGRAMMING LAB-III (PERL & PYTHON)	3	30	70	100	4.0
12	18P3CSPD	PROGRAMMING LAB-IV (ANDROID)	3	30	70	100	4.0
SEMESTER : 3							
13	18P3CS09	JAVA AND JSP	3	30	70	100	4.0
14	18P3CS10	LINUX, SHELL & NETWORK PROGRAMMING	3	30	70	100	4.0
15	16P3CS11	ELECTIVE-III	3	30	70	100	5.0
16	18P3CSPE	PROGRAMMING LAB-V (JAVA AND JSP)	3	30	70	100	4.0
17	18P3CSPF	PROGRAMMING LAB-VI (LINUX, SHELL & NETWORK PROGRAMMING)	3	30	70	100	4.0
18		SUPPORTIVE PAPER:	3	30	70	100	4.0
SEMESTER : 4							
19	08P3CSV1	PROJECT REPORT & VIVA-VOCE		30	70	100	15.0
						TOTAL CREDITS: 90	

List of Elective Papers:

1. ARTIFICIAL NEURAL NETWORKS
2. CLOUD COMPUTING
3. NETWORK SECURITY & CRYPTOGRAPHY
4. DIGITAL IMAGE PROCESSING
5. SOFTWARE QUALITY MANAGEMENT
6. ADVANCED NETWORKING (TCP/IP)
7. GENETIC ALGORITHMS
8. GRID COMPUTING
9. DISTRIBUTED COMPUTING
10. DATA COMPRESSION
11. CLIENT SERVER COMPUTING
12. EMBEDDED SYSTEM
13. INTERNET OF THINGS
14. ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

M.Sc. (CS/IT)
SEMESTER – I
DATA ANALYTICS

Instruction Hrs : 75 hrs

Objectives :

1. To know about the technologies for big data analytics.
2. To know about the basis of Hadoop, mapreduce and also how to use on Big Data.
3. To learn about the basis of R.

UNIT – I :

15Hrs

What is Big Data? - The Arrival of analytics, Where is the value?, More to Big Data than meets the Eye, Dealing with the nuances of Big Data, An Open Source brings Forth Tools, Caution : Obstacles Ahead - **Why Big Data Matters** – Big Data Reaches Deep, Obstacles Remain, Data continue to Evolve, Data and Data Analysis are getting more complex, The Future is now – **Big Data and the Business Case** – Realizing value, The case for Big Data, The Rise of Big Data Option, Beyond Hadoop, With Choice Come Decisions.

UNIT – II :

15Hrs

Building The Big data Team – The Data Scientist, The team challenge, Different teams, Different Goals, Don't Forget the Data, Challenges Remain, Team Versus Culture, Gauging Success – **Big Data Sources** – Hunting For Data, Setting the Goal, Big Data Sources Growing, Diving Deeper into Big Data Sources, A wealth of Public Information, Getting Started with big data Acquisition, Ongoing Growth, No End in Sight – **The Nuts and Bolts of big data** – The Storage Dilemma, Building a Platform, Bringing Structure to Unstructured Data, Processing Power, Choosing among In-House, Outsourced, or Hybrid Approches.

UNIT – III :

15Hrs

The Evaluation of Big Data – Big Data: The Modern Era, Today, Tomorrow and the NextDay, Changing Algorithms, **Best Practices For Big Data Analytics** – Start Small With Big Data, Thinking Big, Avoiding Worst Practices, Baby Steps, The Value Of Anomalies, Expediency Versus Accuracy, In-Memory Processing – **Bringing it All Together** – The Path to Big Data, The Realities of Thinking big data, Hands-On big data, The Big Data Pipeline in Depth, Big Data Visualization, The Data Privacy.

UNIT – IV :

15Hrs

BECOMING FAMILIER WITH R: Some Simple math – Use R like a Calculator, Storing the Result of Calculation – **Reading and Getting Data Into R** – Using the Combine Command for making Data, Using The Scan Command for Making Data, Reading Bigger Data Files – **Viewing Named Objects** – Viewing previously Loaded Named-objects, Removing Objects From R - **Types of Data Items – The Structure Of Data Items – Examining Data Structure: Working With History Commands** – Using History Files, Editing History Files – **Saving your Work in R** – Saving The Workspace on Exit, Saving Data Files to Disk, Reading Data files to Disk, Saving Data to Disk as Text Files.

UNIT – V :

15Hrs

INTRODUCING HADOOP – Why “Hadoop in Action”?, What is Hadoop?, Understanding Distributed Systems and Hadoop, Comparing SQL Databases and Hadoop, Understanding Map Reduce, Counting Words With Hadoop-Running your First Program, History of hadoop – **Starting Hadoop** - The Building Blocks of Hadoop, Setting Up SSH for a Hadoop cluster, Running Hadoop, WebBased Cluster UI – **Component of Hadoop** - Working with Files in HDFS, Anatomy of a Map Reduce Program, Reading and Writing.

TEXT BOOKS :

1. Frank J. Ohlhorst, Big Data Analytics – Turning Big Data Into BigMoney, SAS Insitute Inc., Cary, North Carolina, USA, 2012.(Unit - I,II & III)

2. Dr. Mark Gardener, Beginning R The Statistical Programming Language, Wiley India Pvt. Ltd., First Edition, 2013. (Unit - IV)

3. Chuck Lam, Hadoop in Action, Dreamtech Press, First Edition, 2011. (Unit - V)

REFERENCE BOOKS :

1. Vignesh Prajapati, Big Data Analytics with R and Hadoop. First Edition, 2013

M.Sc. (CS/IT)
SEMESTER I
VISUAL COMPUTING

Instructional Hrs:75

Objectives: 1. Learning the fundamentals of web page design using ASP and C#
2. To design web pages with back end connectivity and custom controls.

UNIT -I **15Hrs**

THE .NET FRAME WORK: Languages,CLR, Namespace, Assemblies, **ASP.NET:** File Types, Stages in ASP.NET request, Code behind, global.asx files, Web.config files, **C#.NET Programming:** Variables, Data Types, Scope, Conditional Structure, Loop Structure, Functions and Subroutines.

UNIT -II **15 Hrs**

ASP.NET FUNDAMENTALS: Page Directives, Page Events, Cross Page Posting, **ASP.NET SERVER CONTROLS:** Types of Server controls, Building, Working and Applying styles to server controls, **WEB SERVER CONTROLS:** TextBox, Button, HyperLink, ListBox, Radio Button, Calender, Adrotator - Events and methods.

UNIT -III **15 Hrs**

VALIDATION SERVER CONTROLS: Client side Validation, Validation controls, Regular Expressions, Programming with Validation, **STATE MANAGEMENT:** Session states, Understanding session object in ASP.NET, Query strings, Cookies, Hidden Field, ViewState, Programming with state Management.

UNIT -IV **15 Hrs**

DATA MANAGEMENT WITH ADO.NET: Common ADO.NET operations, ADO.NET Namespace and Classes, Objects - Connection, Command, Data Reader, DataSet, Data Tables using parameters, Programming with ADO.NET.

UNIT -V **15 Hrs**

DATA BINDING: Data Source controls – Sql Data source control, **DATA SOURCE CONTROL CATCHING:** Storing Connection, **USING BOUND LIST CONTROLS WITH DATA SOURCE CONTROL: Grid View-** Templates, Paging, Using Template field columns, Editing, Deleting, **List view binding, Form view binding,** Programs for binding.

Text Book:

- 1.THE COMPLETE REFERENCE ASP.NET, MATHEW MAC DONALD, Tata McGraw Hill Publishing, Edition, 2002 (UNIT-I).
- 2.PROFESSIONAL ASP.NET 4 IN C# AND VB, BILL EVJEN, SCOTT HANSELMAN & DEVIN RADER,Wiley Publishing, Reprint- 2011 (UNIT II-V).

M.Sc. (CS)
SEMESTER - I
DATA WAREHOUSING AND MINING

Instructional Hrs: 75

- Objectives: 1. To introduce the basic concepts & techniques.
2. Recognize the key areas & issues in data mining.
3. To introduce the text mining concepts.

UNIT-I **15 Hrs**

Data warehousing components –Introduction: Overall Architecture - Data warehouse database-Sourcing, Acquisition, Cleanup and Transformation tools – Metadata.

Access Tools: Accessing and Visualizing Information - Tool Taxonomy - Query and Reporting tools – Applications - OLAP tools - Data Mining tools.

Data Marts-Data Warehouse Administration and Management-Impact of the Web - Approaches to using the Web.

UNIT-II **12 Hrs**

Data Mining – The Mining Analogy – Measuring Data Mining Effectiveness – (Accuracy Speed – Cost) Embedding Data Mining into a Business Process – Data Mining Methodology.

UNIT-III **17 Hrs**

Classical Techniques – Statistics, Neighbourhoods and Clustering. Next Generation Techniques – Trees, Network rules – When to use Data Mining.

UNIT-IV **16 Hrs**

The Business Value – Customer Profitability, Customer Acquisition, Cross Selling, Customer Retention – Customer Segmentation.

UNIT-V **15 Hrs**

Business Intelligence and Information Mining – Text Mining and Knowledge Management – Text Mining Technologies – Text Mining Products – Conclusion.

Text Book:

Alex Berson, Stephen Smith & Kurt Thearling, “Building Data Mining Applications for CRM”, Tata McGraw Hill Edition, 2000.

M.Sc. (CS/IT) - SEMESTER II
OPEN SOURCE SCRIPTING TOOLS (PERL & PYTHON)

Instructional Hrs: 60

- Objectives:** 1. To Learn the fundamentals of Python Programming
2. To know the basics of Perl programming

UNIT - I

12 Hrs

INTRODUCTION: Regular Expression, Symbols and Characters, Matching, Patterns and characters, Denoting Ranges, Closure operators, Special Characters and grouping, **REGEXES AND PYTHON:** Core functions and Methods, Compiling Regexes, Matching strings and characters, sub(), subn(), split() functions.

UNIT – II

12 Hrs

MULTITHREADED PROGRAMMING: Introduction to Threads and Processes, **THREADS AND PYTHON:** Locking and exiting Threads, Accessing Threads, Thread module, **THREADING MODULE:** Thread Class, Thread instance, Passing in Function and Callable class Instance, Subclass Thread and Instance, **COMPARING SINGLE vs MULTITHREADED EXECUTION:** Multithreading examples, Porting to Python, **SEMAPHORE EXAMPLES**

UNIT – III

12 Hrs

DATABASE PROGRAMMING: Introduction, Basic Database operations, **PYTHON DB-API:** Module Attributes, connection objects, cursor objects, Type objects, **DATABASE AND PYTHON:** Adaptors, Insertion, Deletion, and Updation using Adaptor objects.

UNIT – IV

12 Hrs

PERL: Introduction, Perl Scripts - The Script, Getting a Handle on Printing- The Print, Printf Function, **NAME:** Perl variables, Scalars, Arrays, Hashes, **ARRAY Functions, HASH Functions.**

UNIT V

12 Hrs

OPERATORS: Types, **CONTROL STRUCTURES:** Decision making, Repetition with loops, **REGULAR EXPRESSIONS:** Modifiers, operators, **GETTING A HANDLE ON FILES:** User defined handles, Passing Arguments, **SUBROUTINES:** Calling function, Passing Arguments, Call by reference.

TEXT BOOKS:

1. Wesley J.Chun, CORE PYTHON APPLICATIONS PROGRAMMING, Dorling Kindersley Publishers, Pearson Education, Third Edition, 2013 (UNIT - I to III)
2. Ellie Quigley, PERL, Fourth Edition, Dorling Kindersley Publishers, Pearson Education, Fourth Edition, 2009 (UNIT - IV, V)

URL REFERENCE

<http://www.spoken-tutorial.org>

M.Sc. (CS/IT)
SEMESTER-II
ANDROID

Instruction Hrs: 75

Objectives:

1. This subject introduces mobile application development for android platform.
2. Students will learn skills for creating and deploying android applications.

UNIT I **15 Hrs**

OVERVIEW OF ANDROID: Android APIs – Android Architecture – Application Framework – Features – Application Components – Manifest File – Developing and Executing the First Android Application. ACTIVITIES: Working with Activities.

UNIT II **15 Hrs**

Intent Objects – Intent Resolution – Intent Filters – Resolving Intent Filter Collision – Linking the Activities Using Intent – Obtaining Results – Passing Data Using an Intent Object – Fragments – Working With View Groups.

UNIT III **15 Hrs**

Working with Views – Binding Data With the AdapterView Class – Designing the AutoTextView – Handling UI Events – Specialized Fragments – Creating Menus.

UNIT IV **15Hrs**

Working with Image Views – Context Menu for Image View – Analogclock and Digitalclock Views – Embedding Web Browser in an Activity – Notifying the User - Working With Graphics – Drawable Object – ShapeDrawable Object – NinePatchDrawable Graphics – Working With Animations.

UNIT V **15 Hrs**

STORING THE DATA PERSISTENTLY: Data Storage Options – Internal Storage – External Storage – SQLite Database – Working with Content Providers - Creating and Consuming User-Defined Content Provider.

Text Book:

1. Pradeep Kothari, “ANDROID APPLICATION DEVELOPMENT”, Dreamtech Press, 2016. (UNIT I to V).

Reference Book:

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd., 2010.
2. James C.Sheusi, “Android Application Development for Java Programmers”, Course Technology, Cengage Learning India Pvt Ltd., 2013.

M.Sc. (CS)
SEMESTER - II
COMPILER DESIGN

Instructional Hours: 75

Objectives: 1. Introducing students to the concepts and principles of compiler design.

2. Providing students with basic understanding of grammars and language definition.

3. Introducing students to the various phases of designing a compiler.

UNIT I: **15 Hrs**

Introduction - The Structure of a Compiler - Compiler writing tools - The Lexical and Syntactic Structure of a language - The role of the Lexical Analyzer - Design of Lexical Analyzers - Regular Expression - Finite automata.

UNIT II: **15 Hrs**

Context - Free Grammars - Derivations and parse tree - Capabilities of Context - free Grammars - Parsers - Shift - reduce parsing - Operators - Precedence Parsing - Top - down parsing - predictive parsers.

UNIT III: **15 Hrs**

LR parsers - The Canonical collection of LR (0) items - Constructing SLR parsing Tables – Symbol Tables - Data Structure for Symbol Tables.

UNIT IV: **15 Hrs**

Syntax - directed translation Schemes - Implementation of Syntax - directed translators - Intermediate Code - postfix notation – Parse tree & Syntax trees – Three address code – Translation of assignment statements – Boolean expression.

UNIT V: **15 Hrs**

The Principal source of optimization - Loop optimization - DAG representation of basic blocks – problems in code generation – A sample code generator.

Text Book:

1. Alfred V. Aho & Jeffrey D. Ullman, “Principles of Compiler Design”, Narosa Publishing House (Units I to V).

Reference Books:

1. Alfred V. Aho, Monica, S. Lam, Ravi Sethi and Jeffrey D. Ullman, “Compilers: Principles, Techniques and Tools”, 2nd Edition.
2. Kenneth C. Louden, “Compiler Construction: Principles and Practice “.

M.Sc. (CS & IT)
SEMESTER III
JAVA and JSP

Instructional Hrs: 75 hrs

Objectives:

1. To make the students to understand the strength of Java language from other conventional language.
2. To teach the concepts of Web Programming using Java Server Pages.

UNIT – I **15 hrs**
Fundamental Programming Structure in Java – Class – Objects – Inheritance-Overloading - Constructors and Functions.

UNIT – II **15 hrs**
Interfaces – Packages - Exception Handling – Applets -Multithreading.

UNIT – III **15 hrs**
EVENT HANDLING: Event Classes, Event Listener Interfaces, Handling Mouse Events, Handling Keyboard Events, Adapter Classes, **DEVELOPING SERVLETS:** The Architecture of Java Servlet, The Basics Servlet Architecture, Generic Servlet and Httpservlet, The Life Cycle of a Servlet, Building a Basic Servlet.

UNIT – IV **15 hrs**
OVERVIEW OF JDBC: Basic JDBC operations, Essential Classes, Jdbc Drivers, **STATEMENT INTERFACES:** Connection, Statement Objects, ExecuteQuery, Execute Update methods, Prepared Statements, Callable Statements, Resultsets, Program with Resultset Objects. **JSP OVERVIEW:** How JSP works, JSP syntax and Semantics, JSP Development Model, Components of JSP, Developing JSP pages, JSP Actions, JSP Expression, Scriplet, Implicit Object Declaration.

UNIT – V **15 hrs**
REQUEST DISPATCHING: Anatomy of Request Processing, JSP Include Actions, Passing Parameters, Forwarding Requests, **SESSION AND THREAD MANAGEMENT:** Hidden Fields, URL Rewriting, Cookies, Manipulating Sessions, Programming with Session Management.

Text Books:

1. JAVA2, THE COMPLETE REFERENCE, HERBERT SCHILDT, Tata McGraw Hill Publishing, Edition 2002. (UNITS I-III)
2. THE COMPLETE REFERENCE-JSP 2.0, PHIL HANNA, Tata McGraw Hill Publishing, Edition 2003. (Units IV, V)

Reference Books:

1. Cay S. Horstmann & Gray Cornell, “Core Java 2”, Pearson Education.

M.Sc. (CS/IT) – III SEMESTER
LINUX, SHELL AND NETWORK PROGRAMMING

Instructional Hrs: 75

- Objectives:
1. To give the knowledge about multiuser operating system.
 2. To provide knowledge about script and network programming.
 3. To provide awareness about open source OS.

UNIT - I

14 Hrs

Introduction to Linux Operating System: The Linux Operating System. Managing Files and Directories: The Linux File System - Directory Commands in Linux - File Commands in Linux. Creating Files Using the vi Editor: Text Editors - The vi editor - The emacs editor - The PICO editor - Managing Documents: Locating Files in Linux - Standatrd Files.

UNIT - II

15 Hrs

Redirection - Filters - Pipes. Automating Tasks Using Shell Scripts: Introduction - Variables - Local and Shell Variables - Command Substitution. Using Conditional Execution in Shell Scripts: Conditional Execution - The case..esac Construct. Managing Repetitive Tasks Using Shell Scripts; Using Iteration in Shell Scripts - Parameter Handling in Shell scripts - The shift command.

UNIT - III

15 Hrs

System Programming: Process Model: Define Process, Attributes, Information, Primitives, Sessions and Process groups, Creating Clones. Simple File Handling: File Mode and Operations, Manipulating Directory Entries and File Descriptors, Creating Unnamed Pipes. Signal Processing: Signal Concepts, Available signals. Job Control: Basics. Directory Operations: Current Working Directory, Changing root Directory, Creating and Removing Directory, File Name Globbing.

UNIT - IV

16 Hrs

Linux Network Services: TCP/IP Networking - Network File System and Information System - Connecting to Microsoft Networks.

UNIT - V

15 Hrs

Networking with Sockets: Protocol Support - Utility functions - Basic Socket Operations - UNIX Domain Socket - Networking Machines with TCP/IP - Socket Errors. Time: Telling time and dates, Using Timers.

TEXT BOOKS:

- 1.NIIT, "Operating System LINUX", Prentice Hall of India Private Limited - 1st Edition, 2003. (UNIT I & II)
- 2.Michael K. Johnson & Erik W.Troan, "Linux Application Development", Pearson Education, 2nd Edition, 2009 .(UNIT III & V)
- 3.Terry Collings and KUrt Wall, "Red,hat Linux Networking & System Administration", Wiley Publication, Dreamtech India Pvt. Ltd, First Edition, 2005. (UNIT IV).

REFERENCE BOOKS:

- Neil Mathew & Richard Stones, "Beginning Linux Programming", Wiley India Pvt. Ltd., 4th Edition, 2007.
- Bill Ball, "Using Linux", PHI Ltd Publication, 5th Edition, - 2000.

URL REFERENCE

<http://www.spoken-tutorial.org/>

M.Sc. (CS/IT) - ELECTIVE ARTIFICIAL NEURAL NETWORKS

Instructional Hrs: 75

- Objectives:
1. To understand the biological neural networks.
 2. To know about the various neural networks methods.
 3. To describe the architecture of neural networks.

UNIT-I

15 Hrs

Basics of artificial neural networks – characterization of biological neural networks – artificial intelligence Vs neural networks – principles and promises – Learning rules.

UNIT-II

15 Hrs

Functional units of ANN – Activation functions – feed forward ANN (pattern association classification) – single layer network limitation – need for multi layer network limitation – Need for Multi – Layer Network Capabilities – Back Propagation Algorithm – limitations.

UNIT-III

15 Hrs

Feed back ANN – Hop field network – Architecture Dynamics – Definition of Energy Function – Applications of Hop Field Network – Optimization using Hop Field Network.

UNIT-IV

15 Hrs

Feed back and feed forward networks pattern clustering & feature mapping competitive learning algorithms – right initialization issues solving convex combination method noise addition method – neighborhood method – feature mapping – self organizing map applications

UNIT-V

15 Hrs

Neural architectures for complex pattern recognition tasks-counter propagation network (pattern mapping) – applications – image compression – function approximation look up table – bi-directional associative memory – variations on BAM – applications.

Text Books:

1. Philip D. Wassermann, “Neural computing theory and practices”, Vanstrand Reinhold, 1989.
2. A. Free Nan and David M. Skapura, “Neural Networks: Algorithms, Applications and programming Techniques”, Addison Wesley publishing company, 1990.

Reference Book:

M.Sc. – CS/IT
ELECTIVE - CLOUD COMPUTING

Instruction Hrs : 60 Hrs

Objectives:

1. To know about implementation service with a quality control from project imitation to production.
2. To know about a commitment of quality of work delivered to the public.
3. To know about the Specialized cloud services

UNIT I :

12Hrs

Introduction - ERA OF CLOUD COMPUTING:How We Got to the Cloud-Server Virtualization Versus Cloud Computing-Components of Cloud Computing- Cloud Types - Private, Public and Hybrid - Impact of Cloud Computing on Businesses. INTRODUCING VIRTUALIZATION:Introducing Virtualization and its Benefits-Implementation Levels of Virtualization- Virtualization at the OS Level- Virtualization Structure- Virtualization Mechanisms-Open Source Virtualization Technology Xen Virtualization Architecture-Binary Translation with Full Virtualization - Paravirtualization with Compiler Support- Virtualization of CPU, Memory and I/O Devices-Hardware Support for Virtualization in Intex x86 Processor-Virtualization in Multicore Processors.

UNIT II :

12Hrs

CLOUD COMPUTING SERVICES:Infrastructure as a Service(IaaS)-Platform as a Service(PaaS)-Leveraging PaaS for Productivity-Guidelines for Selection a PaaS Provider-Concerns with PaaS-Language and PaaS-Software as a Service(SaaS)-Database as a Service(DBaaS)-Specialized Cloud Service.CLOUD COMPUTING AND BUSINESS VALUE:Key Drivers for Cloud Computing-Cloud Computing and Outsourcing-Types of Scalability-Use of Load Balancers to Enhance Scalability-Variable Operating Costs Using Cloud Computing-Time-to-market Benefits of Cloud Computing-Distribution Over the Internet-Levels of Business Value from Cloud Computing.

UNIT III :

12Hrs

CLOUD TYPES AND MODELS:Private Cloud-Community Cloud-Public Cloud-Hybrid Cloud.CLOUD DEPLOYMENT TECHNIQUES:Potential Network Problems and their Mitigation-Cloud Network Topologies-Automation for Cloud Deployment-Self-Service Features in a Cloud Deployment-Federated Cloud Deployments-Cloud Performance- Cloud Performance Monitoring and Tuning-Impact of Memory on Cloud Performance-Improving Cloud Database Performance-Cloud Services Brokerage(CSB).RECENT TRENDS IN CLOUD COMPUTING AND STANDARDS:Conflict of Interest for Public Cloud and IT Product Providers-Cloud Compliance-BYOD and Encryption Exposures-Cloud Standards-Approaches to Implement Interoperability between Clouds-Recent Changes in Professional Certification-Cloud Ratings-Cloud Computing Trends that are Accelerating Adoption.

UNIT IV :

12Hrs

HOST SECURITY IN THE CLOUD:Security for the Virtualization Product-Host Security for SaaS--Host Security for PaaS--Host Security for IaaS.DATA SECURITY IN THE

CLOUD:Challenges with Cloud Data-Challenges with Data Security-Data Confidentiality and Encryption-Data Availability-Data Integrity-Cloud Data Management Interface-Cloud Storage Gateways(CSGs)-Cloud Firewall-Virtual Firewall.

UNIT V :

12Hrs

APPLICATION SECURITY IN THE CLOUD:Cloud Application Software Development Lifecycle(SDLC)-Cloud Service Reports by Providers- Application Security in an IaaS Environment- Application Security in a PaaS Environment- Application Security in a SaaS Environment.MOBILE CLOUD COMPUTING:Definitions of Mobile Cloud Computing-Architecture of Mobile Cloud Computing-Benefits of Mobile Cloud Computing-Mobile Cloud Computing Challenges.

Text Book :

Kailash Jayaswal, Jagannath Kallakurchi, Donald J.Houde, Dr. Deven Shah, Cloud Computing-Black Book, Publications : Dreamtech press, Editon : 2014 ISBN: 978-93-5119-418-7

Reference Book :

1. M.N.Rao, Cloud Computing, PHI Learning Private India Eastern Economy Edition : 2015 ISBN 978-81-203-5073-1

2. A.Srinivasan, J-Suresh Cloud Computing, Pearson Education in SouthAsia, Dorling Kindersley(India) Pvt.Ltd, First Edition ISBN 978-81-317-7651-3.

M.Sc – CS/IT
ELECTIVE
NETWORK SECURITY & CRYPTOGRAPHY

Instruction Hrs : 60

Objectives:

1. Subject to provides an essential study of computer security issues and methods in networking systems.
2. Students to Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write a security policy.
3. It will be illustrated how network security and management mechanisms employ cryptography to prevent, detect, and mitigate security threats against the network.

UNIT I:

The OSI Security Architecture – Security attacks – Services – Security Models – Classical encryption Techniques – Symmetric Cipher model – Substitution techniques – Transposition techniques – Block cipher Principles – The data encryption Standard.

12 Hrs

UNIT II:

Finite fields – Groups – Rings – Fields – Modular Arithmetic – The euclidean Algorithm – Finite Fields of the form GF – Polynomial Arithmetic – Advanced encryption Standard – Evaluation criteria for AES – The AES Cipher - Symmetric Ciphers – Multiple encryption and Triple DES – Block cipher modes of Operation.

12 Hrs

UNIT III:

Symmetric encryption – Placement of encryption function – Traffic confidentiality – Key distribution – Random number Generation – Number Theory – Prime number – Testing for Primality – Chinese theorem – Discrete algorithm.

12 Hrs

UNIT IV:

Public Key Cryptography and RSA – Principles of Public Key Cryptography – The RSA algorithm – Key management – diffie hellman Key exchange – Elliptic curve arithmetic.

12 Hrs

UNIT V:

Message authentication and hash Function - Authentication Requirement and Functions - Hash Function - Message authentication Codes – Block chaining techniques – Security of Hash Functions and MACS – Secure hash algorithm – Whirl Pool – Structure – Block Cipher W – HMAC - Algorithm CMAC – Digital Signatures and Authentication Protocol - Digital Signatures - Protocol – Signature Standards.

Text book:

William Stallings, " Cryptography and Network Security" - Fourth Edition 2006, Pearson Education.

M.Sc. (CS/IT) - ELECTIVE

DIGITAL IMAGE PROCESSING

Instructional Hours: 75

Objectives: 1.General understanding of the fundamentals of digital image processing.
2. To know the categories of image processing applications.
3. To understand the filters & their uses.

Unit – I 15 Hrs

Introduction: Digital Image Fundamentals -Elements of visual perception-Light and the Electromagnetic Spectrum-Image Sensing and Acquisition-Basic Concept in Sampling and Quantization-Representing Digital Images-Spatial and Gray-Level Resolution-Zooming and Shrinking Digital Images-Some Basic Relationships Between Pixels.

Unit – II 15 Hrs

Image Enhancement in the Spatial Domain-Background-Some Basic Gray Level Transformations-Histogram Processing-Smoothing Spatial Filters.

Unit – III 15 Hrs

Image Enhancement in the Frequency Domain-Background-Introduction to the Fourier Transform and the Frequency Domain-Smoothing Frequency-Domain Filters-Sharpening Frequency Domain Filters.

Unit – IV 15 Hrs

Morphological Image Processing-Preliminaries-Dilation and Erosion-Opening and Closing-The Hit-or-Miss Transformation.

Unit – V 15 Hrs

Image Segmentation-Detection of Discontinuities-Foundation-The Role of Illumination-Basic Global Thresholding-Optimal Global and Adaptive Thresholding-Region-Based Segmentation.

TEXT BOOK:

1.Rafael C.Gonzalez & Richard E.Woods,"Digital Image Processing", Pearson Education, Second Edition, 2002.

**M.Sc. (CS/IT) - ELECTIVE
SOFTWARE QUALITY MANAGEMENT**

Instructional Hrs: 75

Objectives: 1.To improve the knowledge about software quality management.

2. To describe the phases of software management & its techniques.

3. To identify the quality metrics.

UNIT-I

15 Hrs

Software Reliability — Introduction - The Concept of Software Reliability — The Concept of Software Repair and Availability - software Errors and Faults — Estimating the Number of Bugs in a Computer Program

UNIT-II

15 Hrs

Management Techniques — Introduction — Requirements, Specifications and Initial Design — Performance, Reliability and Quality Measures — Cost Estimation — Managing the Development Process — Software Maintenance

UNIT-III

15 Hrs

Program Testing — Introduction — Statistics on the Testing Process - Test Philosophy and Type — A Comparison of Test Methods — Debugging - Graph Methods of Testing — Choice of Test Data — Exhaustive Testing — Simulator, Scenario and Operational Tests — Classification of Test.

UNIT-IV

15 Hrs

Management of Software Engineering — Management Functions — Project Planning — Project Control — Organization — Risk Management SEI Process Maturity Model — Software Reengineering.

UNIT-V

15 Hrs

Quality Management - Process Quality Assurance — Quality Reviews — Software Standards — Software Inspections — Documentation Standards — Software Metrics — Product Quality Metrics.

TEXT BOOKS

1. Martin L. Shooman, "SOFTWARE ENGINEERING" (Design Reliability and Management), McGraw Hill International Editors ,1987 (UNITS 1, II & III)

2 Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, "FUNDAMENTALS SOFTWARE ENGINEERING", Prentice Hall of India Pvt.Ltd., 1999 (UNIT IV)

3 Lan Sommerville, "SOFTWARE ENGINEERING", Addison Wesley Publishing Company, 1998 (UNIT V)

**M.Sc. (CS/IT) - ELECTIVE
ADVANCED NETWORKING (TCP/IP)**

Instructional Hrs: 75

- Objectives:
1. To encourage a performance perspective towards analysis of computer & communications.
 2. To know the knowledge about different protocols.
 3. To identify network architecture & applications.

UNIT-I

15 Hrs

Introduction Inter Networking Concept- Application Level — Network Level Interconnection — Internet Architecture — Inter Connection IP Routers, Internet Addresses Mapping — Internet Address to Physical Addresses (ARP) - Determining an Internet Address at Start up (RANP)

UNIT-II

15 Hrs

Internet Protocol :Connectionless Datagram Delivery, Routing IP datagrams, Error & Control Messages (ICMP) Subnet & Super Net Addresses Extensions User Datagram Protocol (UDP).

UNIT-III

15 Hrs

Routing Cores — Peers — Algorithms — Autonomous Systems - Exterior Gateway Protocols, Multicast Addresses Internet Group Management Protocol (IGMP) & implementation

UNIT-IV

15 Hrs

TCP / IP Over ATM Networks: ATM hardware, ATM Cell Transport, Adaption Layer, IP Address Binding in an ATM Network — Logical IP Subnet Concept — ATMARP Packet Format. Socket Interface Unix I/O — Paradigm & Network I/O — Creating a Socket — Addresses — Obtaining Information about Hosts, Networks, Protocols, Network Services Bootstrap & Auto Configuration — Domain Name System.

UNIT-V

15 Hrs

Applications: Remote Login (Telnet, Rlogin) - File Transfer & Access (FTP, TFTP, NFS) — Electronic Mail (SMTP, MIME) — Internet Management (SNMP, SNMP V2) — Internet Security & Firewall Design.

Text Book:

Douglas E Comer, "Internet Working with TCP/IP", PHI, 1998.

M.Sc. (CS/IT) - ELECTIVE**GENETIC ALGORITHMS**

Instructional Hrs: 75

Objectives: 1. To introduce the basics of genetic algorithm.

2. To know the knowledge about various applications of genetic algorithm.

3. To provide the concept of genetic based learning.

UNIT-I**15 Hrs**

Introduction Genetic Algorithms (GA) — Traditional Optimization and Search Methods — GA vs Traditional methods - Simple GA - Schemata — Learning the lingo - GA mathematical foundation: Schema Processing — Two armed and K-armed Bandit problem — Building block Hypothesis — Minimal deceptive problem. Data Structure — GA operations — Mapping objectives functions to fitness values. Fitness scaling — Coding — Multi parameter representation discretization — Constraints.

UNIT-II**15 Hrs**

Applications of GA: the rise of GA — Bagley and Adaptive Game playing program, Tosenberg and Biological cell simulation — Pattern recognition — Metalevel Gas — Hollstien and function optimization techniques, programming. Function optimization — improvements in basic techniques — Current applications — Pipeline systems — Structural optimization — Medical registration

UNIT-III**15 Hrs**

Dominance — Diploidy and Abeyance and Reordering Operators — other Micro Operators : Segregation, Translocation, Multiple Chromosome Structure - Duplication and deletion Sexual determination and differentiation - Niche and Specification. Multi Objective Optimization - Knowledge Based Techniques — GA and Parallel Processors

UNIT-IV**15 Hrs**

Genetic Based Machine: Classifier system — Rule and Message system - the Bucket Brigade GA -Implementation issues.

UNIT-V**15 Hrs**

Genetic Based Learning (GBL) — Development of Cs1-Smith's Poker Player — Lsl-Performance — GBL efforts — Animate classifier system, Pipeline operation classifier system.

TEXT BOOK:

D.E. GOLDBERG, "Genetic Algorithms, Optimization and Machine Learning", Addison Wesley 2000.

M.Sc – CS/IT

ELECTIVE - GRID COMPUTING

Instruction Hrs : 60 Hrs

Objectives :

1. To know about the distinguished from conventional high performance computing systems.
2. To know about the more heterogeneous and geographically dispersed.
3. To know about the overview of computing networks.

UNIT I :

12Hrs

INTRODUCTION:Basic Concepts-Entering into Grid-Definitions-Grid Projects-Grid Layered Architecture-Distributed Computing-Computational Grids-Data Grids.DYNAMIC VIRTUAL ORGANIZATION:Introduction-Functionality-Implementation-Single Sign-on Authorization in Virtual Organization.DISTRIBUTED SHARED MEMORY IN GRID ENVIRONMENT:Introduction-Problem Description-Analysis using Central Server Algorithm-Implementation-Future Work.CONCEPTUAL EVOLUTION AND PATHWAY TO GRID COMPUTING:Introduction and Evolution-Concept of Networking in Grid-Grid Pathway-Grid Business Values.

UNIT II :

12Hrs

SERVICE ORIENTED ARCHITECTURE(SOA):Service Oriented Architecture-SOA Reference Architecture-Design and Development-Execution Paradigm.WEB SERVICES IN GRID:Web Services Technologies-Technologies for Web Services.XML,RELATED TECHNOLOGIES AND THEIR ROLE IN GRID>About XML-SOAP(Simple Object-Access Protocol)-WSDL(Web Service Description Language)-Global XML Architecture.

UNIT III :

12Hrs

OPEN GRID SERVICE ARCHITECTURE(OGSA):Introduction-OGSA Architecture-Grid Service Description-OGSA Core Services.OGSA BASIC SERVICES:Introduction-OGSA Basic Services-OPEN GRID SERVICES INFRASTRUCTURE(OGSI):Introduction-OGSI Authorization and Attributes-OGSI Components-WSRF(Web Service Resource Framework)-WSRF vs OGSI-OGSI Port Type Model-Service Data Concepts-Naming in Grid Service Instances.

UNIT IV :

12Hrs

GRID COMPUTING SECURITY:Introduction-Security Fundamentals-Authentication Schemes-Standard Protocols-Grid Taxonomy-Grid Security Infrastructure(GSI)-Security-Web Services Security-Different Emerging Security Technologies in Grid-Standard Diagrams.GLOBUS TOOLKIT:Data Management-Resource Management-Information Services-Security-

UNIT V :

12Hrs

GT4 IN LINUX AND RUNNING SAMPLE WEB SERVICES:Installing Globus Toolkit4.0.7-Details Steps for Installation along String from Operating System Set-up-Installation of Prerequisites Software-Installation of Local Resource Management System(LRMS)-Installing GLOBUS-Configuring GLOBUS-Build a Grid Application-Building a Grid Archive-Application Interface(Hello World.java)-Ant Properties.CLUSTER:Introduction-History of Clusters-Cluster Organizations-Implementation of Cluster in Linux Environment.GRID TECHNOLOGIES,SYSTEMS AND SCHEDULING:Introduction-Oracle Grid-Sun Grid-IBM Grid-Grid Scheduling-GridSim Tool-Data Grid-WWG-Case Study:Mobile Grid Computing-Cloud Computing-GARUDA.

Text Book:

P Venkata Krishna, M Rajasekhara Babu,V Saritha, Principles of Grid Computing Concepts and Applications,, Ane Books Pvt, Edition 2010, Ltd. ISBN 978-93-8061-815-9. (UNIT I to V)

Reference Book:

1. Chithra, Grid Computing, SAMS Publishers, First Edition : 2010 ISBN 978-93-80485-02-7.
2. C.S.R.Prabhu, Grid and Cluster Computing, PHI Prentice Hall of India Pvt. Ltd., Edition 2008, ISBN 978-81-203-3428-1.

**M.Sc. (CS/IT) - ELECTIVE
DISTRIBUTED COMPUTING**

Instructional Hrs: 60

- Objectives:
1. To introduce the concept of Distributed computing.
 2. Fundamental concept of communication process in Distributed computing Environment.
 3. Various inter connection structures are discussed.

UNIT-I **10 Hrs**

Distributed Systems: Fully Distributed Processing Systems — Networks and Inter Connection Structures — Designing a Distributed Processing System.

UNIT-II **12 Hrs**

Distributed Systems: Pros and Cons of Distributed Processing - Distributed Databases-The Challenge of Distributed Data — Loading Factors — Managing the Distributed Resources — Division of Responsibilities.

UNIT-III **14 Hrs**

Design Considerations —Line Loading-Line Loading calculations - Partitioning and allocation - Data Flow Systems — Dimension, Analysis — Network Database Design Considerations — Ratio Analysis: Database Design, Decision Trees: Synchronization of Network Databases.

UNIT-IV **10 Hrs**

Client-Server Network Model: Concept— File Server — Printer Server — E-Mail Server

UNIT-V **14 Hrs**

Distributed Databases: An Overview — Distributed Databases— Principles of Distributed Databases — Levels of Transparency — Distributed Database Design. — The R* Project Technique Problems of Heterogeneous Distributed Databases

TEXT BOOKS

- 1 John A Sharp, "An Introduction to Distributed and Parallel Processing", Blackwell Scientific Publications, 1987 (UNIT I & III)
- 2 Uyles D.Black, "Data Communications and Distributed Networks" (UNIT-II)
- 3 Joel M.Crichlow, "An Introduction to Distributed and Parallel Computing" (UNIT-IV)
- 4 Stefans Ceri, Ginseppe Palagatti, "Distributed Databases Principles and Systems", McGraw Hill Book Co., New York, 1985 (UNIT-V).

M.Sc. (CS/IT) - ELECTIVE DATA COMPRESSION

Instructional Hrs: 75

Objectives: 1. To provide knowledge about data compression.
2. To know about various techniques in data compression.
3. To know how to reduce storage capacity.

UNIT-I

15 Hrs

Introduction to Data Compression History – Data Compression – Dawn Age - Coding – Modeling – Ziv and Lempel – Lassy Compression Dawn Age Minimum Redundancy Coding: Shannon – Fano Algorithm – Huffman Algorithm – Huffman in C – Reminder About Prototypes – In to the Huffman Code – Counting The Symbols – Saving The Counts – Building the Tree – Using the Tree – The Compression Code.

UNIT-II

15 Hrs

Significant Improvement Adaptive Huffman Coding: Adaptive Coding – Updating the Huffman Tree – Swapping – Algorithm – Enhancement – Escape Code – Overflow Problem – Rescaling Bonus – The Code – Initialization of the Array – Compress Main Program – Expand the Main Program – Encoding the Symbol Updating the Tree – Decoding the Symbol – Huffman one Better Arithmetic Coding: Difficulties - Arithmetic Coding – Practical Matters – Complication – Decoding – The Code – Compression Program – Expansion Program – Initializing the Encoder – Encoding Process – Flushing the Encoder – Decoding Process.

UNIT-III

15 Hrs

Statistical Modeling: Higher – Order Modeling – Finite Context Modeling – Adaptive Modeling – A Simple Example – Using the Escape Code As A Fallback – Improvements – Highest Order Modeling – Updating the Model – Escape Probabilities – Score Broading – Data Structures – Finishing Touches – Model Flushing Implementation – Conclusions – Enhancement – Dictionary Based – LZSS Compression – Data Structures – A Balancing Act – Greedy Vs Best Possible – The Code - Constants and Macros – Global Variable – The Compression Code – Initialization – The Main Loop – Exit Code – Add String() – Delete String () – Binary Tree Support Routines.

UNIT-IV

15 Hrs

Compression: Effective Variant – Decompression – The Catch LZW Implementation – Tree Maintenance and Navigation – Speech Compression: Digital Audio Concepts – Fundamentals – Sampling Variable – PC Based Sounds – Lossless Compression – Companding.

UNIT-V

15 Hrs

Lossy Graphics Compression: Enter Compression – Standard Works: JPEG – Implementing the DCT – Coding – Zig Zag Sequence – Entropy Encoding – Sample Program – Input Format – Initialization – Forward DCT Routing – Write Dctdata() – Output code() – File Expansion – Readdctdata(), Archiving Package: Car and Carman – Carman Command Set – Car File – Header – Storing the Header – Header CRC – Command Line Processing – Generating the File List – Main Processing Loop – Fractal Image Compression: History – Image Compression With Iterated Function Systems – Image Compression with Partitioned Iterated Function Systems – Fractal Image Decoding – Resolution Independence.

TEXT BOOK:

Mark Nelson, Jean Loup Gailly, “The Data Compression Book”, BPB Pub, 2nd Edition 1996.

M.Sc. (CS/IT) - ELECTIVE CLIENT/SERVER COMPUTING

Instructional Hrs: 75

Objectives: 1. To know the basic concepts of C/S technology.

2. To improve the communication between the users.

3. To share various files, data and messages.

UNIT-I

15 Hrs

Introduction – Client / Server Computing era –File Server – Database Server – Transaction Server – Groupware Server – Object Server – Web Server.

Client/Server Building Blocks – Intergalactic Client / Server Building Blocks.

UNIT-II

15 Hrs

Operating Systems – Anatomy of a Server Program – Base Services – Extended Services – Scalability.

Clients – Client Anatomy – Non GUI clients – GUI clients – OOUI clients – GUI versus OOUI – OOUI’s on Steroids.

UNIT-III

15 Hrs

NOS – NOS Middleware – Extending the local OS’s reach – Global Directory Services – Distributed Time Services – Distributed Security Services.

RPC – Peer – to – Peer Communications – Sockets – Names – Pipes – RPC – MOM Middleware – MOM versus RPC.

UNIT-IV

15 Hrs

SQL Database Servers – Fundamentals of SQL and Relational Databases – ISO Standards – Stored Procedures, Triggers and Rules.

UNIT-V

15 Hrs

Client/ Server Groupware – Groupware – Components of Groupware.

Distributed Objects to Components – CORBA OMG'S Object management architecture Client/Server and the Internet.

Text Books:

1. Robert Orfali, Dan Harkey and Jeri Edwards, "The Essential Client/Server survival Guide", second edition, Galgotia Publications Pvt. Ltd., 1999.
2. Steve Bobrowski, "Oracle 7.0 and Client/Server Computing", Second Edition, BPB Publications – 1996.

**M.Sc. (CS/IT) - ELECTIVE
EMBEDDED SYSTEM**

Instructional Hrs: 75

Objectives: 1. To introduce the basic concept of Embedded system.

2. The various techniques used for embedded system with real time examples.

3. To introduce the details about the development of embedded software.

UNIT-I

18 Hrs

What is an Embedded System – Categories of Embedded Systems – Requirements of Embedded Systems – Challenges and Issues in Embedded Software Development- Trends in Embedded Software Development, Application Market Segments – Consumer electronics – Control Systems and industrial automation – Biomedical systems – Field instrumentation, Handheld computers – Data communication, Networked information appliances – Telecommunications – Wireless Communications, Hardware Architecture – Processor – Memory – Latches and buffers – Crystal – Reset circuit – Chip – select logic circuit – ADC and DAC – Application – Specific control circuitry – Display units – Keypads, Example: An 8031 – Based Control System, The Smart Card, Case study: A Micro – Controller Architecture – The 8051 Architecture – Reduced Power Modes – Memory Organization.

UNIT-II

12 Hrs

16 – Bit and 32 – Bit Processors – DSP Architecture – Communication Interface Standards – Development Tools – Hardware – Software Interaction, Embedded System Development Process, Operating Systems – Kernel Architecture – Embedded Operating Systems – Task Scheduling in Embedded Systems – Context switch – Task synchronization – Timers – Types of embedded operating systems – Real-time operating systems – Mobile/handheld operating systems.

UNIT-III

10 Hrs

Development Tools for Target Processors, Implementing Embedded Systems: Development Environment – Serial Communication – Null Modem Cable Connections – PC – to – PC Communication, Serial Communication with the 8051 Family of Micro – controllers, Development of a Navigation System: Development Environment – Project overview.

UNIT-IV**19 Hrs**

Devices and Communication Buses for Devices Network: I/O Types and Examples – Serial Communication Devices – Parallel Device Ports – Sophisticated Interfacing Features in Device Ports – Wireless Devices – Timer and Counting Devices – Watchdog Timer –Real Time Clock – Networked Embedded Systems – Serial Bus Communication Protocols – Parallel Bus Device Protocols – Internet Enabled Systems – Wireless and Mobile System Protocols.

UNIT-V**16 Hrs**

Embedded Software Development Process and Tools: Introduction – Host and Target Machines – Linking and Locating Software – Getting Embedded software into the Target system – Issues in Hardware – Software Design and Co-design. Testing, Simulation and Debugging Techniques and Tools: Testing on Host Machine – Simulators – Laboratory Tools.

Text Books:

1. Dreamtech Software Team, “Programming for Embedded Systems”, Wiley Publishing, Inc, 2002. UNIT(I, II & III)
2. Raj Kamal, “Embedded Systems – Architecture, Programming and Design”, Tata McGraw-Hill, Second Edition, 2008 UNIT(IV & V)

Reference Book

1. David E. Simon, “An Embedded Software Primer”, Pearson Education, Inc, 1999.

**M.Sc. (CS/IT)
ELECTIVE PAPER
INTERNET OF THINGS**

Instructional Hrs:60

Objectives:

1. To learn the fundamentals of IoT.
2. To realize the concepts of Wireless sensor networks and RFID applications.
3. To understand the standards and settings of IoT.

UNIT – I **12 Hrs**

INTRODUCTION TO THE INTERNET OF THINGS: Introduction – History of IoT – About object/things in the IoT – The identifier in the IoT – Enabling technologies of IoT – About the Internet in IoT, **RADIO FREQUENCY IDENTIFICATION TECHNOLOGY:** Introduction – Principle of RFID – Components of an RFID system – Issues.

UNIT – II **12 Hrs**

WIRELESS SENSOR NETWORKS: TECHNOLOGY: History and context – The node – Connecting nodes – Networking nodes – Securing communication – Standards and Fora.

UNIT – III **12 Hrs**

RFID APPLICATIONS: Introduction – Concepts and terminology – RFID applications.

UNIT – IV **12 Hrs**

RFID DEPLOYMENT FOR LOCATION AND MOBILITY MANAGEMENT ON THE INTERNET: Introduction – Background and related work – Localization and handover management relying on RFID – Technology considerations.

UNIT – V **12 Hrs**

THE INTERNET OF THINGS – SETTING THE STANDARDS: Introduction – Standardizing the IoT – Exploiting the potential of RFID – Identification in the IoT – Promoting ubiquitous networking – Safeguarding data and consumer privacy.

Text Book:

1. **Hakima Chaouchi**, *The Internet of Things connecting objects to the web*, WILEY Publication, 2017.

Reference Books:

1. **Rajkamal**, *Internet of Things Architecture and Design Principles*, MCGrawHill Education, 2017.
2. **Arshdeep Bahga**, *Internet of Things A hands on Approach*, Universities Press, 2016.

M.Sc. (CS/IT)
ELECTIVE PAPER
ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

Instructional Hrs: 60

Objectives:

1. To learn the fundamentals of Artificial Intelligence
2. To realize the intelligent human behaviours on a computer.
3. To design intelligent agents to solve real world problems

UNIT – I 12 Hrs
WHAT IS ARTIFICIAL INTELLIGENCE: A definition – The Underlying Assumption – What is an AI Technique - The Level of the Model – Criteria for Success.
PROBLEMS AND PROBLEM SPACES: Defining the Problem as a State Space Search – Problem Characteristics – Production System Characteristics.

UNIT – II 12 Hrs
BASIC PROBLEM–SOLVING METHODS: Forward versus Backward Reasoning – Problem Trees versus Problem Graphs – Knowledge Representation and the Frame Problem – Matching – Heuristic Functions – Weak Methods : Generate-and-Test, Hill Climbing, Breadth-First Search, Best-First Search: OR Graphs, Best-First Search: Agendas.

UNIT – III 12 Hrs
KNOWLEDGE REPRESENTATION USING PREDICATE LOGIC: Introduction to Representation – Representing Simple Facts in Logic – Resolution – Conversion to Clause Form, The Basis of Resolution, Resolution in Propositional Logic, The Unification Algorithm, Resolution in Predicate Logic – Natural Deduction, **KNOWLEDGE REPRESENTATION USING OTHER LOGICS:** Introduction – Statistical and Probabilistic Reasoning.

UNIT – IV 12 Hrs
STRUCTURED REPRESENTATIONS OF KNOWLEDGE: Introduction – Some Common Knowledge Structures - Declarative Representations. **EXPERT SYSTEMS:** Structure of an Expert System, Interacting with an Expert System.

UNIT – V 12 Hrs

NATURAL LANGUAGE UNDERSTANDING: Introduction – Understanding Single Sentences - Understanding Multiple Sentences – Going the Other Way: Language Generation – Going Both Ways: Machine Translation.

TEXT BOOK:

Elaine Rich, “Artificial Intelligence”, McGraw – Hill Book Company, International Edition, 1983.

REFERENCE BOOK:

V.S.Janakiraman, K.Sarukasi, P.Gopalakrishnan and Rajiv Beri, “Artificial Intelligence and Expert Systems”, Macmillan Publishers Indian Limited, Reprint 2009.

M.Sc. Computer Science

Question Paper Pattern:

SECTION-A

Answer all questions. No choice One question from each unit. Each question carries three Marks. (5 x 3 = 15)

SECTION-B

Essay type questions of either or type – 5 questions – One question from each unit. (5 x 11 = 55)

SEMESTER - III
Supportive Paper – PG
Open Source Tools

Instructional Hours: 60

Objectives: 1. The paper provides knowledge about open source tools for non computer science students.
2. It will improve the programming skill of students in HTML and PHP.

Unit – I: **12 Hrs**

Overview of Open Source Software: Introduction – Need and Advantages of Open Source Software – FOSS – Free Software Movement – Open Source Movement – Comparing Open Source Software with other Software.

Using HTML Basics: Structure of an HTML Document – Creating an HTML Document. Formatting an HTML Document – Fonts and Colors: Adding Fonts.

Unit – II: **12 Hrs**

Lists and Tables: Using List in an HTML Document – Using Tables in an HTML Document – Table Variables, Table and Caption Elements, Table Row Element, Table Data and Heading Elements. Hyperlinks and Frames – Images: Inserting Images in a HTML Page. Forms.

Unit – III: **12 Hrs**

PHP Language Structure: The Building Blocks of PHP – Flow Control Functions and PHP – Working with Functions: What is a Function, Calling and Defining Functions, Returning Values from User Defined Function, Variable Scope and Saving State between Function Calls with the Static Statement.

Unit – IV: **12 Hrs**

Working with Arrays: What are Arrays – Creating Arrays – Some Array Related Functions. Working with Objects: Creating an Object – Object Inheritance. Working with

Strings, Date and Time: Formatting Strings – Investigating and Manipulating Strings in PHP – Using Date and Time Functions.

Unit – V:

12 Hrs

Working with Forms: Creating a Simple Input Form – Accessing Form Input with User Defined Arrays – Combining HTML and PHP Code on a Single Page – Using Hidden Fields to Save State – Redirecting the User – Sending Mail on Form Submission – Working with File Uploads. Working with Cookies and User Sessions: Introduction – Setting and Deleting a Cookie with PHP – Session Function Overview – Starting a Session – Working with Session Variables- Passing Session Ids in the Query String – Destroying Sessions and Unsetting Variables – Using Session in an Environment with Registered Users.

Text Books:

1. Prof. Dayanand Ambawade, Dr. Deven Shah & Kogent Learning Solutions Inc., “Linux Labs and Open Source Technologies”, Dreamtech Press, 2014 (Unit I).
2. NIIT, “HTML and XML An Introduction”, PHI Learning Private Limited, 2012 (Unit I & II).
3. Julie C. Meloni, “PHP, MySQL and Apache All in One”, Pearson Publication, Fourth Edition, 2013 (Unit III, IV & V).

Question Paper Pattern

PART – A

Answer all questions. No choice. One question from each unit. Each question carries three marks. (5 x 3 = 15)

PART – B

Essay type questions of either or type – 5 questions – One question from each unit (5 x 11 = 55)