**Table - 5 : Common Course Structure for PG Degree Programme in Science -
M.Sc. (Computer Science)**

(with effect from the academic year 2017-2018 onwards)

Sem. (1)	Sub. No. (2)	Subject Status (3)	Subject Title (4)	Contact Hrs./ Week (5)	Credits (6)
I	1	Core - 1	Design and Analysis of Algorithms	5	4
	2	Core - 2	Advanced Java Programming	5	4
	3	Core - 3	Mathematical Foundation for Computer Science	4	4
	4	Core - 4	Object Oriented Systems Development	4	4
	5	Core - 5	Distributed Computing	4	4
	6	Core - 6 Practical - 1	Algorithm Lab Using C++	4	2
	7	Core - 7 Practical - 2	Advanced Java Lab	4	2
			Subtotal	30	24
II	8	Core - 8	Web Application Development	5	4
	9	Core - 9	Open Source Technology	5	4
	10	Core - 10	Advanced Data Base Management System	4	4
	11	Core - 11	Security in Computing	4	4
	12	Elective - 1	Data Mining, Multimedia Systems, Cloud Computing	4	3
	13	Core - 12 Practical - 3	Web Application Lab	4	2
	14	Core - 13 Practical - 4	Open Source Lab	4	2
			Subtotal	30	23

Sem. (1)	Sub. No. (2)	Subject Status (3)	Subject Title (4)	Contact Hrs./ Week (5)	Credits (6)
III	15	Core - 14	Digital Image Processing	4	4
	16	Core - 15	Soft Computing	4	4
	17	Core - 16	Software Testing	4	4
	18	Core - 17	Advanced Computer Networks	4	4
	19	Core - 18	Research Methodology	4	4
	20	Elective - 2	Principles of Compiler Design, Big Data Analytics, Mobile Computing	4	3
	21	Core - 19 Practical - 5	Image Processing Using MATLAB	4	2
	22	Core - 20	Mini Project	2+2*	2
			Subtotal	30	27
IV	23	Core - 21	Major Project	30+2*	16
			Subtotal	30	16
			Total	120	90

* Extra hours for Project

For the Project, flexible credits are b/w 5 - 8 & Hours per week are b/w 10 - 16.

Total number of credits ≥ 90   :   90

Total number of Core Courses   :   21 (14 T + 5 P + 2 Prj.)

Total number of Elective Courses   :   2

Total hours   :   120

I SEMESTER

Core – 1
DESIGN AND ANALYSIS OF ALGORITHMS

Unit - I

Introduction : Algorithm-Specification-Performance Analysis. Elementary Data Structure : Stacks And Queues- Trees-Dictionaries-Priority Queues.

Unit - II

Divide And Conquer : General Method-Binary Search- Finding the Maximum And Minimum-Quicksort-Strassen's Matrix Multiplication.

Unit - III

The Greedy Method : General Method-Knapsack Problem-Job Sequencing with Deadlines-Minimum Cost Spanning Tree-Single Source Shortest Path.

Dynamic Programming : General Method-Multistage Graph-All Pairs Shortest Path-Binary Search Tree-0/1 Knapsack Travelling Salesperson Problem.

Unit - IV

Basic Traversal And Search Techniques : Techniques for Binary Trees-Graphs-Connected Components and Spanning Trees-Biconnected Components.

Backtracking : General Method-8-Queen. Graph Coloring : Hamiltonian Cycle.

Unit - V

Branch and Bound : Method-0/1 Knapsack Problem.

NP-Hard And NP-Complete Problem-Basic Concepts-Cook's Theorem- Clique Decision Problem-Job Shop Scheduling.

Text Book

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition,Universities Press(India) Private Ltd., 2008

Reference Books

1. Aho, Hoporoft and Ullman, "The Design and Analysis of Computer Algorithm", Pearson Education, Delhi, 2001.

2. Basu S.K., "Design Methods and Analysis of Algorithms", PHI, 2006.

3. M.A.Weiss, "Data Structures and algorithm Analysis in C++", Pearson Education, Asia, 2013.

Core – 2
ADVANCED JAVA PROGRAMMING

Unit - I

Classes and Objects : Introduction-General form-Object creation-Constructor-Finalize()-Static member-Inner and Anonymous Inner classes; Inheritance and Polymorphism:-Introduction-Inheriting the variables in a class-Inheriting the methods in a class-Inheritance and Constructors-Abstract classes-Final classes-Interfaces and package-Exception Handling.

Unit - II

J2EE Multi-Tier Architecture : Distributive system-The Tier-J2EE Multi Tier Architecture-client-Tier Implementation-web tier Implementation-Enterprise Java Bean tier implementation-Enterprise information system tier implementation; J2EE Best practices:-Enterprise Application strategy-The Enterprise Application-Client Session management-Web Tier and Java Server Pages-Enterprise JavaBean Tier.

Unit - III

JDBC Objects : The concept of JDBC-JDBC drivers-JDBC packages-A brief overview of the JDBC process-database connection-Associating JDBC/ODBC bridge with the database statement objects-Result set-Transaction processing-Metadata; JDBC and Embedded SQL:-Tables-Indexing-Inserting into tables- Selecting data from tables-Joining tables-Calculating data-Grouping and ordering data-subqueries.

Unit - IV

Java Servlets : Java Servlets and Common Gateway Interface Programming-A Simple java Servlet-Anatomy of Java Servlet-Reading Data from a Client-Reading Http Request Headers-Sending Data to Client and Writing the Http Response Headers- Working with Cookies-Tracking Sessions; Java Server Pages:-JSP-JSP Tags Tomcat-Request String-User Sessions Cookies-Session objects.

Unit - V

Enterprise Java Bean:-Enterprise Java Beans-Deployment Descriptors-Session Java Bean-Entity Java Bean- Message Driven Bean-The JAR File; Java Interface Definition Language and CORBA:-The Concept of object RequestBrokerage- Java IDL and CORBA- The IDL Interface-The Client Side the Server Side-Running the Code.

Text Book

1. C.Muthu,"Programming with Java",SecondEdition,VNI, 2008.
2. Jim Keogh,"TheComplete Reference J2EE",TMH, 2004 (Reprint)

References

1. Herbert Schildt, "The Complete Reference Java", Seventh Edition, TMH, 2007.
2. Joseph O'Neil, "JavaBeans Programming", TMH, 1998.

Core -3
MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

Unit - I
Mathematical Logic: Introduction-Statements and Notation-Connectives-Normal Forms-The Theory of Inference for the Statement calculus-The Predicate Calculus-Inference theory of the Predicate Calculus

Unit - II
Set Theory: Introduction- Basic concepts of Set theory-Relations-Functions.

Unit - III
Matrices: Rank of Matrix, Solving System of Equations, Eigen values and Eigen Vectors-Inverse of matrix- Cayley Hamilton Theorem.

Unit - IV
Graph Theory: Introduction-Graphs-Application of Graphs-Finite and Infinite Graphs-Incidence and Degree-Isolated Vertex, Pendant Vertex and Null Graph
Paths and Circuits: Isomorphism- Subgraphs - Walks, Paths and Circuits-Connected and Disconnected graphs-Components-Euler Graphs-Operation on Graphs-Hamiltonian paths and circuits-Travelling Salesman Problem

Unit - V
Trees and Fundamental Circuits: Properties of Trees-Pendant vertices in trees-Distance and centers in a Tree-Rooted and Binary Tree-Spanning Tree-Fundamental circuits—Spanning Tree in the Weighted Graph.
Matrix Representation of Graphs: Incidence Matrix-Submatrices-Circuit Matrix-Path matrix-Adjacency Matrix

References
1. J.P. Trembley and R.Manokar, "Discrete Mathematical Structures with Applications to Computer Science",Tata McGraw Hill Publications, 2009.
2. Narasingh Deo, "Graph Theory With Applications To Engineering And Computer Science", Prentice-Hall of India Private Limited, 2007.
3. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Tata McGraw Hill, 4th edition, 2002.

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Core – 4

OBJECT ORIENTED SYSTEMS DEVELOPMENT

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Unit - I

Overview of Object Oriented Systems Development : Introduction – Two orthogonal views-Development methodology- Object orientation.

Object basics: Introduction-Object Oriented Philosophy- Object – Attributes – Object respond to messages – Encapsulation – Inheritance – Polymorphism – Object relationship and associations. OOSD life cycle : Introduction – Software development process – OOSD Use case Driven Approach – Reusability.

Unit - II

Object Oriented Methodology – Rumbaugh etal's methodology- Booch methodology – Jacobson methodology – Pattern. Unified Modeling Language - Introduction – static dynamic model – UML diagrams – UML class diagrams – Use case- UML dynamic modeling – packages and model organization.

Unit - III

Object Oriented Analysis : Introduction – Business Object Analysis, Use case driven object oriented analysis – Effective documentation. Classification : Introduction – Classification theory – Naming classes. Identifying object relationships, attributes, methods : Association – Super sub class relationship – Aggregation.

Unit - IV

OOD process and design axioms : Introduction – OOD process- Design axioms – Corollaries – Design pattern. Designing classes : Introduction – Designing classes process – Class visibility – Refining attributes – Designing methods and protocols – Packages and managing classes. Access layer: Introduction - Object Store and persistence – DBMS – Logical and physical Database Management System – Distributed Databases and Client Server Computing – Next generation of client Server Computing – Multidata base System – Design Access layer classes

Unit - V

Software Quality Assurance : Introduction – Quality Assurance Tests – Object Orientation on Testing – Testing strategies – Test Cases- Test Plan.

System Usability and Measuring User satisfaction : Introduction – Usability Testing.

Text Book

1. Ali Bahrami, "Object Oriented Systems Development using UML", Tata McGraw-Hill Education Private Limited, 2008

References

1. Brahma Dathan, Sarnath Ramnath, "Object Oriented Analysis, Design and Implementation", Universities Press, 2010.

2. Mahesh P.Matha, "Object-Oriented Analysis and Design Using UML", PHI Learning Private Limited, 2012.

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Core - 5

DISTRIBUTED COMPUTING

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Unit - I

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

Unit - II

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

Unit - III

Remote Procedure Calls : RPC models – Transparency of RPC–Stub generation–RPC messages–Marshaling   arguments and results–Exception Handling–Light weight RPC; Distributed Shared Memory: Introduction – General Architecture of DSM system – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory – Consistency Models – Replacement Strategy – Thrashing.

Unit - IV

Synchronization: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithm–Process Management: Introduction-Process Migration–Threads.

Unit - V

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

Text Book

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

References

1.Andrew S Tanenbaum , "Distributed Operating Systems", First Edition, PHI.2002
2. Abraham Silberchalz Peter B. Galvin, G.Gagne, "Operating Systems Concepts", Seventh edition, Addision Wesley Publishing Co., 2010.
3.Pabitra Pal Choudhury, "Operating Systems : Principles and Design", PHI, 2009.

Core – 6
ALGORITHM LAB USING C++

Programs should include but not limited to:
1. Write a program that implements Stack
2. Write a program to implement Queue
3. Write a program that implements Priority Queue
4. Write a program that implements Binary Search
5. Write a program that implements Quick Sort
6. Write a program that implements Strassen's matrix multiplication
7. Write a program that implements Prim's Algorithm
8. Write a program that implements Kruskal's Algorithm
9. Write a program that implements All pair shortest path problem
10. Write a program that implements N-Queen Problem
11. Write a program that implements BFS
12. Write a program that implements DFS
13. Write a program that implements Travelling Salesperson Problem
14. Write a program that implements knapsack using greedy

Core – 7
ADVANCED JAVA LAB

Programs should include but not limited to:

1.Write a java code to demonstrate class with constructors

2.Write a java code to demonstrate Inheritance

3.Write a java code to demonstrate Interface

4.Write a java code to demonstrate packages

5.Write a java code to demonstrate Custom Exception

6.Write a java code to create a connection to access database from hard disk using domain server name and display a message SUCCESSFULLY CONNECTED, if the connection is created.

7.Write a java code to fetch the table information using JDBC.

8.Write a java code to update a particular record using JDBC.

9.Create a servlet and display a message using hyperlink .

10.Write a servlet code to change the Explorer background color

11.Write a HTML code to capture the user Input name and E-mail ID and display the information in the next form using JSP

12.Write a simple JSP code to create a form and validate a password

13.Write a java servlet to get information in the first form and display in second form

Core – 8
WEB APPLICATION DEVELOPMENT

Unit - I

ASP.NET Introduction :.NET Programming Framework, , The Common language runtime and .NET Class Library, Features of ASP.NET and Visual studio .NET.

.NET language : Data types - declaring variables - Scope and accessibility - Variable Operators & Operations - Type conversions - Object based manipulations - Conditional and Loop structures - Functions and subroutines.

Types, Objects and Namespaces : Class – object - constructor - Value types and Reference types. Advanced class programming : Inheritance – polymorphism – Interfaces - Exception handling - Multithreading. Understanding namespaces.

Unit - II

ASP.NET Applications – File types, Simple Application from start to finish. Code behind compilation - Global .asax application files, ASP.Net configuration.

Web Form fundamentals : Simple page applet- server controls - Deeper look in HTML controls - page classes

Web control classes : Auto postback and web control event- Generating Automatic greeting card.

Unit - III

Validation and Rich Controls : Calendar and Ad Rotator control - Validation Controls – Simple validation example – Regular expression concepts- Customer form validation.

State management : view state - custom cookies - Session state - Session state configuration - Application state.

Unit - IV

ASP.NET Intrinsic Objects **:** HTTP Request Object, HTTP Response Object, HTTP ServerUtility Object, ObjectContext Object

Data Access with ADO.NET **:** Overview of ADO.NET Objects - Characteristics of ADO.NET - ADO.NET object model.

ADO.NET data access : SQL basics – select, update, insert, delete statements. Accessing data - Creating a connection – Defining select statement - Using command with data reader - Updating data. Accessing disconnected data.

Unit - V

Comparing the template control : The Data list - The Data grid - The Repeater - Selecting Items - Editing Items - Paging with Data Grid - Sorting with Data grid.

Web Server and IIS manager, Web services Architecture : The Open Standards Plumbing - WSDL- SOAP- UDDI. Communicating with web service.

Text Book

1 Mathew Mac Donald, "ASP.NET Complete Reference", TMH 2005.

References

1. Crouch Matt J, "ASP.NET and VB.NET Web Programming", Addison Wesley 2002.
2. J.Liberty, D.Hurwitz, "Programming ASP.NET", Third Edition, O'REILLY, 2006.

Core – 9
OPEN SOURCE TECHNOLOGY

Unit - I

Getting started – Introduction to UNIX, Linux GNU – Programming Linux.

Shell Programming – Basics – Pipes and Redirection – The Shell as a Programming Language – Shell syntax.

Working with files – Linux File Structure –Low level File Access – The Standard I/O Library.

Unit - II

Working with files – Formatted Input and Output – File and Directory Maintenance – Scanning Directories – Errors.

The Linux Environment – Program Arguments – Environment Variables – Time and Date – Temporary Files – User Information – Host Information.

Terminals- Reading from and writing to the terminal.

Unit - III

Why PHP & MySQL – What is PHP? – What is MySQL?

Server-side Web Scripting – Static HTML – Client-side Technologies – Server-Side Scripting

Syntax and Variables – Comments – Variables – Simple types – outputs.

Control and Functions – Boolean expressions – Branching – Looping – Terminating execution – Using functions – Defining your own function – Functions and variable scope.

Unit - IV

Passing information between Pages – GET Arguments – POST Arguments – Formatting Form Variables – PHP super global arrays.

String – Strings in PHP – String Functions.

Arrays and Array Functions – Creating Arrays – Retrieving Values – Multidimensional Arrays – Deleting from Arrays

Numbers – Numerical Types – Mathematical Operators – Simple Mathematical Functions.

Unit - V

PHP/MySQL Functions – Connecting to MySQL – Making MySQL Queries – Fetching Data Sets – Multiple Connections – Error Checking – Creating MySQL Databases with PHP – MySQL Functions.

Displaying Queries in Tables - HTML Tables and Database Tables – Creating the Sample Tables.

Building Forms from Queries – HTML Forms - Basic Form Submission to a Database – Self Submission – Editing Data with an HTML Form.

Textbooks
1) Neil Matthew and Richard Stones "Beginning Linux Programming", 4/e; New Delhi: Wiley-India, 2009.
2) Tim Converse and Joyce Park with Clark Morgon, "PHP 5 and MySQL Bible"; New Delhi: Wiley-India, 2008.

References
1. M.N.Rao, "Fundamentals of Open Source Software", PHI, 2015.
2. Kailash Vadera and Bhavyesh Gandhi, "Open Source Technology", Laxmi Publications, First Edition 2009.
3. Narain Gehani, "The Database Application Book Using the MYSQL Database System", University Press, 2012.

Core – 10
ADVANCED DATA BASE MANAGEMENT SYSTEM

Unit - I

Introduction to Relational Model : Structure of Relational Databases- Database Schema – Keys – Schema Diagrams – Relational Query Language – Relational Operations.

Formal Relational Query Languages : The Relational Algebra – The Tuple relational Calculus – The Domain Relational Calculus.

Unit - II

Database Design and the E-R Model : Overview – The Entity-Relationship model – Constraints – Removing Redundant Attributes in Entity Sets – Entity Relationship Diagrams- Reduction to relational schemas – Entity Relationship Design Issues – Extended E-R Features.

Relational Database Design : Features of good relational Design – Atomic Domains and First Normal Forms – Decomposition Using Functional Dependencies.

Unit - III

Indexing and Hashing : Basic Concepts – Ordered Indices – B^+ Tree Index Files – B^+ Tree Extensions – Multiple Key Access – Static Hashing – Dynamic Hashing – Comparison of Ordered Indexing and Hashing – Bitmap Indices .

Transactions : Transaction Concept – A simple Transaction model – Storage Structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability.

Unit - IV

Concurrency Control : Lock based Protocols – Deadlock Handling – Multiple Granularity – Timestamp Based Protocols – Validation Based Protocols – Multiversion Schemes – Snapshot Isolation – Insert Operations, Delete Operations and Predicate Reads.
Recovery Systems : Failure Classification – Storage – Recovery and Atomicity – Recovery Algorithm – Buffer Management.

Unit - V

Database System Architecture : Centralized and Client Server Architectures – Server System Architectures – Parallel Systems – Distributed Systems.
Parallel Databases : Introduction – I/O parallelism – Interquery parallelism – Intraquery parallelism – Intraoperation parallelism – Interoperation parallelism – Query Optimization.
Distributed Databases : Homogeneous and Heterogeneous Databases – Distributed Data Storage – Distributed Transactions.

Textbook

1. Abraham Silberschatz, Henry F. Korth and S.Sudarshan, "Database System Concepts", Sixth Edition, McGrawHill International Edition, 2011.

References

1. Ramez Elmashree, Shamkant B.Navathe, "Fundamentals of Database Systems", Pearson Education, 2011.
2. C.J.Date, "Introduction to Database Systems", 8th Edition, Pearson Education, 2003.
3. Rajesh Narang, "Database Management Systems", 2nd Edition, PHI, 2012.

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Core – 11
SECURITY IN COMPUTING

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Unit – I

Cryptography : Terminology and Background – Substitution ciphers - The Caesar cipher, The Vernam cipher, Book cipher; Transposition ciphers.
DES – AES - Public key encryption - RSA encryption - Possible attacks on RSA-Uses of Encryption

Unit – II

Program Security : Secure programs – Fixing faults, Unexpected behavior, Types of flaws; Nonmalicious Program errors

Virus and other malicious code – Kinds of malicious code, How Viruses attach, Document viruses, How viruses gain control, Homes for viruses, Virus Signatures, The source of Viruses, Prevention of Virus Infection.

Targeted malicious code – Trojans, Trapdoors, Salami Attack.

Unit – III

Security in Databases : Security Requirements - Integrity of the database, Element Integrity, Audibility, Access control, User authentication, Availability, SQL injection; Reliability and Integrity – Protection features from the operating system, Two-phase update, Redundancy/Internal consistency, Recovery, Concurrency/Consistency, Monitors; Sensitive data - Access decisions, Types of disclosures, Security versus Precision; Inference – Direct Attack , Indirect Attack; Multilevel databases – Granularity , Security Issues.

Unit – IV

Security in Networks : Threats in Networks – What makes a network vulnerable? Categories of attack, Who attacks Networks?

 Network Security Controls – Security Threat analysis, Effect of security in architecture of network, Encryption, Content integrity, Strong authentication, Access controls, Wireless security, Alarms and alerts, Honeypots, Traffic flow security.

Firewalls – Design of firewalls, Types of Firewalls, Personal Firewalls, Comparison of Firewall Types.

Unit – V

Legal and Ethical Issues in Computer Security : Protecting Programs and data – Information and the law - Redress for software failures – Selling correct software, Reporting software flaws.

Computer Crime : Why a separate category for computer crime is needed, Why computer crime is hard to define, Why computer crime is hard to prosecute, Indian Cyber law offences, Cyber Pornography, Accessing Protected System, Tampering with Computer Source code.

Ethical Issues in Computer Security : Differences between the Law and the Ethics, Studying Ethics, Ethical Reasoning.

Text Book

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007.

References

1. Michael Whitman, Herbert J. Mattord, "Management of Information Security", Third Edition, Course Technology, 2010.

2. William Stallings, "Cryptography and Network Security:Principles and Practices", Fifth Edition. PHI, 2010.

3. V.K.Pachghare, "Cryptography and Information Security", PHI, 2013.

Elective - I
1. DATA MINING

Unit - I

Introduction : Basic Data Mining Tasks - Data Mining Versus Knowledge Discovery in Databases - Data Mining Issues - Data Mining Metrics - Social Implication of Data Mining - Data Mining from a Database Perspective

Data Mining Techniques : A Statistical Perspective on Data Mining - Similarity Measures - Decision Trees - Neural Networks - Genetic Algorithms

Unit - II

Classification : Introduction – Statistical - Based Algorithms - Distance-Based Algorithms - Decision Tree-Based Algorithms - Neural Network - Based Algorithms - Rule-Based Algorithms - Combining Techniques.

Unit - III

Clustering : Introduction - Similarity and Distance Measures - Outliers - Hierarchical Algorithms - Partitional Algorithms - Clustering Large Databases - Clustering with Categorical Attributes.

Unit - IV

Association Rules : Introduction - Large Itemsets - Basic Algorithms - Parallel and Distributed Algorithms - Comparing Approaches - Incremental rules - Advanced Association Rule Techniques - Measuring the Quality of Rules

Unit - V

Web Mining : Introduction - Web content Mining - Web Structure Mining - Web Usage Mining. Spatial Mining : Introduction - Spatial Data Overview - Spatial Data Mining Primitives -Generalization and Specialization - Spatial rules - Spatial Classification Algorithms - Spatial Clustering Algorithms

Text Book

1.Marget H.Dunham, "Data Mining Introductory and Advanced Concepts",Pearson Education 2003.

References

1. G.K.Gupta, "Introduction to Data Mining with Case Studies", 3rd Edition, PHI,2015.
2. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education, 2007.
3. Jiawei Han and Micheline Kambar, "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

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Elective - I

2. MULTIMEDIA SYSTEMS

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Unit - I

Uses of Multimedia Information : Defining the scope of multimedia, Hypertext and Collaborative research, Multimedia and personalized computing, Multimedia on the map, Emerging applications, The challenges.

The convergence of computers, Communications, and entertainment products: The technology trends, Multimedia appliances, Hybrid Devices, Designers perspective, industry perspective of the future, Key challenges ahead, Technical, regulatory, Social.

Architectures and issues for Distributed Multimedia systems: Distributed Multimedia systems, Synchronization, and QOS Architecture, The role of Standards, A frame work for Multimedia systems

Unit - II

Digital Audio Representation and processing : Uses of Audio in Computer Applications, Psychoacoustics, Digital representation of sound, transmission of digital sound, Digital Audio signal processing, Digital music making, Speech recognition and generation, digital audio and the computers.

Video Technology : Raster Scanning Principles, Sensors for TV Cameras, Colour Fundamentals, Colour Video,Video performance Measurements, Analog video Artifacts, video equipments, Worldwide television standards.

Digital Video and Image Compression : Video compression techniques, standardization of Algorithm, The JPEG Image Compression Standard, ITU-T Recommendations, The EPEG Motion Video Compression Standard, DVI Technology

Unit - III

Operating System Support for Continuous Media Applications : Limitation of Work station Operating system, New OS support, Experiments Using Real Time Mach.

Middleware System Services Architecture : Goals of Multimedia System services, Multimedia system services Architecture, Media stream protocol.

Multimedia Devices, Presentation Services, and the User Interface : Client control of continuous multimedia, Device control, Temporal coordination and composition, toolkits, hyper applications.

Multimedia File systems and Information Models : The case for multimedia information systems, The file system support for continuous Media, Data models for multimedia and Hypermedia information, Content- based Retrieval of Unstructured Data.

Multimedia presentation and Authoring : Design paradigms and User interface, barriers to wide spread use, research trends.

Unit - IV

Multimedia Services over the Public Networks: Requirements, Architecture, and protocols, Net work services, applications.

Multimedia Interchange : Quick time Movie File Format, QMFI, MHEG (Multimedia and Hypermedia Information Encoding Expert Group), Format Function and representation, Track model and Object model, Real Time Interchange.

Multimedia conferencing : Teleconferencing Systems, Requirements of Multimedia Communications, Shared Application Architecture and embedded Distributed objects, Multimedia Conferencing Architecture.

Unit - V

High Definition Television and desktop computing : Video versus Computing-Viewing Conditions-Quality-HDTV,ATV,EDTV,IDTV-HDTV Standards – Standardization Issues HDTV standards.

Knowledge based Multimedia systems - Anatomy of an Intelligent Multimedia system

Text Book

John F.Koegel Buford, "Multimedia Systems", Pearson Education, 2012

References

1.Tay Vaughan, "Multimedia – Making it work", Fifth Edition, TMH 2003

2.Ralf Steinmetz and Klara Nahrstedt, "Multimedia:Computing , Communication and Application", Pearson Education, 2009

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Elective - I

3. CLOUD COMPUTING

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Unit – I

Cloud computing – An Overview : Introduction – History of cloud computing – Characteristics of cloud – Cloud computing model – Advantages and disadvantages of cloud computing – Security, Privacy and trust – Virtualization – Next generation of cloud computing.

Cloud computing Architecture : Introduction - Cloud Architecture – Cloud computing models – Deployment models – Identity as a service.

Unit – II

Virtualization in Cloud : Virtualization – Implementation of Virtualization - Virtualization support at the OS level – Advantages of Virtualization – Application Virtualization - Virtualization implementation techniques – Hardware virtualization – Types of Virtualization – Logical cloud computing model – Virtualization for Data-centre.

Security Issues and challenges in Cloud computing : Introduction - Security challenges in Cloud computing – Information Security in Cloud computing – Security, Privacy and Trust.

Security Management : Introduction – Security in reference architecture – Security Issues in cloud computing – Classification of security issues – Types of attackers – Security risk in

cloud computing – Security Threats against cloud computing – Emerging trends in security and privacy.

Unit - III

Virtualization System specific Attacks : Attacks in cloud computing environment – Attacks in Hypervisor – Security challenges – Desktop virtualization Security – Planning and deployment for secure virtualization.

Web Services : Amazon web services – Microsoft Azure – Google App Engine

Unit – IV

Service Oriented Architecture : SOA components – Design principles of SOA – SOA requirements – Benefits of SOA – Significance of SOA in cloud computing – Enterprise Service Bus – Web Services – Recurring Architectural Capabilities.

Migrating Applications to the Cloud computing : Motivations for migration – Issues in migrating the applications to the cloud – Types of migration – Planning for migrating the application to the cloud – Migration Roadmap. Cloud Computing Applications : Business applications – Finance and banking applications – Cloud computing in education.

Unit – V

Standards in Cloud Computing : Standardization activities – Challenges – Fields of standardization - Standardization organizations in Cloud Computing. Mobile Cloud Computing : Needs of mobile Cloud Computing – Mobile Cloud Computing Architecture – Technologies for MCC – MCC Applications – Challenges in building applications – Platforms.

Microservices : Need of microservices – Microservice architecture – Benefits of Microservices – Drawbacks of microservices – Communication mechanisms – Decentralized data management - Essential ckeck - lists for migration from monolithic to microservices.

Text book

1. V.K.Pachghare, "Cloud Computing", PHI, 2016.

References

1. Michael Miller, "Cloud Computing", Pearson Education, New Delhi, 2009

2.Anthony T.Velte,Toby J.Velte,Pobert Elsenpeter,"Cloud Computing",TMH,2010

3. Kumar Saurbh , "Cloud Computing – Insights into New-Era Infrastructure", Wiley India, 2011.

4. John W.Rittinghouse and James F. Ransome, "Cloud Computing : Implementation, Management and Security", CRC press, 2010.

Core – 12
WEB APPLICATION LAB

Programs should include but not limited to:

1. Change the background color using RGB()
2. Implement Currency Converter
3. Demonstrate Event Tracker
4. Write a program using file uploading control
5. Write a program to create a registration page using validation controls
6. Write a program using Session State and Application State variables
7. Write a program to demonstrate the use of Session.TimeOut
8. Write a program using QueryString.
9 Write a program to create Cookies
10. Write a program using DataGrid and DataList controls
11. Write a program to search and store student data in MSAccess
12. Write a program to save customer information and generate electricity bill using MS Access

Core – 13
OPEN SOURCE LAB

Programs should include but not limited to:

1. Create a Relational Database in MySQL , insert values and execute queries using basic and advanced select commands.
2. Perform join operation on relational tables
3. Create Queries using aggregate functions
4. Create views of the database
5. Implement a PHP program to display a Welcome page based on client browser.
6. Implement a PHP program to process HTML forms.
7. Implement a PHP program to demonstrate Object Oriented Programming in PHP
8. Implement a PHP program to demonstrate database handing.
9. Write a PHP program to create a directory, and to read contents from the directory.
10. Execute the Linux commands:
    a) ls, cat, chmod, find, sort, bc, cal, wc
    b) pipe and filter
11.Write a C program to generate Fibonacci series and execute in Linux OS
12. Write a shell program to check whether the given number is Armstrong or not.
13. Write a shell program to generate pay slip of an employee.