

SEMESTER WISE COURSE LIST

Semester	Sub. No.	Subject Status	Subject Title	Contact Hrs./ Week	Credits
I	1	Core-1	Design & 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	Compiler Design	4	4
	5	Core - 5	Distributed operating system	4	4
	6	Core - 6 Practical - 1	Algorithm Lab	4	2
	7	Core - 7 Practical - 2	Advanced Java Lab	4	2
	Subtotal				30
II	8	Core- 8	Advanced Web Technology	5	4
	9	Core- 9	Machine Learning	5	4
	10	Core- 10	Advanced DBMS	4	4
	11	Core- 11	Cryptography and Network Security	4	4
	12	Elective– 1	Data Mining	4	3
	13	Core - 12 Practical - 3	Advanced Web Technology Lab	4	2
	14	Core - 13 Practical - 4	Machine Learning Lab using Python	4	2
	Subtotal				30

Scheme of Examination / Question Paper Pattern I - Theory Subjects:

(Total Marks: 100 (Internal: 25 Marks, External: 75 Marks))

Parameters	
Student shall secure pass in both internal and external and also obtain 50 marks together to get a pass	
CIA- Internal Marks	End semester Examination - External Marks
i. Average of best two tests from three: 15 Marks	Total : 75 Marks
ii. Assignment: 05 Marks	
iii. Seminar: 05 Marks	
Total : 25 Marks	
Passing minimum 40% i.e. 10 marks	Passing minimum 50% i.e. 38 marks

External (End Semester) examination question pattern :

Time: 3 Hours

Max. Marks: 75

Part – A

(10*1=10)

Answer all the questions

Ten Questions, two objective type questions from each unit.

Part – B

(5*5=25)

Answer all the questions

Five Questions, two short answer type questions from each unit with internal choice

(Either ...Or... type)

Part – C

(5*8=40)

Answer all the questions

Five Questions, two descriptive/Analytical type questions from each unit with internal choice

(Either ...Or... type)

Scheme of Examination - Practical Subjects:

(Total Marks: 100 (Internal: 25 Marks, External: 75 Marks))

- The following list of parameters taken into account for the evaluation of practical examination.

Parameters			
CIA-Internal Marks (CIA - Continuous Internal Assessment)		End semester Examination - External Marks	
Experimental performance	10	Internal Examiner (Guide) 37.5 Marks	External Examiner (Other Institution) 37.5 Marks
Record work:	5		
Test:	10		
Total : 25 Marks		Total : 75 Marks	

Note: The External Examiner may also fix exercises other than those found in the list (Syllabus) in consultation with the Internal Examiner without violating the scope of the prescribed syllabus.

Semester I

Subject No	Core/Elective	Subject Name	Hours per week	Credits
1	Core-1	Design & 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	Compiler Design	4	4
5	Core - 5	Distributed operating system	4	4
6	Core - 6 Practical - 1	Algorithm Lab	4	2
7	Core - 7 Practical - 2	Advanced Java Lab	4	2

DESIGN AND ANALYSIS OF ALGORITHMS [C L T P 4 4 1 0]

Course Objectives:

- To understand fundamental concepts of Algorithm
- To impart knowledge about Basic Traversal And Search Techniques and Problematic Design

Course Outcomes:

- Get a view of how to choose problem
- Able to design and solve complex problems

UNIT-1

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

UNIT – II

Divide And Conquer : General Method-Binary Search- Finding the Maximum And Minimum-Quick sort - 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-Optimal Binary Search Tree-0/1 Knapsack-Travelling Salesperson Problem.

UNIT – IV

Basic Traversal And Search Techniques : Techniques for Binary Trees –Techniques for Graphs- Connected Components and Spanning Trees-Biconnected Components and DFS. Backtracking : General Method-8-Queen Problem, Sum of Subsets Graph Coloring : Hamiltonian Cycle.

UNIT – V

Branch and Bound : The Method-0/1 Knapsack Problem. NP-Hard And NP - Complete Problem - Basic Concepts - Cook's Theorem -NP - HARD GRAPH Problems - Clique Decision Problem - Chromatic Number Decision Problem NP - HARD Scheduling Problems - Flow Shop Scheduling
- Job shop scheduling.

Text books and References

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, —Fundamentals of Computer Algorithms, 2nd Edition, Universities Press(India) Private Ltd., 2018.
2. Aho, Hopcroft and Ullman, —The Design and Analysis of Computer Algorithm, Pearson Education, Delhi, 2001.
3. Basu S.K., —Design Methods and Analysis of Algorithms, PHI, 2006.
4. M.A.Weiss, —Data Structures and algorithm Analysis in C++, Pearson Education, Asia, 2013.
5. Sandeep Sen and Amit Kumar Design and Analysis of Algorithms: A contemporary perspective, Cambridge University Press, 2019.

ADVANCED JAVA PROGRAMMING [C L T P 4 4 1 0]

Course Objectives:

- To deepen student's programming skills by analyzing the real world problem in a programmer's point of view and implement the concepts in real time projects
- To enable the students to learn the ethical, historical, environmental and technological aspects of Advanced Java Programming and how it impacts the social and economic development of society

Course Outcomes:

- Able to develop a Graphical User Interface (GUI) with Applet and Swing.
- Develop a Client-Server Application with Database Maintenance.

UNIT-1 Applets & Event Handling

Applets - Applet Basics, Methods of Building an Applet, Some General Methods of Applet , Displaying Text in Status Bar, Embedding Applet Information, The HTML Applet Tag , Reading Parameters into Applets , Colors in Applet, Getting Document base and Code base, Interfaces in Applet, Multimedia in Applet Event Handling- Model, Event, Event Listeners, Registering Listener with Source, Example programs, Adapter Classes.

UNIT – II Swing and GUI Components

Swing - Origin of Swing, Creating Windows in Swing, JFrame, JButton, JLabel, JToggleButton, JCheckBox, JRadioButton, JList, JScrollBar, JScrollPane, JTextField, JPasswordField, JTextArea, JComboBox, JMenuItem, JMenu, JMenuBar, JDialog, JOptionpane, JFileCheck, JProgressBar, LayoutManager.

UNIT – III Networking

Networking – Inet Address, Socket Programming, Datagram, URL.

UNIT – IV JDBC

JDBC- Introduction, Driver Manager, Connection Interface, Statement Interface, Prepared Statement Interface, Callable Statement Interface, Result Set Interface.

UNIT – V Servlet & JSP

Servlet – Introduction, HTML, Interface Servlet, Http Servlet Class, Servlet Programs, Servlet with I/O Files, Servlet with JDBC, Session Handling, Session Tracking. JSP – Introduction, JSP Working Model, Syntax of a JSP Page with Sample Programs.

Text books and References

1. Advanced Programming in Java2, K.Somasundaram, Jaico publishing Company Limited, New Delhi, 2008.
2. Herbert Schildt, Java 2-The complete reference, 7th Edition McGraw Hill, 2018.
3. Naughton and Herbert Schildt, Java The complete reference, 7th Edition McGraw Hill, 2007.
4. Jim Keogh, The Complete Reference J2EE, Tata McGraw Hill Edition, New Delhi, 2002.
5. Marty Hall, and Larry Brown, Core Servlets and Java Server Pages, 2nd Edition, Pearson Education, 2004.

E-Resources

1. Advanced Programming in Java2, https://www.researchgate.net/publication/315894230_Advanced_Programming_in_Java2
2. JDBC, Java Database Connectivity, K.Somasundaram, Jaico Publishing House, Mumbai, India, First Edition, 2013. https://www.researchgate.net/publication/263808284_JDBC_Java_Database_Connectivity
3. JSP, Java Server Pages, In book: Server Side Programming Chapter: Chapter 25, K.Somasundaram, 2012, DOI: 10.13140/2.1.1715.9365
4. https://www.researchgate.net/publication/268076772_Java_Server_Pages

MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

[C L T P 4 3 1 0]

Course Objectives:

- To enable a clear understanding about mathematical logic
- To apply basic mathematical concepts in project developments
- To get clear understanding about graph and tree

Course Outcomes:

- Get an insight about basic mathematical concepts related to computer science
- Able to get knowledge about simple data structure concepts
- Able to have knowledge about mathematical logic

UNIT-1

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- Sub graphs - 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-Sub matrices-
CircuitMatrix-Path matrix-Adjacency Matrix

Text books and References

1. J.P. Trembley and R.Manokar, —Discrete Mathematical Structureswith Applications to Computer Science , Tata Mc Graw Hill Publications,2017.
2. Narasingh Deo, — Graph Theory With Applications To Engineering And Computer Science, Prentice-Hall of India Private Limited, 2017.
3. Kenneth H. Rosen — Discrete Mathematics and Its Applications with Combinatorics and Graph Theory (SIE) | 7th Edition, Tata Mc Graw Hill Publications, 2017.

Course Objectives:

- To discover principles and techniques that can be used to construct various phases of compiler.
- To explore knowledge about parsers, optimization technique

Course Outcomes:

- Able to understand various phases of a compiler
- Explore the features of code generation and optimization techniques
- Able to design a compiler

UNIT-1 LEXICAL ANALYSIS

Introduction to Compiling: Language Processors, The Structure of a Compiler. Lexical Analysis: The role of the lexical analyzer - Input buffering Specification of tokens - Recognition of tokens – The Lexical Analyzer Generator Lex - Finite automata - Regular expression to finite automata – Design of Lexical Analyzer Generator - Optimization of DFA - based pattern matchers.

UNIT – II SYNTAX ANALYSIS

Syntax Analysis : The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers- Parser Generators. Run time environment : Storage Organization – Static Allocation of space.

UNIT – III INTERMEDIATE CODE GENERATION

Intermediate Code Generation : Variants of Syntax trees – Three Address code – Types and Declarations - Translation of Expressions – Type checking - Control flow - Back patching - Switch Statements – Intermediate Code for Procedure

UNIT – IV CODE GENERATION

Code Generation : Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs – Optimization of Basic Blocks - A simple code generator – Peephole Optimization.

UNIT – V OPTIMIZATION TECHNIQUES

Machine Independent Optimizations: The Principal Sources of Optimization - Introduction to Data Flow analysis – Foundations of data flow analysis – Partial Redundancy Elimination - Loops in flow graph

Text books and References

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, “Compilers-Principles, Techniques,and Tools”, Second Edition, Pearson Education Asia, 2014.
2. Kennath C.Louden, Compiler Construction Principles and Practice, Vikas publishing House, 2004.
3. Terence Halsey, Compiler Design Principles, Techniques and Tools, Larsen andKeller Education, 2018
4. Sudha Rani S, Karthi M., Raj Kumar Y - Compiler Design, Wiley 2019.
5. Adesh K Pandey, “Concepts of Compiler Design”, Katson, 2013.

Course Objectives:

- To get a clear understanding about networks and operating systems
- To apply basic networking concepts in projects
- To get clear understanding about file systems

Course Outcomes:

- Get an insight about networking concepts
- Able to get knowledge about operating system concepts
- Able to have knowledge about file system concepts

UNIT-1

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 – Multi datagram 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 books and References

1. Pradeep K Sinha, —Distributed Operating Systems – Concepts and Design, PHI, 2016
2. Andrew S Tanenbaum , —Distributed Operating Systems, First Edition, PHI.2017
3. Abraham Silberchalz Peter B. Galvin, G.Gagne, —Operating Systems Concepts, Ninth edition, Addison Wesley Publishing Co., 2018.
4. Coulouris George, Dollimore Jean, Blair Gordon—Distributed systems- concepts and design Pearson 2017.

Course Objectives:

- To learn programming constructs of C++.
- To implement the linear and non-linear data structure using STL
- To Understand different operations of search trees
- To Implement graph traversal and searching algorithms
- Be exposed to searching and sorting algorithms

Course Outcomes:

- Apply generic programming technique to implement any data structure
- Apply appropriate search trees for an application
- Use graphs in problem solving

(Model List only, Please add more algorithms based programmes)

1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n.
2. Sort a given set of elements using merge sort method and determine the time required to sort the elements. Repeat the experiment for different of values of n.
3. Write a program to obtain the topological ordering of vertices in a given digraph.
4. Implement travelling salesman problem.
5. Implement the knapsack problem (0/1).
6. Print all the nodes reachable from a given starting node in a digraph using BFS method.
7. Check whether a given graph is connected or not using DFS method.
8. Write a program to implement binary search using divide and conquer technique
9. Write a program to implement insertion sort using decrease and conquer technique
10. Find minimum cost spanning tree of a given undirected path using a Prim's algorithm.
11. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

Course Objectives:

- To deepen student's programming skills by analyzing the real world problem in a programmer's point of view and implement the concepts in real time projects
- To enable the students to learn the ethical, historical, environmental and technological aspects of Advanced Java Programming and how it impacts the social and economic development of society

Course Outcomes:

- Able to develop a Graphical User Interface (GUI) with Applet and Swing.
- Develop a Client-Server Application with Database Maintenance.

(Model List only, Please add more programmes)

1. Write a Program in Java to implement Calculator using Swing technology
2. Write a Program that displays two textboxes for entering a students' Roll-no and Name with appropriate labels and buttons
3. Write a Java program that makes a connection with database using JDBC and prints metadata of this connection
4. Include the database connectivity to insert, update, delete and display of student information and display it
5. Write a java program for one way TCP communication for server and client, where server will response to client with current data and time.
6. Write a java program for two way TCP communication for server and client. It should look like a simple chat application
7. Write a java program for UDP Communication where client will send name of country and server will return the capital of that country
8. Create a simple calculator application that demonstrates the use of RMI. You are not required to create GUI.
9. Create Servlet That Prints Hello World.
10. Create Servlet That Prints Today's Date

11. Create Servlet for login page, if the username and password is correct then prints message "Hello username" else a message "login failed".
12. Create Servlet that uses cookies to store the number of times a user has visited the servlet
13. Create a Servlet for demo of KBC game. There will be continuous two or three pages with different MCQs. Each correct answer carries Rs. 10000. At the end as per user's selection of answers total prize he won should be declared. User should not be allowed to backtrack.
14. Create a Servlet that implements ServletContextAttributeListener interface such that a message dialog is displayed whenever an attribute is added or removed or replaced.
15. Create a Servlet filter that calculates server's response time and add it to response when giving it back to client.
16. Create a jsp that prints hello world.
17. Create jsp that prints current date and time.
18. Create a jsp that add and subtract two numbers.
19. Create a jsp for login module.
20. Create a web page that prints 1 to 10 using JSTL.
21. Create a custom JSP tag that prints current date and time. Use this tag into JSP page

Semester II

Subject No	Core/Elective	Subject Name	Hours per week	Credits
8	Core- 8	Advanced Web Technology	5	4
9	Core- 9	Machine Learning	5	4
10	Core- 10	Advanced DBMS	4	4
11	Core- 11	Cryptography and Network Security	4	4
12	Elective– 1	Data Mining	4	3
13	Core - 12 Practical - 3	Advanced Web Technology Lab	4	2
14	Core - 13 Practical - 4	Machine Learning Lab using Python	4	2

ADVANCED WEB TECHNOLOGY [CLTP 4410]

Course Objectives:

- Explore the backbone of web page creation by developing .NET skill.
- Enrich knowledge about HTML control and web control classes
- Provide depth knowledge about ADO.NET
- Understand the need of usability, evaluation methods for web services

Course Outcomes

- Design a web page with Web form fundamentals and web control classes
- Recognize the importance of validation control, cookies and session
- Apply the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model.
- Recognize the difference between Data list and Data grid controls in accessing data.

UNIT 1: OVERVIEW

OVERVIEW OF ASP.NET - The .NET framework – Learning the .NET languages Data types – Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces : The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting Up ASP.NET and IIS

UNIT - II APPLICATIONS

Developing ASP.NET Applications - ASP.NET Applications: ASP.NET applications– Code behind- The Global. asax application file- Understanding ASP.NET Classes- ASP.NET Configuration. Web Form fundamentals: A simple page applet- Improving the currency converter- HTML control classes- The page class- Accessing HTML server controls. Web controls: Web Control Classes – Auto Post Back and Web Control events- Accessing web controls. Using Visual Studio.NET: Starting a Visual Studio.NET Project- Web form Designer- Writing code- Visual studio.NET debugging. Validation and Rich Controls: Validation- A simple

Validation example- Understanding regular expressions- A validated customer form. State management - Tracing, Logging, and Error Handling.

UNIT– III WORKING WITH DATA

Working with Data - Overview of ADO.NET - ADO.NET and data management- Characteristics of ADO.NET-ADO.NET object model. ADO.NET data access : SQL basics– Select , Update, Insert, Delete statements- Accessing data- Creating a connection- Using a command with a DataReader - Accessing Disconnected data - Selecting multiple tables – Updating Disconnected data. Data binding: Single value Data Binding- Repeated value data binding- Data binding with data bases. Data list – Data grid – Repeater – Files, Streams and Email – Using XML

UNIT- IV WEB SERVICES

Web Services - Web services Architecture : Internet programming then and now- WSDL–SOAP- Communicating with a web service-Web service discovery and UDDI. Creating Web services : Web service basics- The Stock Quote web service – Documenting the web service- Testing the web service- Web service Data types- ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with Terra Service.

UNIT – V ADVANCED ASP.NET

Advanced ASP.NET - Component Based Programming: Creating a simple component – Properties and state- Database components- Using COM components. Custom controls: User Controls- Deriving Custom controls. Caching and Performance Tuning: Designing and scalability– Profiling- Catching- Output catching- Data catching. Implementing security: Determining security requirements- The ASP.NET security model- Forms authentication- Windows authentication.

Text Books and References

1. Mathew Mac Donald, “ASP.NET Complete Reference”, TMH 2005.
2. Crouch Matt J, “ASP.NET and VB.NET Web Programming”, Addison Wesley 2002.
3. J.Liberty, D.Hurwitz, “Programming ASP.NET”, Third Edition, O’REILLY, 2006.

MACHINE LEARNING

[CLTP4410]

Course Objectives:

- To Learn about Machine Intelligence and Machine Learning applications
- To implement and apply machine learning algorithms to real- world applications.
- To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
- To understand how to perform evaluation of learning algorithms and model selection.

Course Outcomes

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
- Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
- Be able to design and implement various machine learning algorithms in a range of real-world applications.

UNIT -1 INTRODUCTION

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Linear Discriminants – Perceptron – Linear Separability– Linear Regression.

UNIT - II LINEAR MODELS

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT– III TREE AND PROBABILISTIC MODELS

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

UNIT- IV DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

UNIT – V GRAPHICAL MODELS

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

Text Books and References

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.

ADVANCED DBMS

[C L T P 4 3 1 0]

Course Objectives:

- Acquire broad understanding of database concepts and database management system software and Emerging Trends in it.
- Learn the method of handling distributed and object databases.

Course Outcomes

- Know about the Various Data models and Works on Database Architecture
- Knowledge patterns, Object Oriented Databases are well equipped.

UNIT -1

Database design and the ER 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–1NF to 5NF – Denormalization.

UNIT - II

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– III

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- IV

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.

UNIT – V

Object-Based Databases: Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multiset, Object Identity and Reference Types, Object Oriented versus Object Relational. XML : Motivation-Structure of XML Data- XML document schema-Querying and transformation- Application Program Interfaces to XML –Storage of XML Data- XML Application

Text Books and References

1. Abraham Silberschatz, Henry F. Korth and S.Sudarshan, — “Database System Concepts”, Sixth Edition, McGrawHill International Edition, 2011.
2. C.J.Date, — “Introduction to Database Systems”, 8th Edition, Pearson Education, 2003.
3. <https://spoken-tutorial.org>
4. Kogent Learning Solutions "Database Management Systems applications" Dreamtech Press, 2014

CRYPTOGRAPHY AND NETWORK SECURITY [CLTP4310]

Course Objectives:

- To understand security design principles
- To learn secure programming techniques
- To understand the mathematics behind cryptography
- To know the standard algorithms used to provide confidentiality, integrity and authenticity
- To understand the security requirements in operating systems and databases
- To learn about the security applications in wireless environment.

Course Outcomes:

- Illustrate the approaches, trade-offs in security design principles.
- Apply number theory in public key encryption techniques.
- Design a secure operating system
- Discuss the various platform security models in a mobile environment.

UNIT-1

Introduction-Security trends-The OSI security architecture- Security attacks, services and mechanisms- A Model of network security-Security Goals- Cryptographic Attacks—Classical encryption techniques: Symmetric cipher Model-substitution-transposition - steganography- Block cipher and the DES: Block cipher Principles – DES - The strength of DES- Differential and Linear Crypt Analysis-Block Cipher Design Principles.

UNIT – II

Advanced Encryption Standard- AES Cipher-More on Symmetric Ciphers: Block Cipher modes of operation-Stream Cipher and RC4.Public-Key Encryption and Hash Function: Prime Numbers- Testing for Primality- The Chinese remainder theorem-Public-Key Cryptography and RSA: Principles of Public Key Cryptosystem- The RSA Algorithm-Key Management -Diffie-Hellman Key Exchange- Message Authentication and Hash Function: Authentication Function – Message Authentication Codes-Hash function – HMAC – CMAC - Digital Signature-Authentication Protocol.

UNIT – III

Authentication Applications – Kerberos-x.509AuthenticationService-Public-KeyInfrastructure-Secret Key Algorithm-Security at the Application Layer: Electronic Mail Security-Pretty Good Privacy (PGP)- S/MIME.

UNIT – IV

IPSecurity- IPSecurity - Overview- IPSecurity - Architecture,-Authentication-Header-Encapsulating Security Payload- Combining Security Associations. Web Security: Web Security Considerations-Secure Socket Layer (SSL) and Transport Layer Security (TLS)- Secure Electronic Transaction (SET).Network Management Security :Basic Concepts of SNMP, SNMPv1, SNMPv3, VPN.

UNIT – V

System Security: Intruders - Intruders, Intrusion Detection- Password Management-Malware. Malicious Software: Viruses and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks. Firewalls: Firewall Design Principles, Trusted Systems, Common Criteria for information technology Security Evaluation. Legal and Ethical Issues in Computer Security: Protecting Programs Data-Information and the Law-Redress for Software failures-Selling Correct Software Flaws.

Text books and References

1. Stallings William, “Cryptography and Network Security - Principles and Practice2017.
2. Behrouz A. Ferouzan, “Cryptography & Network Security” , Tata McGraw Hill, 2007,Reprint 2015.
3. Charless P.Pfleeger, Shari Lawrence Pfleeger, “ Security in Computing”, Fourth Edition, 2007
4. Young Man Rhee, “Internet Security: Cryptographic Principles”, “Algorithms And Protocols”,Wiley Publications, 2003.
5. William Stallings, “Network Security Essentials Applications and Standards” Third Edition, Pearson Education, 2008.
6. Charles Pfleeger, “Security In Computing”, 4th Edition, Prentice Hall Of

India,2006.

7. Ulysess Black, “Internet Security Protocols”, Pearson Education Asia,2000.
8. Charlie Kaufman And Radia Perlman, Mike Speciner, “Network Security, Second Edition, Private Communication In Public World”, PHI2002.
9. Bruce Schneier And Neils Ferguson, “Practical Cryptography” ,First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
10. Douglas R Simson “Cryptography – Theory And Practice”, First Edition, CRC Press,1995.

DATA MINING

[C L T P 3 3 1 0]

Course Objectives:

- Examine the types of the data to be mined.
- Explore and understand data mining algorithms.

Course Outcomes:

- To evaluate various mining techniques on complex data objects
- To develop applications using Big Data Mining Tools.

UNIT-1

Data Mining and Data Preprocessing: Data Mining – Motivation – Definition – Data Mining on what Kind of Data –Functionalities – Classification – Data Mining Task Primitives – Major Issues in Data Mining . Data Preprocessing – Definition – Data Cleaning – Integration - Transformation – Data Reduction.

UNIT – II

Data Warehousing: Definition -Data Warehouse Architecture- Multidimensional Data Model . Frequent Patterns, Associations : Market basket analysis - Association Rule, Support and Confidence - Apriori algorithm - Generating association rule from frequent itemset - Mining frequent item sets without candidate generation (FP- growth) - Overview of multilevel association rule - Multidimensional association rule- - closed item set - maximal item set.

UNIT – III

Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbor – Other Classification Methods.

UNIT – IV

Cluster Analysis: Definition – Types of data in Cluster Analysis – Categorization of major Clustering Techniques – Partitioning Methods – Hierarchical Clustering – BIRCH - ROCK – Grid Based Methods – Model Based Clustering Methods – Outlier Analysis.

UNIT – V

Spatial, Multimedia, Text and Web Data: Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining.
Data mining tool – Orange Tool.

Text books and References

1. Jiawei Han and Micheline Kambar, — “Data Mining Concepts and Technique:”, Second Edition, Elsevier, Reprinted 2008.
2. Marget H.Dunham, — “Data Mining Introductory and Advanced Concepts” Pearson Education 2003.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, - “Introduction to Data Mining”, Pearson Education, 2007.
4. G.K.Gupta, - “Introduction to Data Mining with Case Studies”, 3rd Edition, PHI,2015.
5. <http://www.celta.paris-sorbonne.fr/anasem/papers/miscelanea/InteractiveDataMining.pdf>

Advanced Web technology LAB [C L T P 2004]

Course Objectives:

- Try and develop the most important technologies that are being used today by web developers to build a wide variety of web applications.
- To develop Java based web programming.
- To build web applications using proven developer tools and message formats.

Course Outcomes:

- Apply the Object Oriented features of Java for programming on the internet
- Implement socket programming and Client side scripting in Java
- Design a Web application using various technologies such as Java, XML, AJAX, Servlets, PHP, JSP, Django and Jena.
- Create applications using web services such as WSDL and SOAP

LIST OF EXERCISES RECOMMENDED:

1. HTML

- I. Simple HTML
- II. Hyper Links
- III. Using Frames
- IV. Registration Form with Table

2. CSS

- I. Inline Style, Internal Style, and External Style Sheets

3. DHTML

- I. Use user defined function to get array of values and sort them in Ascending order
- II. Demonstrate String and Math Object's predefined methods
- III. Demonstrate Array Objects and Date Object's predefined methods
- IV. Exception Handling
- V. Calendar Creation: Display all month
- VI. Event Handling

4. ASP

- I. Create a welcome Cookie (Hit for a page) and display different image and text content each time when the user hit the page

- II. List a table of content and navigate within the pages
- III. Demonstrate Request and Response object using HTML Form
- IV. Database Connection to display all the values in the table

5. Java Servlets

- I. Simple Servlets
- II. Servlets with HTML form
- III. Cookie creation and retrieval using servlet

6. XML

- I. Create a any catalog
- II. Display the catalog created using CSS or XSL

7. PHP

- I. File operation
- II. Regular Expression, Array, Math, String, Date functions

MACHINE LEARNING LAB USING PYTHON [C L T P 2004]

Course Objectives:

- To apply the concepts of Machine Learning to solve real-world problems
- To implement basic algorithms in clustering & classification applied to text & numeric data
- To implement algorithms emphasizing the importance of bagging & boosting in classification & regression
- To implement algorithms related to dimensionality reduction
- To apply machine learning algorithms for Natural Language Processing applications

Course Outcomes:

- To learn to use Weka tool for implementing machine learning algorithms related to numeric data
- To learn the application of machine learning algorithms for text data
- To use dimensionality reduction algorithms for image processing applications
- To apply CRFs in text processing applications
- To use fundamental and advanced neural network algorithms for solving real-world data

LIST OF EXERCISES RECOMMENDED:

1. Solving Regression & Classification using Decision Trees
2. Root Node Attribute Selection for Decision Trees using Information Gain
3. Bayesian Inference in Gene Expression Analysis
4. Pattern Recognition Application using Bayesian Inference
5. Bagging in Classification
6. Bagging, Boosting applications using Regression Trees
7. Data & Text Classification using Neural Networks
8. Using Weka tool for SVM classification for chosen domain application
9. Data & Text Clustering using K-means algorithm
10. Data & Text Clustering using Gaussian Mixture Models
11. Dimensionality Reduction Algorithms in Image Processing applications
12. Application of CRFs in Natural Language Processing