

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING****Detailed Syllabus – BR20****For UG - B.Tech: Computer Science and Engineering****III Year – II SEMESTER**

S.No	Course Code	Courses	L	T	P	Credits
1	20CS6T12	Compiler Design	3	0	0	3
2	20CS6T13	Data mining and Data warehousing	3	0	0	3
3	20CS6T14	Design and Analysis of Algorithms	3	0	0	3
4	20CS6D05 20CS6D06 20CS6D07 20CS6D08	Professional Elective -II 1.Machine Learning 2.Big Data Analytics 3. Distributed Systems 4.Network Programming/MOOCs	3	0	0	3
5	20CS6E03 20ME6E02 20CE6E02 20EC6E02	Open Elective- II (Inter Disciplinary) 1. Mean Stack Development 2. Operations Research 3. Green Building 4. Digital Signal Processing	3	0	0	3
6	20CS6L13	Compiler Design Lab	0	0	3	1.5
7	20CS6L14	Data Mining Lab(Python Implementation)	0	0	3	1.5
8	20CS6L15	Web Technology Lab	0	0	3	1.5
9	20CS6S04	Skill Advanced course: Game Development	1	0	2	2
10	20HS6M05	Universal Human Values	2	0	0	0
Total			18	0	11	21.5



III YEAR II SEM	Code: 20CS6T12	L	T	P	C
		3	0	0	3
COMPILER DESIGN					
Course Objectives: Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.					
Course Outcomes: . At the end of the course, student will be able to <ul style="list-style-type: none"> • Demonstrate phases in the design of compiler • Organize Syntax Analysis, Top Down and LL(1) grammars • Design Bottom Up Parsing and Construction of LR parsers • Analyze synthesized, inherited attributes and syntax directed translation schemes • Determine algorithms to generate code for a target machine 					
UNIT I Lexical Analysis: Language Processors, Structure of a Compiler, Lexical Analysis, The Role of the Lexical Analyzer, Bootstrapping, Input Buffering, Specification of Tokens, Recognition of Tokens, Lexical Analyzer Generator-LEX, Finite Automata, Regular Expressions and Finite Automata, Design of a Lexical Analyzer Generator.					
UNIT II Syntax Analysis: The Role of the Parser, Context-Free Grammars, Derivations, Parse Trees, Ambiguity, Left Recursion, Left Factoring, Top Down Parsing: Pre Processing Steps of Top Down Parsing, Backtracking, Recursive Descent Parsing, LL (1) Grammars, Non-recursive Predictive Parsing, Error Recovery in Predictive Parsing.					
UNIT III Bottom Up Parsing: Introduction, Difference between LR and LL Parsers, Types of LR Parsers, Shift Reduce Parsing, SLR Parsers, Construction of SLR Parsing Tables, More Powerful LR Parsers, Construction of CLR (1) and LALR Parsing Tables, Dangling Else Ambiguity, Error Recovery in LR Parsing, Handling Ambiguity Grammar with LR Parsers.					
UNIT IV Syntax Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's. Intermediate Code Generation: Variants of Syntax Trees, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking, Control Flow, Backpatching, Intermediate Code for Procedures.					
UNIT V Run Time Environments: Storage Organization, Run Time Storage Allocation, Activation Records, Procedure Calls, Displays, Code Optimization: The Principle Sources of Optimization, Basic Blocks, Optimization of Basic Blocks, Structure Preserving Transformations, Flow Graphs, Loop Optimization, Data-Flow Analysis, Peephole Optimization Code Generation: Issues in the Design of a Code Generator, Object Code Forms, Code Generation Algorithm, Register Allocation and Assignment.					
Text Books: 1) Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson. 2) Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.					
Reference Books: 1) Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press. 2) The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH 3) Writing compilers and interpreters, R. Mak, 3rd edition, Wiley student edition.					



III YEAR II SEM	Subject Code: 20CS6T13	L	T	P	C
		3	0	0	3
DATA MINING AND DATA WAREHOUSING					
<p>Course Objectives: To Understand about Data Warehouse and Data Mining to extract knowledge from data repository for data analysis, frequent pattern, classification, Clustering and prediction.</p>					
<p>Course Outcomes:</p> <ul style="list-style-type: none"> ➤ Understand Importance of extraction of Knowledge from huge data and Data mining functionalities. ➤ Understand the data pre-processing techniques aggregation, sampling, dimensionality reduction. ➤ Understand multi-dimensional data model like OLAP and Architecture of Data Warehouse ➤ Understand Classification algorithms for Extraction of data to get potential Knowledge ➤ Understanding Associatively among various Item sets and Understanding Associatively using Association Algorithms ➤ Understand and Analyze Various Clustering Algorithms 					
<p>UNIT I Introduction: What Motivated Data Mining? Why Is It Important, Data Mining—On What Kind of Data, Data Mining Functionalities—What Kinds of Patterns can Be Mined? Are All of the Patterns Interesting?, Data Mining Task Primitives, Major Issues in Data Mining. (Han & Kamber)</p>					
<p>UNIT II Data Pre-processing: Why Pre-process the Data? Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation, Data Warehouse and OLAP Technology: An Overview: What Is a Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, (Han & Kamber)</p>					
<p>UNIT III Association Analysis: Basic Concepts and Algorithms: Introduction, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. (Tan & Vipin)</p>					
<p>UNIT IV Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction. Classification: Alternative Techniques, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks</p>					
<p>UNIT V Cluster Analysis: Basic Concepts and Algorithms: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting K-means, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical clustering, Basic Agglomerative Hierarchical clustering Algorithm, Specific Techniques, DBSCAN, Traditional Density: center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses. (Tan & Vipin)</p>					
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Introduction to Data Mining: Pang- Ning Tan & Michael Steinbach, Vipin Kumar, Pearson. 2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier. 					
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning. 2. Data Mining :Introductory and Advanced topics: Dunham, Pearson. 3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH. 4. Data Mining Techniques, Arun K Pujari, Universities Press. 					



III YEAR II SEM	Subject Code: 20CS6T14	L	T	P	C
		3	0	0	3
DESIGN AND ANALYSIS OF ALGORITHMS					
Course Objectives: <ol style="list-style-type: none">1. To provide an introduction to formalisms to understand, analyze and denote time complexities of algorithms2. To introduce the different algorithmic approaches for problem solving through numerous example problems3. To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness					
Course Outcomes: <ol style="list-style-type: none">1. Describe asymptotic notation used for denoting performance of algorithms2. Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms3. List and describe various algorithmic approaches4. Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches					
UNIT I Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation-Big oh notation, Omega notation, Theta notation, small oh notation and Little oh notation, probabilistic analysis.					
UNIT II Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Defective Chess board					
UNIT III Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, spanning trees, Minimum cost spanning trees, Single source shortest path problem.					
UNIT IV Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search tree, String Edition Problem, 0/1 knapsack problem, All pairs shortest path problem, Optimal Merge Pattern,					
UNIT V Backtracking: General method, applications-n-queen problem, sum of sub sets problem, graph coloring, Hamiltonian cycles.					
Text Books: <ol style="list-style-type: none">1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.2. Design and Analysis of Algorithms , S Sridhar, Oxford3. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu Balachandra Dave, 2nd ed, Pearson Education.					
Reference Books: <ol style="list-style-type: none">1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest and. Stein, PHI Pvt. Ltd.					



III Year - II Semester	Code: 20CS6D05	L	T	P	C
		3	0	0	3
MACHINE LEARNING					
<p>Course Objectives: The course is introduced for students to</p> <ul style="list-style-type: none"> <input type="checkbox"/> Gain knowledge about basic concepts of Machine Learning <input type="checkbox"/> Study about different learning algorithms 					
<p>Course Outcomes:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Identify machine learning techniques suitable for a given problem <input type="checkbox"/> Solve the problems using various machine learning techniques <input type="checkbox"/> Apply Dimensionality reduction techniques <input type="checkbox"/> Design application using machine learning techniques 					
<p>UNIT I Introduction: Definition of learning systems, Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation. Inductive Classification: The concept learning task, Concept learning as search through a hypothesis space, General-to-specific ordering of hypotheses, Finding maximally specific hypotheses, Version spaces and the candidate elimination algorithm, Learning conjunctive concepts, The importance of inductive bias.</p>					
<p>UNIT II Decision Tree Learning: Representing concepts as decision trees, Recursive induction of decision trees, Picking the best splitting attribute: entropy and information gain, Searching for simple trees and computational complexity, Occam's razor, Over fitting, noisy data, and pruning. Experimental Evaluation of Learning Algorithms: Measuring the accuracy of learned hypotheses. Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.</p>					
<p>UNIT III Computational Learning Theory: Models of learn ability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension. Rule Learning: Propositional and First-Order, Translating decision trees into rules, Heuristic rule induction using separate and conquer and information gain, First-order Horn-clause induction (Inductive Logic Programming) and Foil, Learning recursive rules, Inverse resolution, Golem, and Progol.</p>					
<p>UNIT IV Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.</p>					
<p>UNIT V Bayesian Learning: Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logistic regression. Bayes nets and Markov nets for representing dependencies. Instance-Based Learning: Constructing explicit generalizations versus comparing to past specific examples. K-Nearest-neighbor algorithm. Case-based learning.</p>					
<p>Text Books:</p> <ol style="list-style-type: none"> 1) T.M. Mitchell, "Machine Learning", McGraw-Hill, 1997. 2) Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019. 					
<p>Reference Books:</p> <ol style="list-style-type: none"> 1) Ethern Alpaydin, "Introduction to Machine Learning", MIT Press, 2004. 2) Stephen Marsland, "Machine Learning -An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014. 					



III YEAR II SEM	Code: 20CS6D06	L	T	P	C
		4	1	0	3
BIG DATA ANALYTICS					
Course Objectives:					
<ol style="list-style-type: none"> 1. To provide students with the fundamentals and essentials of Big Data and Hadoop. 2. Demonstrate various challenges in processing Big Data. 3. Demonstrate various concepts of Big Data and Hadoop. 					
Course Outcomes:					
<ol style="list-style-type: none"> 1. Understand about the HDFS and Hadoop architecture. 2. Identify appropriate techniques and tools to solve actual Big Data problems. 3. Understand and analyze the knowledge about the Pig and HIVE. 4. Obtaining the knowledge about the MongoDB and Spark. 					
UNIT I					
Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization					
UNIT II					
Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Name node, Data node, Secondary Name node, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.					
UNIT III					
Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner.					
UNIT IV					
Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections. Pig: Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts.					
UNIT V					
Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables. MongoDB: What is MongoDB, use of MongoDB, difference of RDBMS and MongoDB, data types, MongoDB Query Language. SPARK: Introduction to Spark - Getting started, Resilient Distributed Dataset and Data Frames					
Text Books:					
<ol style="list-style-type: none"> 1. "BigData and Analytics" by SeemaArcharya and SubhashiniChellappan, Wiley publications. 2. "Learning Spark: Lightning-Fast Big Data Analysis" by Holden Karau, O'Reilly publications. 					
Reference Books:					
<ol style="list-style-type: none"> 1. Hadoop in Practice by Alex Holmes, MANNING Publication. 2. Hadoop Map Reduce Cook book, SrinathPerera, ThilinaGunarathne 					



III YEAR II SEM	Code: 20CS6D07	L	T	P	C
		3	0	0	3
DISTRIBUTED SYSTEMS					
Course Outcomes: <ul style="list-style-type: none">➤ Develop a familiarity with distributed file systems.➤ Describe important characteristics of distributed systems and the salient architectural features of such systems.➤ Describe the features and applications of important standard protocols which are used in distributed systems.➤ Gaining practical experience of inter-process communication in a distributed environment					
UNIT I Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model					
UNIT II Interprocess Communication: Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.					
UNIT III Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Model, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI					
UNIT IV Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads – Address Space, Creation of a New Process, Threads.					
UNIT V Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.					
Text Books: <ol style="list-style-type: none">1. Ajay D Kshemkalyani, MukeshSighal, “Distributed Computing, Principles, Algorithms and Systems”, Cambridge.2. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems- Concepts and Design”, Fourth Edition, Pearson Publication					
Reference Books: <ol style="list-style-type: none">1. Distributed-Systems-Principles-Paradigms-Tanenbaum PHI					



III YEAR II SEM	Code: 20CS6D08	L	T	P	C
		3	0	0	3
NETWORK PROGRAMMING					
Course Outcomes: <ul style="list-style-type: none">➤ After completion of the subject a student will be➤ able to explore basics networking concepts➤ able to demonstrate TCP socket programming➤ able to illustrate UDP socket programming.➤ able to demonstrate inter process communication.					
UNIT I Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.					
UNIT II TCP client server : Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host					
UNIT III Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.					
UNIT IV Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.					
UNIT V IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores.					
Text Books: <ol style="list-style-type: none">1. UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.					
Reference Books: <ol style="list-style-type: none">1. UNIX Systems Programming using C++ T CHAN, PHI.2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, Kingabls, Pearson Education3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education					



III Year - II Semester	Code: 20CS6E03	L	T	P	C
		3	0	0	3
MEAN STACK DEVELOPMENT					
<p>Course Outcomes: After the completion of the course, student will be able to</p> <ul style="list-style-type: none"> ➤ Enumerate the Basic Concepts of Web & Markup Languages ➤ Develop web Applications using Scripting Languages & Frameworks ➤ Make use of Express JS and Node JS frameworks ➤ Illustrate the uses of web services concepts like restful, react js ➤ Apply Deployment Techniques & Working with cloud platform 					
<p>UNIT I Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.</p>					
<p>UNIT II JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, \$eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS.</p>					
<p>UNIT III Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js: Introduction to Express Framework, Introduction to Nodejs , What is Nodejs, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.</p>					
<p>UNIT IV RESTful Web Services: Using the Uniform Interface, Designing URIs, Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.</p>					
<p>UNIT V Mongo DB: Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.</p>					
<p>Text Books:</p> <ol style="list-style-type: none"> 1) Programming the World Wide Web, Robert W Sebesta, 7ed, Pearson. 2) Web Technologies, Uttam K Roy, Oxford 3) Pro Mean Stack Development, ELadElrom, Apress 4) Restful Web Services Cookbook, Subbu Allamraju, O'Reilly 5) JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly 6) Web Hosting for Dummies, Peter Pollock, John Wiley Brand 					
<p>Reference Books:</p> <ol style="list-style-type: none"> 1) Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006). 2) Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012). 3) Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech. 4) An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning. 					



III YEAR II SEM	Code : 20CS6E05	L	T	P	C
		3	0	0	3
CLOUD COMPUTING					
Course Objectives:					
1. The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.					
Course Outcomes:					
1. Understanding the key dimensions of the challenge of Cloud Computing					
2. Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization					
UNIT I					
Systems modeling, Clustering and virtualization:					
Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency.					
UNIT II					
Virtual Machines and Virtualization of Clusters and Data Centers:					
Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.					
UNIT III					
Cloud Platform Architecture:					
Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.					
UNIT IV					
Cloud Programming and Software Environments:					
Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.					
UNIT V					
Storage Systems:					
Evolution of storage technology, storage models, file systems and database, distributed file Systems, general parallel file systems. Google file system. Apache Hadoop, BigTable, Megastore, Amazon Simple Storage Service (S3).					
Text Books:					
1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK B Elsevier.					
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.					
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press.					
Reference Books:					
1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH.					
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH.					



III YEAR II SEM	Code: 20CS6L13	L	T	P	C
		0	0	3	1.5
COMPILER DESIGN LAB					
Course Objectives: To enlighten the student with knowledge base in compiler design and its applications					
Course Outcomes: The end of the course student will be able to <ul style="list-style-type: none">• Design simple lexical analyzers• Determine predictive parsing table for a CFG• Apply Lex and Yacc tools• Examine LR parser and generating SLR Parsing table• Relate Intermediate code generation for subset C language					
Experiments: <ol style="list-style-type: none">1. Write a C program to identify different types of Tokens in a given Program.2. Write a Lex Program to implement a Lexical Analyzer using Lex tool.3. Write a C program to Simulate Lexical Analyzer to validating a given input String.4. Write a C program to implement the Brute force technique of Top down Parsing.5. Write a C program to implement a Recursive Descent Parser.6. Write C program to compute the <i>First</i> and <i>Follow</i> Sets for the given Grammar.7. Write a C program for eliminating the left recursion and left factoring of a given grammar8. Write a C program to check the validity of input string using Predictive Parser.9. Write a C program for implementation of LR parsing algorithm to accept a given input string.10. Write a C program for implementation of a Shift Reduce Parser using Stack Data Structure to accept a given input string of a given grammar.11. Write a C program for generating the three address code of a given expression/statement.12. Write a C program for implementation of a Code Generation Algorithm of a given expression/statement.					
Text Books & Reference Books : <ol style="list-style-type: none">1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson Publishers, 2007.2. John R Levine, Tony Mason, Doug Brown, "Lex and Yacc", Orielly, 2nd Edition, 2009.					



III YEAR II SEM	Code: 20CS6L14	L	T	P	C
		0	0	3	1.5
Data Mining Lab					
Course Objectives: The main objective of the course is to <ul style="list-style-type: none">• Inculcate Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment• Design a data warehouse or data mart to present information needed by management in a form that is usable• Emphasize hands-on experience working with all real data sets.• Test real data sets using popular data mining tools such as WEKA, Python Libraries• Develop ability to design various algorithms based on data mining tools.					
Course Outcomes: By the end of the course student will be able to <ul style="list-style-type: none">• Design a data mart or data warehouse for any organization• Extract knowledge using data mining techniques and enlist various algorithms used in information analysis of Data Mining Techniques• Demonstrate the working of algorithms for data mining tasks such as association rule mining, classification for realistic data• Implement and Analyze on knowledge flow application on data sets and Apply the suitable visualization techniques to output analytical results					
List of Experiments: <ol style="list-style-type: none">1. Creation of a Data Warehouse.<ul style="list-style-type: none">➤ Build Data Warehouse/Data Mart (using open source tools like Pentaho Data Integration Tool, Pentaho Business Analytics; or other data warehouse tools like Microsoft-SSIS, Informatica, Business Objects, etc.,)➤ Design multi-dimensional data models namely Star, Snowflake and Fact Constellation schemas for any one enterprise (ex. Banking, Insurance, Finance, Healthcare, manufacturing, Automobiles, sales etc).➤ Write ETL scripts and implement using data warehouse tools.➤ Perform Various OLAP operations such slice, dice, roll up, drill up and pivot2. Explore machine learning tool “WEKA”<ul style="list-style-type: none">➤ Explore WEKA Data Mining/Machine Learning Toolkit.➤ Downloading and/or installation of WEKA data mining toolkit.➤ Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface, Experimenter, command-line interface.➤ Navigate the options available in the WEKA (ex. Select attributes panel, Preprocess panel, Classify panel, Cluster panel, Associate panel and Visualize panel)➤ Study the arff file format Explore the available data sets in WEKA. Load a data set (ex. Weather dataset, Iris dataset, etc.)➤ Load each dataset and observe the following:<ol style="list-style-type: none">1. List the attribute names and they types2. Number of records in each dataset3. Identify the class attribute (if any)4. Plot Histogram5. Determine the number of records for each class.6. Visualize the data in various dimensions3. Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets<ul style="list-style-type: none">➤ Explore various options available in Weka for preprocessing data and apply Unsupervised filters like Discretization, Resample filter, etc. on each dataset➤ Load weather. nominal, Iris, Glass datasets into Weka and run Apriori Algorithm with different support and confidence values.➤ Study the rules generated. Apply different discretization filters on numerical attributes and run the Apriori association rule algorithm. Study the rules generated.					



- Derive interesting insights and observe the effect of discretization in the rule generation process.
4. Demonstrate performing classification on data sets
 - Load each dataset into Weka and run Id3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kappa statistic.
 - Extract if-then rules from the decision tree generated by the classifier, Observe the confusion matrix.
 - Load each dataset into Weka and perform Naïve-bayes classification and k-Nearest Neighbour classification. Interpret the results obtained.
 - Plot RoC Curves
 - Compare classification results of ID3, J48, Naïve-Bayes and k-NN classifiers for each dataset, and deduce which classifier is performing best and poor for each dataset and justify.
 5. Demonstrate performing clustering of data sets
 - Load each dataset into Weka and run simple k-means clustering algorithm with different values of k (number of desired clusters).
 - Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights.
 - Explore other clustering techniques available in Weka.
 - Explore visualization features of Weka to visualize the clusters. Derive interesting insights and explain.
 6. Demonstrate knowledge flow application on data sets
 - Develop a knowledge flow layout for finding strong association rules by using Apriori, FP Growth algorithms
 - Set up the knowledge flow to load an ARFF (batch mode) and perform a cross validation using J48 algorithm
 - Demonstrate plotting multiple ROC curves in the same plot window by using j48 and Random forest tree
 7. Demonstrate ZeroR technique on Iris dataset (by using necessary preprocessing technique(s)) and share your observations
 8. Write a java program to prepare a simulated data set with unique instances.
 9. Write a Python program to generate frequent item sets / association rules using Apriori algorithm
 10. Write a program to calculate chi-square value using Python. Report your observation.
 11. Write a program of Naive Bayesian classification using Python programming language.
 12. Implement a Java program to perform Apriori algorithm
 13. Write a program to cluster your choice of data using simple k-means algorithm using JDK
 14. Write a program of cluster analysis using simple k-means algorithm Python programming language.
 15. Write a program to compute/display dissimilarity matrix (for your own dataset containing at least four instances with two attributes) using Python
 16. Visualize the datasets using matplotlib in python.(Histogram, Box plot, Bar chart, Pie chart etc.)



III YEAR II SEM	Code : 20CS6L15				L	T	P	C																											
					0	0	3	1.5																											
WEB TECHNOLOGIES LAB																																			
<p>Course Objectives: From the course the student will</p> <ol style="list-style-type: none"> 1. Learn the core concepts of both the frontend and backend programming course 2. Get familiar with the latest web development technologies 3. Learn all about PHP and SQL databases 4. Learn complete web development process 																																			
<p>Course Outcomes: By the end of the course the student will be able to</p> <ol style="list-style-type: none"> 5. Analyze and apply the role of languages like HTML, CSS, XML 6. Review JavaScript, PHP and protocols in the workings of the web and web applications 7. Apply Web Application Terminologies, Internet Tools, E – Commerce and other web services 8. Develop and Analyze dynamic Web Applications using PHP & MySql 9. Install & Use Frameworks 																																			
<p>List of Experiments:</p> <p>1) Design the following static web pages required for an online book store web site: (a) HOME PAGE: The static home page must contain three frames. Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below). Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link “MCA” the catalogue for MCA Books should be displayed in the Right frame.</p> <ol style="list-style-type: none"> 1. Right frame: The <i>pages to the links in the left frame must be loaded here</i>. Initially this page contains description of the web site. 																																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: center;">Logo</td> <td colspan="8" style="text-align: center;">Web Site Name</td> </tr> <tr> <td style="text-align: center;">Home</td> <td style="text-align: center;">Login</td> <td style="text-align: center;">Registration</td> <td style="text-align: center;">Catalogue</td> <td style="text-align: center;">Cart</td> <td colspan="4"></td> </tr> <tr> <td style="text-align: center;">mca mba BCA</td> <td colspan="8" style="text-align: center;">Description of the Web Site</td> </tr> </table>									Logo	Web Site Name								Home	Login	Registration	Catalogue	Cart					mca mba BCA	Description of the Web Site							
Logo	Web Site Name																																		
Home	Login	Registration	Catalogue	Cart																															
mca mba BCA	Description of the Web Site																																		
<p>(b) LOGIN PAGE:</p>																																			


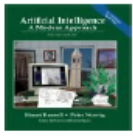



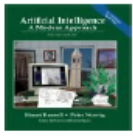



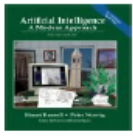




Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA	Login : <input type="text" value="11a51f0003"/> Password : <input type="password" value="*****"/> <input type="button" value="Submit"/> <input type="button" value="Reset"/>			

(c) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table: The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.

Logo	Web Site Name																			
Home	Login	Registration	Catalogue	Cart																
MCA MBA BCA	<table border="1"> <tr> <td>  XML Bible </td> <td> Book : XML Bible Author : Winston Publication : Wiely </td> <td>\$ 40.5</td> <td><input type="button" value="Add to cart"/></td> </tr> <tr> <td>  Artificial Intelligence </td> <td> Book : AI Author : S.Russel Publication : Princeton hall </td> <td>\$ 63</td> <td><input type="button" value="Add to cart"/></td> </tr> <tr> <td>  例解 Java2 企业级J2EE程序设计 </td> <td> Book : Java 2 Author : Watson Publication : BPB publications </td> <td>\$ 35.5</td> <td><input type="button" value="Add to cart"/></td> </tr> <tr> <td>  HTML 4 </td> <td> Book : HTML in 24 hours Author : Sam Peter Publication : Sam </td> <td>\$ 50</td> <td><input type="button" value="Add to cart"/></td> </tr> </table>				 XML Bible	Book : XML Bible Author : Winston Publication : Wiely	\$ 40.5	<input type="button" value="Add to cart"/>	 Artificial Intelligence	Book : AI Author : S.Russel Publication : Princeton hall	\$ 63	<input type="button" value="Add to cart"/>	 例解 Java2 企业级J2EE程序设计	Book : Java 2 Author : Watson Publication : BPB publications	\$ 35.5	<input type="button" value="Add to cart"/>	 HTML 4	Book : HTML in 24 hours Author : Sam Peter Publication : Sam	\$ 50	<input type="button" value="Add to cart"/>
 XML Bible	Book : XML Bible Author : Winston Publication : Wiely	\$ 40.5	<input type="button" value="Add to cart"/>																	
 Artificial Intelligence	Book : AI Author : S.Russel Publication : Princeton hall	\$ 63	<input type="button" value="Add to cart"/>																	
 例解 Java2 企业级J2EE程序设计	Book : Java 2 Author : Watson Publication : BPB publications	\$ 35.5	<input type="button" value="Add to cart"/>																	
 HTML 4	Book : HTML in 24 hours Author : Sam Peter Publication : Sam	\$ 50	<input type="button" value="Add to cart"/>																	

d). REGISTRATION PAGE:

Create a “registration form “with the following fields

- 1) Name (Text field)
- 2) Password (password field)
- 3) E-mail id (text field)
- 4) Phone number (text field)
- 5) Sex (radio button)
- 6) Date of birth (3 select boxes)
- 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
- 8) Address (text area)

2) Design a web page using CSS (Cascading Style Sheets) which includes the following: Use different font, styles:

In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles

3) Design a dynamic web page with validation using JavaScript.

4) Design a HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display

a. Factorial of that number



<p>b. Fibonacci series up to that number c. Prime numbers up to that number d. Is it palindrome or not</p>
<p>5) Write JavaScript programs on Event Handling a. Validation of registration form b. Open a Window from the current window c. Change color of background at each click of button or refresh of a page d. Display calendar for the month and year selected from combo box e. On Mouse over event</p>
<p>6) Write an XML file which will display the Book information which includes the following: 1) Title of the book 2) Author Name 3) ISBN number 4) Publisher name 5) Edition 6) Price a) Write a Document Type Definition (DTD) to validate the above XML file. b) Write a XML Schema Definition (XSD) to validate the above XML file.</p>
<p>7) Create Web pages using AJAX.</p>
<p>8) User Authentication: Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following. 1. Create a Cookie and add these four user id's and passwords to this Cookie. 2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user". Use init-parameters to do this.</p>
<p>9) Example PHP program for registering users of a website and login.</p>
<p>10) Install a database (Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form). Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).</p>
<p>11) Write a PHP which does the following job: Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).</p>
<p>12) Implement a Servlet program on request response processing.</p>
<p>13) Implement a Servlet program for Registration Page.</p>
<p>14) Connect to a database using JSP and practice SQL Queries (MySql or Oracle).</p>



III YEAR II SEM	Code: 20CS6S04	L	T	P	C
		0	0	3	1.5
Skill Advanced course: Game Development					
1	Mini – Game Project				
2	Coin Collection Game				
3	Adventure Game				
4	Car Race Game				
5	Puzzle Game				
Software's					
1	Unity 5.6.7f1				
2	Blender 2.79				
3	Krita				
4	World Machine				