### ANNA UNIVERSITY
DISTANCE EDUCATION
REGULATIONS – 2018
CURRICULUM AND SYLLABUS I TO IV SEMESTERS
MASTER OF COMPUTER APPLICATIONS (MCA - 2 Years)

#### SEMESTER I

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OBJECTIVES:

- To provide methods for understanding the consistency and solving the equation as well as for finding the Eigenvalues and Eigenvectors of square matrix.
- To provide foundation on Applied Probability
- To introducethe concepts of correlation and regression of random variables
- To use various statistical techniques in Application problems
- To introduce the concept of Design of Experiments for data analysis

UNIT - I  MATRICES AND EIGENVALUE PROBLEMS  15
Matrices - Rank of a Matrix - Consistently of a system of linear equations - Solution of the matrix equation $\Delta x = b$ - Row - reduced Echelon Form - Eigenvalues and Eigenvectors - Properties - Cayley - Hamilton Theorem - Inverse of a matrix.

UNIT - II  PROBABILITY AND RANDOM VARIABLES  15

UNIT - III  TWO-DIMENTIONAL RANDOM VARIABLES  15
Joint probability distributions - Marginal and conditional probability distributions - Covariance - Correlation - Linear regression lines - Regression curves - Transform of random variables - Central limit theorem (for independent identically random variables).

UNIT - IV  TESTING OF HYPOTHESIS  15
Sampling distributions - Tests based on small and large samples - Normal, Student’s t, Chi-square and F distributions for testing of mean, variance and proportion and testing of difference of means variances and proportions - Tests for independence of attributes and goodness of fit.

UNIT - V  DESIGN OF EXPERIMENTS  15
Analysis of variance - Completely randomized design - Random block design (One-way and Two-way classifications) - Latin square design - $2^2$ Factorial design.

TOTAL PERIODS: 75

OUTCOMES:

After the completion of the course the student will be able to

- Test the consistency and solve system of linear equations as well as find the Eigenvalues and Eigenvector.
- Apply the Probability axioms as well as rules and the distribution of discrete and continuous ideas in solving real world problems.
- Apply the concepts of correlation and regression of random variables in solving application problems.
- Use statistical techniques in testing hypothesis on data analysis.
- Use the appropriate statistical technique of design of experiments in data analysis.
REFERENCE BOOKS:

DMC6102 ADVANCED DATA STRUCTURES AND ALGORITHMS L T P C
3 0 0 3

OBJECTIVES:
● Understand and apply linear data structures-List, Stack and Queue
● Understand the graph algorithms.
● Learn different algorithm analysis techniques.
● Apply data structures and algorithms in real time applications
● Analyze the efficiency of an algorithm

UNIT I LINEAR DATA STRUCTURES 9

UNIT II NON-LINEAR DATA STRUCTURES 9

UNIT III GRAPHS 9
Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra’s algorithm – Bellman-Ford algorithm – Floyd’s Algorithm - minimum spanning tree – Prim’s and Kruskal’s algorithms.

UNIT IV ALGORITHM DESIGN AND ANALYSIS 9

UNIT V ADVANCED ALGORITHM DESIGN AND ANALYSIS 9

TOTAL: 45 PERIODS

OUTCOMES:
● Implement a program using stack, queue, linked list data structures
● Design and Implement Tree data structures and Sets
● Apply the Graph Data structure and to find shortest path among the several possibilities
● Perform analysis of various algorithms
● Analyze and design algorithms to appreciate the impact of algorithm design in practice.
REFERENCES:


OBJECTIVES:

- To learn the fundamentals of data modeling and design in advanced databases.
- To study the working principles of distributed databases.
- To have an introductory knowledge about the query processing in object-based databases and its usage.
- To understand the basics of spatial, temporal and mobile databases and their applications.
- To learn emerging databases such as XML, Data warehouse and NoSQL.

UNIT I DISTRIBUTED DATABASES


UNIT II NOSQL DATABASES


UNIT III ADVANCED DATABASE SYSTEMS


UNIT IV XML AND DATAWAREHOUSE


UNIT V INFORMATION RETRIEVAL AND WEB SEARCH


TOTAL: 45 PERIODS
OUTCOMES:

On completion of the course, the student will be able to:

1. Design a distributed database system and execute distributed queries.
2. Use NoSQL database systems and manipulate the data associated with it.
3. Design a data warehouse system and apply OLAP operations.
4. Design XML database systems and validating with XML schema.
5. Apply knowledge of information retrieval concepts on web databases.

REFERENCES:

OBJECTIVES:

- To understand the phases in object oriented software development
- To gain fundamental concepts of requirements engineering and analysis.
- To know about the different approach for object oriented design and its methods
- To learn about how to perform object oriented testing and how to maintain software
- To provide various quality metrics and to ensure risk management.

UNIT I SOFTWARE DEVELOPMENT LIFE CYCLE


UNIT II OBJECT ORIENTED REQUIREMENTS ELICITATION & ANALYSIS


UNIT III OBJECT ORIENTED SOFTWARE DESIGN


UNIT IV OBJECT ORIENTED TESTING AND MAINTENANCE


UNIT V SOFTWARE QUALITY & METRICS


TOTAL: 45 PERIODS
OUTCOMES:

- Able to identify the appropriate process model to develop the object oriented software
- Gain knowledge about requirement elicitation and analyzing techniques
- Able to choose and design suitable UML diagrams and methods
- Able to apply correct testing methods and maintain software systems.
- Able to estimate the object oriented application by applying metric data.

REFERENCES:

OBJECTIVES:
- To develop Python programs with conditionals and loops.
- To define Python functions and use function calls.
- To use Python data structures – lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I PYTHON BASICS 10

UNIT II DATA TYPES IN PYTHON 10

UNIT III FILE HANDLING AND EXCEPTION HANDLING 8
Files: Introduction – File Path – Opening and Closing Files – Reading and Writing Files – File Position – Exception: Errors and Exceptions, Exception Handling, Multiple Exceptions

UNIT IV MODULES, PACKAGES 9

UNIT V OBJECT ORIENTED PROGRAMMING IN PYTHON 8
Creating a Class, Class methods, Class Inheritance, Encapsulation, Polymorphism, class method vs. static methods, Python object persistence

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, students will be able to
- Develop algorithmic solutions to simple computational problems.
- Structure simple Python programs for solving problems.
- Read and write data from/to files in Python Programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Decompose a Python program into functions.
REFERENCES:


COURSE OBJECTIVES:
The course should enable the students to:

- Identify an appropriate research problem in their interesting domain.
- Understand ethical issues; understand the Preparation of a research project thesis report.
- Understand the Preparation of a research project thesis report
- Understand the law of patent and copyrights.
- Acquire adequate knowledge of IPR.

UNIT I  RESEARCH METHODOLOGY  6
Research Methodology – An Introduction, Objectives, Types of research, Research approaches, Significance, Research methods versus Methodology, Research and Scientific method, Importance, Research process, Criteria, Problems encountered by researchers.

Defining the research problem – Research problem, Selecting the problem, Necessity, Technique involved, An illustration.

Reviewing the Literature – The place of the literature review in research, How to review the Literature, Writing about the literature reviewed.

UNIT II  RESEARCH DESIGN  6
Research Design – Meaning, Need, Features, Different research design, Basic principles of experimental designs, Important experimental designs.

Measurement & Scaling techniques – Sampling Design, Measurement in research, Measurement scales, Error, Measurement tools, Scaling, Meaning, Scale classification, Scale construction techniques

Data Collection – Collection of primary data, Collection of secondary data, Selection of appropriate method for data collection.

UNIT III  RESEARCH TECHNIQUE AND TOOLS  6
Testing of Hypothesis – Basic concepts, Procedure, Test of Hypothesis, Important parametric Tests, Hypothesis Testing unifications.

Interpretation & Report writing – Meaning, techniques, Precaution in Interpretation, Significance of Report writing, steps, Layout, types, mechanics, precautions.

Use of Tools/ Techniques for research – Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science Discipline, Use of tools / techniques for Research methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism

UNIT IV  INTELLECTUAL PROPERTY RIGHTS  6
Intellectual Property – The concept, IPS in India, development, Trade secrets, utility Models, IPR & Bio diversity, CBD, WIPO, WTO, Right of Property, Common rules, PCT, Features of Agreement, Trademark, UNESCO.

UNIT V  PATENTS  6

TOTAL: 30 PERIODS
REFERENCE BOOKS:
2. Research Methodology a step-by-step guide for beginners by Ranjit Kumar, SAGE publications Ltd 3rd Edition 2011 (For the topic Reviewing the Literature under Unit I)

OUTCOMES: (Cos)

On completion of the course the student would be able to :

CO1: Understand the research problem and Literature review.
CO2: Understand the various research designs and their characteristics.
CO3: Prepare a well-structured research paper and scientific presentations.
CO4: Explore on various IPR Components and process of filing.
CO5 Develop awareness the patent law and procedural mechanism in obtaining a patent.
OBJECTIVES:
The student should be able:
- To understand the concepts of Open Source DBMS.
- To understand the process of distributing tables across multiple systems
- To understand the process of storing, retrieving spatial and temporal data
- To understand the process of storing, retrieving objects in a database
- To understand the process of storing and retrieving data from a XML Database
- To use the open source database for building a mobile application

EXPERIMENTS IN THE FOLLOWING TOPICS:
1. NOSQL Exercises
   a. MongoDB – CRUD operations, Indexing, Sharding, Deployment
   b. Cassandra: Table Operations, CRUD Operations, CQL Types
   c. HIVE: Data types, Database Operations, Partitioning – HiveQL
   d. OrientDB Graph database – OrientDB Features
2. MySQL Database Creation, Table Creation, Query
3. MySQL Replication – Distributed Databases
4. Spatial data storage and retrieval in MySQL
5. Temporal data storage and retrieval in MySQL
6. Object storage and retrieval in MySQL
7. XML Databases, XML table creation, XQuery FLWOR expression
8. Mobile Database Query Processing using open source DB (MongoDB/MySQL etc)

OUTCOMES:
Upon completion of this course, the student should be able to:
- Design and implement databases.
- Formulate complex queries using SQL
- Design and implement applications that have GUI and access databases for backend connectivity
- To design and implement Mobile Databases
- To design and implement databases to store spatial and temporal data objects
OBJECTIVES:

- To learn the basic programming constructs in Python.
- To implement Recursive programming in Python
- To implement Divide and Conquer algorithmic technique in Python
- To implement Tree Data structures in Python
- To implement Graphs in Python
- To deploy the standard libraries in Python

EXPERIMENTS:

1. Towers of Hanoi using Recursion
2. To implement Binary Search
3. Merge Sort
4. To implement AVL Trees using Python
5. To implement Splay Trees using Python
6. To implement Red black Trees using Python
7. To implement Graphs using Python
9. Implementing real-time/technical applications using Files and Exception handling.

TOTAL: 60 PERIODS

OUTCOMES:

On completion of the course, students will be able to:

1. Develop algorithmic solutions to simple computational problems
2. Develop and execute Python programs.
3. Decompose a Python program into functions.
4. Represent compound data using Python data structures.
5. Apply Python features in developing software applications.
OBJECTIVES:
- To provide opportunities to learners to practice English and thereby make them proficient users of the language.
- To enable learners to fine-tune their linguistic skills (LSRW) with the help of Technology.
- To enhance the performance of students listening, speaking, reading and writing and thereby develop their career opportunities.

LIST OF ACTIVITIES:
1. Listening:
   - Listening and practicing neutral accents
   - Listening to short talks and lectures and completing listening comprehension exercises
   - Listening to TED Talks
2. Speaking:
   - Giving one minute talks
   - Participating in small Group Discussions
   - Making Presentations
3. Reading:
   - Reading Comprehension
   - Reading subject specific material
   - Technical Vocabulary
4. Writing:
   - Formal vs Informal Writing
   - Paragraph Writing
   - Essay Writing
   - Email Writing

TOTAL: 30 PERIODS

REFERENCES/MANUALS/SOFTWARE: Open Sources/websites

OUTCOMES:
On completion of the course the students will be able to:
- Listen and comprehend Lectures in English
- Articulate well and give presentations clearly
- Participate in Group Discussions successfully
- Communicate effectively in formal and informal writing
- Write proficient essays and emails
UNIT I
INTRODUCTION TO WEB & CLIENT SIDE PROGRAMMING 9
Introduction to Web: Server - Client - Communication Protocol (HTTP), JavaScript: Data Types and Variables - Expressions - Operators and Statements - Objects and Arrays - Functions - Classes - Modules - DOM - Events - Storage: LocalStorage, Cookies, IndexedDB, JSON, AJAX

UNIT II
SERVER SIDE PROGRAMMING 9

UNIT III
SPRING 9

UNIT IV
JAVA PERSISTENCE API AND HIBERNATE 9

UNIT V
ADVANCED CLIENT SIDE PROGRAMMING 9

TOTAL: 45 PERIODS

Course Outcomes:
Upon completion of the course the students should be able to:
- To write client side scripting.
- To implement the server side of the web application.
- To implement Web Application using Spring.
- To implement a Java application using Java Persistence API.
- To implement a full-stack Single Page Application using React, Spring and JPA.

REFERENCE BOOKS
OBJECTIVES:

- To understand the basic concepts of Distributed systems
- To learn about the current trend and basics of Cloud computing
- To be familiar with various Cloud concepts
- To expose with the Server, Network and storage virtualization
- To be aware of Microservices and DevOps

UNIT I  DISTRIBUTED SYSTEMS  9


UNIT II  INTRODUCTION TO CLOUD COMPUTING  9


UNIT III  CLOUD INFRASTRUCTURE  9


UNIT IV  CLOUD ENABLING TECHNOLOGIES  9


UNIT V  MICROSERVICES AND DEVOPS  9


TOTAL: 45 PERIODS
OUTCOMES:

Upon completion of the course, the students will be able to

- Use Distributed systems in Cloud Environment
- Articulate the main concepts, key technologies, strengths and limitations of Cloud computing
- Identify the Architecture, Infrastructure and delivery models of Cloud computing
- Install, choose and use the appropriate current technology for the implementation of Cloud
- Adopt Microservices and DevOps in Cloud environment

REFERENCES:

OBJECTIVES:

- To familiarize with the principles of Artificial intelligence like problem solving, inference, perception, knowledge representation, and learning.
- To understand the various characteristics of Intelligent agents
- To design and implement the machine learning techniques for real world problems
- To gain experience in doing research using Artificial intelligence and Machine learning techniques.

UNIT I ARTIFICIAL INTELLIGENCE


UNIT II KNOWLEDGE AND REASONING


UNIT III BAYESIAN LEARNING


UNIT IV PARAMETRIC MACHINE LEARNING

Logistic Regression: Classification and representation – Cost function – Gradient descent – Advanced optimization – Regularization - Solving the problems on overfitting. Perceptron – Neural Networks – Multi-class Classification - Backpropagation – Non-linearity with activation functions (Tanh, Sigmoid, Relu, PRelu) - Dropout as regularization.

UNIT V NON PARAMETRIC MACHINE LEARNING


TOTAL: 45 PERIODS
REFERENCES:

OUTCOME:
- Apply the techniques of Problem Solving in Artificial Intelligence.
- Implement Knowledge and Reasoning for real world problems.
- Model the various Learning features of Artificial Intelligence
- Analyze the working model and features of Decision tree
- Apply k-nearest algorithm for appropriate research problem.
OBJECTIVES:
- To understand the need and characteristics of mobile applications.
- To design the right user interface for mobile application.
- To understand the design issues in the development of mobile applications.
- To understand the development procedure for mobile application.
- To develop mobile applications using various tools and platforms.

UNIT I INTRODUCTION


UNIT II USER INTERFACE

Generic UI Development - Multimodal and Multichannel UI – Gesture Based UI – Screen Elements and Layouts – Voice XML.

Lab Component:
1. Implement mobile application using UI toolkits and frameworks.
2. Design an application that uses Layout Managers and event listeners.

UNIT III APPLICATION DESIGN


Lab Component:
1. Design a mobile application that is aware of the resource constraints of mobile devices.
2. Implement an android application that writes data into the SD card.

UNIT IV MOBILE OS


Lab Component:
1. Develop an application that makes use of mobile database
2. Implement an android application that writes data into the SD card.

UNIT V APPLICATION DEVELOPMENT

Communication via the Web – Notification and Alarms – Graphics and Multimedia: Layer Animation, Event handling and Graphics services – Telephony – Location based services

Lab Component:
1. Develop web based mobile application that accesses internet and location data.
2. Develop an android application using telephony to send SMS.
OUTCOMES

On completion of the course, the student will be able to

- Understand the basics of mobile application development frameworks and tools
- To be able to develop a UI for mobile application
- To design mobile applications that manages memory dynamically
- To build applications based on mobile OS like Android, iOS
- To build location based services

REFERENCES:

OBJECTIVES

- To learn the principles of cyber security and to identify threats and risks.
- To learn how to secure physical assets and develop system security controls.
- To understand how to apply security for Business applications and Network Communications.
- To learn the technical means to achieve security.
- To learn to monitor and audit security measures.

UNIT I PLANNING FOR CYBER SECURITY


UNIT II SECURITY CONTROLS


UNIT III CYBER SECURITY FOR BUSINESS APPLICATIONS AND NETWORKS


UNIT IV TECHNICAL SECURITY


UNIT V SECURITY ASSESSMENT


TOTAL: 45 PERIODS
OUTCOMES

On completion of the course, the student will be able to

● Develop a set of risk and security requirements to ensure that there are no gaps in an organization’s security practices.
● Achieve management, operational and technical means for effective cyber security.
● Audit and monitor the performance of cyber security controls.
● To spot gaps in the system and devise improvements.
● Identify and report vulnerabilities in the system

REFERENCES:

6. OWASP ZAP: https://owasp.org/www-project-zap/
7. ACUNETIX: https://www.acunetix.com/
Course Objectives:

1. To implement the client side of the web application using javascript.
2. To implement the server side of the web application using Servlets and WebSockets.
3. To develop a web application using Spring.
4. To implement a Persistence layer using Hibernate and Spring Data JPA.
5. To develop a full stack single page application using React, Spring and Hibernate.

1. Create an event registration application using javascript. It should implement different widgets for registration form and registered records view using tabs. It should perform the form validation.
2. Create a javascript application in an Object Oriented way using Classes and Modules. It should also use browser storage for persistence.
3. Build a web application using Gradle. The server side of the application should implement RESTful APIs using Servlet and do necessary logging. The client side of the application should be a single page application which consumes the RESTful APIs through AJAX.
4. Build a chat application using WebSocket.
5. Create a Spring MVC application. The application should handle form validation, file upload, session tracking.
6. Implement a RESTful Spring Boot application using Spring REST, Spring Security and Spring Cache.
7. Design a complex system using JPA and Hibernate. The system should have multiple entities and relationships between the entities. The database schema should be generated through Hibernate. Provide RESTful endpoints for CRUD operations for the defined entities. Also, support pagination and searching using JPA’s JPQL and Criteria API.
8. Create a Spring RESTful Application with Spring Data JPA. Support pagination and searching using Specifications.
9. Create a React application with different components and interactions between the components.
10. Develop a full-stack application using React and Spring. Make use of Spring REST, Spring Security, Spring Data JPA, Hibernate, Spring Boot, Gradle and React’s higher order component.

TOTAL : 60 PERIODS

Course Outcomes:

1. To implement client and server side of the web application.
2. To implement a real time application using WebSocket.
3. To use Spring framework in web development.
4. To implement applications using Java Persistence API.
5. To implement applications using the JavaScript framework React.
OBJECTIVES:

- To familiarize with the machine learning algorithms and implement in practical situations.
- To involve the students to practice AI algorithms and techniques.
- Learn to use different algorithms for real time data sets.

List of Experiments:

1. Write a program to illustrate problem solving as a search.
2. Write a program to illustrate local search algorithms.
3. Write a program to demonstrate logical agents.
4. Evaluate forward chainer and rule base on at least four different databases. Try to create at least one database that demonstrates an interesting feature of the domain, or an interesting feature of forward chaining in general.
5. Demonstrate agent based on propositional logic.
6. Write a program to implement the naïve Bayesian classifier for a sample training data set. Compute the accuracy of the classifier, considering few test data sets.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file.
9. Write a program to implement k-Nearest Neighbor algorithm to classify the data set.
10. Apply the technique of pruning for a noisy data monk2 data, and derive the decision tree from this data. Analyze the results by comparing the structure of pruned and unpruned tree.
11. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets
12. Implement Support Vector Classification for linear kernel.
13. Implement Logistic Regression to classify the problems such as spam detection. Diabetes predictions so on.

OUTCOMES:

- Apply the techniques of Problem Solving in Artificial Intelligence.
- Implement Knowledge and Reasoning for real world problems.
- Model the various Learning features of Artificial Intelligence
- Analyze the working model and features of Decision tree
- Apply k-nearest algorithm for appropriate research problem.

Total: 60 Periods
OBJECTIVES:

- To provide opportunities to learners to practice their communication skills to make them proficient users of English.
- To enable learners to fine-tune their linguistic skills (LSRW) with the help of Technology to communicate globally.
- To enhance the performance of learners at placement interviews and group discussions and other recruitment procedures.

1. SOFT SKILLS

- People skills
- Interpersonal skills
- Team building skills
- Leadership skills
- Problem solving skills

2. PRESENTATION SKILLS

- Preparing slides with animation related to the topic
- Introducing oneself to the audience
- Introducing the topic
- Presenting the visuals effectively – 5 minute presentation

3. GROUP DISCUSSION SKILLS

- Participating in group discussions
- Brainstorming the topic
- Activities to improve GD skills.

4. INTERVIEW SKILLS

- Interview etiquette – dress code – body language
- Attending job interviews
- Answering questions confidently
- Technical interview – telephone/Skype interview
- Emotional and cultural intelligence
- Stress Interview

REFERENCES / MANUALS / SOFTWARE: Open Sources / websites

TOTAL: 30 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

- Students will be able to make presentations and participate in Group discussions with confidence.
- Students will be able to perform well in the interviews.
- Students will make effective presentations.
OBJECTIVES:
- To know the fundamental concepts of data science and analytics.
- To learn fundamental data analysis using R.
- To understand various data modeling techniques.
- To learn the basic and advanced features of open source big data tools and frameworks.
- To study various analytics on stream data.

UNIT I INTRODUCTION TO DATA SCIENCE AND BIG DATA

UNIT II DATA ANALYSIS USING R

UNIT III DATA MODELING

UNIT IV DATA ANALYTICAL FRAMEWORKS

UNIT V STREAM ANALYTICS

TOTAL: 45 PERIODS

OUTCOMES:
On completion of the course, the students will be able to:
1. Convert real world problems to hypothesis and perform statistical testing.
2. Perform data analysis using R.
3. Design efficient modeling of very large data and work with big data platforms.
4. Implement suitable data analysis for stream data.
5. Write efficient Map Reduce programs for small problem solving methods.
OBJECTIONS:

□ To learn the internal architecture and programming of an embedded processor.
□ To introduce interfacing I/O devices to the processor and to run, debug programs in an IDE.
□ To build a small low cost embedded system using Open Hardware Platforms.
□ To apply the concept of Internet of Things in real world scenario.
□ To deploy IoT application and connect to the cloud.

UNIT I EMBEDDED CONTROLLER

Microcontrollers and Embedded Processors, Introduction to 8051, PSW and Flag Bits, 8051 Register Banks and Stack, Internal Memory Organization of 8051, IO Port Usage in 8051, Types of Special Function Registers and their uses in 8051, Pins Of 8051. Memory Address Decoding, 8031/51 Interfacing With External ROM And RAM. 8051 Addressing Modes.

UNIT II EMBEDDED C PROGRAMMING


UNIT III FUNDAMENTALS OF IOT


UNIT IV BUILDING IOT

Open Hardware Platforms: Interfaces, Programming, APIs and Hacks – Web Services – Integration of Sensors and Actuators with Arduino/ Raspberry Pi/ Other Light Weight Boards.

UNIT V APPLICATIONS


OUTCOMES:

On completion of the course, the students will be able to:

□ Analyze architecture of embedded processors and micro controllers.
□ Design and deploy timers and interrupts.
□ Design and develop the prototype of embedded and IoT systems.
□ Design portable IoT using Arduino/Raspberry Pi/equivalent boards.
□ Analyze and develop applications of IoT in real time scenario.

TOTAL: 45 PERIODS
REFERENCES:

OBJECTIVES:
- To understand the basic principles of Double entry system and preparation of balance sheet.
- To understand partnership accounts
- To understand the process of estimating the depreciation of a particular asset.
- To understand single entry accounting

UNIT I  INTRODUCTION TO ACCOUNTING  9

UNIT II  FINAL ACCOUNTS  9
Preparation of Final Accounts of a Sole Trading Concern – Adjustments Receipts and Payments Account, Income & Expenditure Account and Balance Sheet of Non Trading Organizations

UNIT III  PARTNERSHIP ACCOUNTS  9
Partnership Accounts-Final accounts of partnership firms – Basic concepts of admission, retirement and death of a partner including treatment of goodwill - rearrangement of capitals. (Simple problems on Partnership Accounts).

UNIT IV  DEPRECIATION  9

UNIT V  SINGLE ENTRY ACCOUNTING  9
Single Entry – Meaning, Features, Defects, Differences between Single Entry and Double Entry System – Statement of Affairs Method – Conversion Method

OUTCOMES:
- Able to understand the basics of accounting
- Able to understand balance sheet preparation and do analysis
- Able to understand the partnership accounts
- Able to appreciate and depreciate the assets of an organization in accounting
- Able to understand Single Entry Accounting

REFERENCES:
• To provide hands-on cloud and data analytics frameworks and tools.
• To use the Python/R packages for performing analytics.
• To learn using analytical tools for real world problems.
• To familiarize the usage of distributed frameworks for handling voluminous data.
• To write and deploy analytical algorithms as MapReduce tasks.

EXPERIMENTS:
Do the following experiments using R/Python:
1. Download, install and explore the features of R/Python for data analytics.
2. Use the Diabetes data set from UCI and Pima Indians Diabetes data set for performing the following:
   b. Bivariate Analysis: Linear and logistic regression modeling.
   c. Multiple Regression Analysis
   d. Also compare the results of the above analysis for the two data sets.
3. Apply Bayesian and SVM techniques on Iris and Diabetes data set.
4. Apply and explore various plotting functions on UCI data sets. Implement the following using Hadoop, Map Reduce, HDFS, Hive:
   1. Perform setting up and Installing Hadoop in its two operating modes: pseudo-distributed and fully distributed.
   2. Implement the following file management tasks in Hadoop: adding files and directories, Retrieving files and Deleting files
   3. (i) Performing a MapReduce Job for word search count (look for specific keywords in a file)
      (ii) Implement stop word elimination problem: Input a large textual file containing one sentence per line and a small file containing a set of stop words (one stop word per line) and save the results in an output textual file containing the same sentences of the large input file without the words appearing in the small file.
   4. Implement a MapReduce program that processes a weather data set to:
      (i) Find average, max and min temperature for each year in National Climate DataCentre data set.
      (ii) Filter the readings of a set based on value of the measurement. The program must save the line of input files associated with a temperature value greater than 30.0 and store it in a separate file.
5. Install, deploy & configure Apache Spark cluster. Run Apache Spark applications using Scala.
6. Install and run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.
7. Mini projects on the following:
   (i) Simulate a simple recommender system with Amazon product dataset, Socialtweet data set etc on Hadoop.
   (ii) Perform a very large text classification run on Hadoop.

OUTCOMES:
On completion of the course, the students will be able to:
1. Install analytical tools and configure distributed file system.
2. Have skills in developing and executing analytical procedures in various distributed frameworks and databases.
3. Develop, implement and deploy simple applications on very large datasets.
4. Implement simple to complex data modeling in NoSQL databases.
5. Develop and deploy simple applications in cloud.

TOTAL: 60 PERIODS
OBJECTIVES:

- To learn tools relevant to embedded system and IoT development.
- To write simple assembly programs that uses various features of the processor.
- To design and develop IoT application Arduino/Raspberry pi for real world scenario.

EXPERIMENTS:

PART I:

1. Implement assembly and Interfacing Programs Using Embedded C.
2. Embedded Application Development
   (i) Using Arduino and Raspberry Pi
   (ii) Using Bluemix platform
3. IoT Application Development
   (i) Using sensors and actuators (temperature sensor, light sensor, infrared sensor)
   (ii) Interfacing sensors with Arduino/Raspberry Pi/other equivalent boards
   (iii) Reading data from sensors
4. Explore different communication methods with IoT devices.
5. Collecting and processing data from IoT systems in the cloud using Xively PaaS.

OUTCOMES:

On completion of the course, the students will be able to:

1. Write and implement simple assembly programs that use various features of the processor.
2. Test and experiment different sensors for application development Arduino/Raspberry Pi/ Equivalent boards.
3. Develop IoT applications with different platform and frameworks.

TOTAL: 60 PERIODS
OBJECTIVES:
- To know how to do project planning for the software process.
- To learn the cost estimation techniques during the analysis of the project.
- To understand the quality concepts for ensuring the functionality of the software

UNIT I SOFTWARE PROJECT MANAGEMENT CONCEPTS 9

UNIT II SOFTWARE EVALUATION AND COSTING 9

UNIT III SOFTWARE ESTIMATION TECHNIQUES 9

UNIT IV RISK MANAGEMENT 9

GLOBALIZATION ISSUES IN PROJECT MANAGEMENT 9

UNIT V

TOTAL: 45 PERIODS
OUTCOMES:
- Understand the activities during the project scheduling of any software application.
- Learn the risk management activities and the resource allocation for the projects.
- Can apply the software estimation and recent quality standards for evaluation of the software projects.
- Acquire knowledge and skills needed for the construction of highly reliable software project.
- Able to create reliable, replicable cost estimation that links to the requirements of project planning and managing.

REFERENCES:
OBJECTIVES:

- To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To do a detailed examination and demonstration of Agile development and testing techniques.
- To understand the benefits and pitfalls of working in an Agile team.
- To understand Agile development and testing

UNIT I  AGILE METHODOLOGY

UNIT II  AGILE PROCESSES

UNIT III  AGILITY AND KNOWLEDGE MANAGEMENT

UNIT IV  AGILITY AND REQUIREMENTS ENGINEERING

UNIT V  AGILITY AND QUALITY ASSURANCE

TOTAL: 45 PERIODS
OUTCOMES:
- Realize the importance of interacting with business stakeholders in determining the requirements for a software system
- Perform iterative software development processes: how to plan them, how to execute them.
- Point out the impact of social aspects on software development success.
- Develop techniques and tools for improving team collaboration and software quality.
- Show how agile approaches can be scaled up to the enterprise level

REFERENCES
OBJECTIVES:

- To learn the various E-learning approaches and Components.
- To explore Design Thinking.
- To understand the types of design models of E-learning.
- To learn about E-learning Authoring tools.
- To know about evaluation and management of E-learning solutions

UNIT I  INTRODUCTION

UNIT II  DESIGNING E-LEARNING COURSE CONTENT

UNIT III  CREATING INTERACTIVE CONTENT

UNIT IV  LEARNING PLATFORMS

UNIT V  COURSE DELIVERY AND EVALUATION

TOTAL: 45 PERIODS
OUTCOMES: On completion of course, the students will be able to:

- Distinguish the phases of activities in models of E-learning.
- Identify appropriate instructional methods and delivery strategies.
- Choose appropriate E-learning Authoring tools.
- Create interactive E-learning courseware.
- Evaluate the E-learning courseware.

REFERENCE BOOKS:

OBJECTIVES:
● To know the behavior of the testing techniques and to design test cases to detect the errors in the software
● To get insight into software testing methodologies
● To understand standard emerging areas in testing
● To learn about the software quality models.
● To understand the models and metrics of software quality and reliability.

UNIT I  INTRODUCTION

UNIT II  SOFTWARE TESTING METHODOLOGY

UNIT III  EMERGING SPECIALIZED AREAS IN TESTING

UNIT IV  SOFTWARE QUALITY MODELS

UNIT V  QUALITY THROUGH CONTINUOUS IMPROVEMENT PROCESS
Role of Statistical Methods in Software Quality – Transforming Requirements into Test Cases – Deming’s Quality Principles – Continuous Improvement through Plan Do Check Act (PDCA)

TOTAL: 45 PERIODS
OUTCOMES:
Up on completion of the course the students will be able to
● choose the software testing techniques to cater to the need of the project
● identify the components of software quality assurance systems
● apply various software testing strategies
● design and develop software quality models
● make use of statistical methods in software quality.

REFERENCE BOOKS:
OBJECTIVES:

- To learn the fundamentals of Operating Systems
- To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
- To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols
- To know the components and management aspects of Real time, Mobile operating systems

UNIT I  FUNDAMENTALS OF OPERATING SYSTEMS  9

UNIT II  DISTRIBUTED OPERATING SYSTEMS  9

UNIT III  DISTRIBUTED RESOURCE MANAGEMENT  9

UNIT IV  REAL TIME AND MOBILE OPERATING SYSTEMS  9

UNIT V  CASE STUDIES  9

TOTAL: 45 PERIODS
OUTCOMES:
Upon Completion of the course, the students should be able to:

- Discuss the various synchronization, scheduling and memory management issues
- Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
- Discuss the various resource management techniques for distributed systems
- Identify the different features of real time and mobile operating systems
- Install and use available open source kernel

REFERENCES:
OBJECTIVES:
● Learn digital image fundamentals.
● Be exposed to simple image processing techniques.
● Learn to represent image enhancement in the spatial and frequency domain.
● Be familiar with image restoration and segmentation techniques.

UNIT I DIGITAL IMAGE FUNDAMENTALS
Elements of visual perception, Electromagnetic Spectrum-overview, Image Sensing and Image Acquisition Systems, Sampling and Quantization, Image Formation, Image Geometry, Relationship between pixels, Basic concepts of distance transform, Color Image fundamentals-RGB-HIS Models, Different color models-conversion

UNIT II IMAGE TRANSFORMS
Unitary Image Transforms-1D Discrete Fourier Transform (DFT), Properties of DFT, 2D transforms – 2D DFT, Discrete Cosine Transform, Hadamard, Walsh and PCA.

UNIT III IMAGE ENHANCEMENT

UNIT IV IMAGE RESTORATION

UNIT V MORPHOLOGICAL IMAGE PROCESSING AND SEGMENTATION
Basic Morphological operators-erosion, dilation, opening and closing-Basic Morphological Reconstruction Algorithms. Segmentation: point, line, edge detection, Region based segmentation, Region Splitting and Merging Technique, Thresholding Techniques, Applications of image processing.

TOTAL: 45 PERIODS
OUTCOMES:

Up on completion of the course, the students will be able to

- Learn how images are formed, sampled, quantized and represented digitally
- Understand and analyze the different image transform techniques
- Understand how the images are enhanced to improve subjective perception to spatial domain and frequency domain.
- Apply image restoration techniques
- Analyze the fundamental concepts of Morphological Image Processing and Segmentation techniques.

REFERENCES:

OBJECTIVES:
- To understand the optimization techniques used in compiler design.
- To be aware of the various computer architectures that support parallelism.
- To become familiar with the theoretical background needed for code optimization.
- To understand the techniques used for identifying parallelism in a sequential program.
- To learn the various optimization algorithms.

UNIT I INTRODUCTION

UNIT II INSTRUCTION-LEVEL PARALLELISM

UNIT III OPTIMIZING FOR PARALLELISM AND LOCALITY-THEORY
Basic Concepts – Matrix-Multiply: An Example - Iteration Spaces - Affine Array Indexes – Data Reuse Array data dependence Analysis.

UNIT IV OPTIMIZING FOR PARALLELISM AND LOCALITY APPLICATION

UNIT V INTERPROCEDURAL ANALYSIS

OUTCOMES:
On completion of the course the students should be able to:
- Identify the various sources of optimization
- identify the constraints and architectures of parallel execution of instructions
- identify the sources of optimization of parallel execution of instructions
- apply the process of optimization using various techniques
- Implement optimization techniques

REFERENCES:
OBJECTIVES:
- To learn the technologies of the .NET framework.
- To cover all segments of programming in C# starting from the language basis, followed by the object-oriented programming concepts.
- To update and enhance skills in writing Windows applications, ADO.NET, and ASP.NET.
- To introduce advanced topics namely data connectivity, WPF, WCF, and WPF with C# and .NET 4.5.
- To implement mobile applications using .Net Compact Framework.

UNIT I C# LANGUAGE BASICS

UNIT II C# ADVANCED FEATURES

UNIT III BASE CLASS LIBRARIES AND DATA MANIPULATION

UNIT IV WINDOW AND WEB BASED APPLICATIONS

UNIT V .NET COMPACT FRAMEWORK

OUTCOMES:
Up on completion of the course, the student will be able to:
- Understand the difference between .NET and Java framework.
- Work with the basic and advanced features of C# language.
- Create applications using various data providers.
- Create web application using ASP.NET.
- Create mobile application using .NET compact framework.

REFERENCES:
OBJECTIVES:
The student should be made:
- To understand the concept about Wireless networks, protocol stack and standards
- To understand and analyse the network layer solutions for Wireless networks
- To study about fundamentals of 3G Services, its protocols and applications
- To learn about evolution of 4G Networks, its architecture and applications
- To explore the architecture of 5G, 5G Modulation Schemes and to analyse the concept of MIMO and other research areas in 5G

UNIT I  WIRELESS LAN  9

UNIT II MOBILE NETWORK LAYER  9

UNIT III 3G OVERVIEW  9

UNIT IV 4G NETWORKS  9

UNIT V 5G NETWORKS  9

TOTAL: 45 PERIODS

OUTCOMES: outcomes to be changed with respect to contentsAt the end of the course, the student should be able to:
- Conversant with the latest 3G/4G networks and its architecture
- Design and implement wireless network environment for any application using latest wireless protocols and standards
- Ability to select the suitable network depending on the availability and requirement
- Implement different type of applications for smartphones and mobile devices with latest network strategies

REFERENCES:
OBJECTIVES:
- To understand the concepts and architecture of the World Wide Web.
- To understand and practice markup languages
- To understand and practice embedded dynamic scripting on client-side Internet
- Programming
- To understand and practice web development techniques on client-side.
- The objective is to enable the students to understand the Organizational Behaviour, and Organizational Change and dynamic of groups.

UNIT I INTRODUCTION TO WWW 9

UNIT II UI DESIGN 9
Cascading Style Sheet: Need for CSS - Importance of separating document structuring and styling-Basic CSS selectors and properties-CSS properties for text (Color, font, weight, align, etc.) and working with colors-Selecting with classes, IDs, tags-CSS Specificity-Ways of linking CSS to HTML-CSS Pseudo selectors-Understanding the box model - Margins, padding and border – Inline and block elements -Structuring pages using Semantic Tags

UNIT III WEB PAGE LAYOUTS WITH CSS3 9
Positioning with CSS – Positions, Floats, z-index-Layouts with Flexbox –Responsive web design with media queries-Advanced CSS Effects – Gradients, opacity, box-shadow-CSS3 Animations – Transforms and Transitions-CSS Frameworks – Bootstrap

UNIT IV JAVA SCRIPT 9
Basic JavaScript syntax-JavaScript Objects and JSON-Understanding the DOM-JavaScript Events and Input validation-Modifying CSS of elements using JavaScript-JavaScript Local Storage and Session Storage-Cross domain data transfer with AJAX-Using JQuery to add interactivity-JQuery Selectors-JQuery Events-Modifying CSS with JQuery -Adding and removing elements with JQuery-AJAX with JQuery-Animations with JQuery (hide, show, animate, fade methods, Slide Method)

UNIT V SERVER-SIDE PROGRAMMING WITH PHP 9
PHP basic syntax-PHP Variables and basic data structures-Using PHP to manage form submissions-File Handling -Cookies and Sessions with PHP-Working with WAMP and PHP-ADMIN -Establishing connectivity with MySQL using PHP

TOTAL: 45 PERIODS

OUTCOMES:
- Create a basic website using HTML and Cascading Style Sheets.
- Create websites with complex layouts
- Add interactivity to websites using simple scripts
- Design rich client presentation using AJAX.
- Add business logic to websites using PHP and databases
REFERENCES:
4. Keith J Grant; “CSS in Depth”, Manning Publications. 1st edition, 2018
OBJECTIVES:
- To understand the basics of Network Programming
- To be familiar with building network applications
- To design and implement client server Applications using TCP and UDP Sockets
- To expose with various socket options
- To get aware of Network security for Network Programming

UNIT I
INTRODUCTION
TCP/IP Layer Model – Multicast, broadcast and Any cast - Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write, close functions – Iterative Server – Concurrent Server

UNIT II
ELEMENTARY TCP SOCKETS
TCP Echo Server – TCP Echo Client – Posix Signal handling – Server with multiple clients – boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown

UNIT III
SOCKET OPTIONS AND MULTIPLEXING

UNIT IV
ELEMENTARY UDP SOCKETS

UNIT V
NETWORK SECURITY

TOTAL: 45 PERIODS

REFERENCE BOOKS:

OUTCOMES:
Upon completion of the course, the student will be able to
- Design and implement the client/server programs using variety of protocols
- Understand the key protocols which support Internet
- Demonstrate advanced knowledge of programming interfaces for network communication
- Use the basic tools for design and testing of network programs in Unix environment.
• Identify some of the factors driving the need for network security
DMC6012  MICROSERVICES AND DEVOPS  LTPC 3003

OBJECTIVES:
- To introduce Microservices and Containers.
- To understand the key concepts and principles of DevOps
- To be familiar with most common DevOps tools
- To explain the business benefits of DevOps and continuous delivery.
- To recall specific DevOps methodologies and framework

UNIT I  INTRODUCTION TO MICROSERVICES
Definition of Microservices – Characteristics - Microservices and Containers – Interacting with Other Services – Monitoring and Securing the Services – Containerized Services – Deploying on Cloud

UNIT II  MICROSERVICES ARCHITECTURE
Monolithic architecture- Microservice architectural style- Benefits - Drawbacks of Microservice architectural style - decomposing monolithic applications into Microservices.

UNIT III  BASICS OF DEVOPS

UNIT IV  MICROSERVICES IN DEVOPS ENVIRONMENT
Evolution of Microservices and DevOps – Benefits of combining DevOps and Microservices- working of DevOps and Microservices in Cloud environment - DevOps Pipeline representation for a NodeJS based Microservices

UNIT V  VELOCITY AND CONTINUOUS DELIVERY

TOTAL: 45 PERIODS

OUTCOMES:
At the end of this course, the students will be able to:
- Understand the Microservices and containers.
- apply Microservices in DevOps
- Understand about DevOps and the common tools used in DevOps.
- Develop and integrate projects using DevOps
- Deploy and monitor projects using DevOps.

REFERENCES:
OBJECTIVES:
- To gain knowledge about social networks, its structure and their data sources.
- To study about the knowledge representation technologies for social network analysis.
- To analyse the data left behind in social networks.
- To gain knowledge about the community maintained social media resources.
- To learn about the visualization of social networks.

UNIT I       INTRODUCTION TO SEMANTIC WEB

UNIT II     KNOWLEDGE REPRESENTATION ON THE SEMANTIC WEB
Ontology-based knowledge Representation – Ontology languages for the Semantic Web: RDF and OWL– Modeling Social Network Data – Network Data Representation, Ontological Representation of Social Individuals and Relationships – Aggregating and Reasoning with Social Network Data.

UNIT III    SOCIAL NETWORK MINING
Detecting Communities in Social Network – Evaluating Communities – Methods for Community Detection – Applications of Community Mining Algorithms – Tools for detecting communities – Application: Mining Facebook - Exploring Facebook’s social Graph API – Analyzing social graph connections

UNIT IV COMMUNITY MAINTAINED SOCIAL MEDIA RESOURCES
Community Maintained Resources – Supporting technologies for community maintained resources– User motivations- Location based social interaction – location technology– mobile location sharing – Social Information Sharing and social filtering – Automated recommender system

UNIT V VISUALIZATION OF SOCIAL NETWORKS

TOTAL: 45 PERIODS

OUTCOMES:
Up on completion of the course, the students will be able to:
- Explain the basic principles behind network analysis algorithms.
- Model and represent knowledge for social semantic Web.
- Use extraction and mining tools for analyzing Social networks.
- Discuss about community maintained social media resources.
- Develop personalized visualization for Social networks.

REFERENCES:
OBJECTIVES:
- To Learn bio-inspired theorem and algorithms
- To Understand random walk and simulated annealing
- To Learn genetic algorithm and differential evolution
- To Learn swarm optimization and ant colony for feature selection
- To understand bio-inspired application in various fields

UNIT I  INTRODUCTION

UNIT II  RANDOM WALK AND ANEALING

UNIT III  GENETIC ALGORITHMS AND DIFFERENTIAL EVOLUTION

UNIT IV  SWARM OPTIMIZATION AND FIREFLY ALGORITHM

UNIT V  APPLICATIONS OF BIO INSPIRED COMPUTING

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students should be able to
- Implement and apply bio-inspired algorithms
- Explain random walk and simulated annealing
- Implement and apply genetic algorithms
- Explain swarm intelligence and ant colony for feature selection
- Apply bio-inspired techniques in various fields.

REFERENCES:
5. Yang, Cui, Xiao, Gandomi, Karamanoglu, "Swarm Intelligence and Bio-Inspired Computing", Elsevier First Edition 2013
OBJECTIVES:

- To understand the basics of information retrieval with pertinence to modeling, query operations and indexing
- To get an understanding of machine learning techniques for text classification and clustering.
- To understand the various applications of information retrieval giving emphasis to multimedia IR, web search
- To understand the concepts of digital libraries

UNIT I: INTRODUCTION: MOTIVATION


UNIT II: MODELING


UNIT III: INDEXING

Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching-Sequential Searching and Pattern Matching. Query Operations -Query Languages – Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency

UNIT IV: CLASSIFICATION AND CLUSTERING

Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning

UNIT V: SEARCHING THE WEB


OUTCOMES:

Upon completion of this course, the students should be able to:

- Build an Information Retrieval system using the available tools.
- Identify and design the various components of an Information Retrieval system.
- Model an information retrieval system
- Apply machine learning techniques to text classification and clustering which is used for efficient Information Retrieval.
- Design an efficient search engine and analyze the Web content structure.

REFERENCES:

OBJECTIVES:
- Understand software architectural requirements and drivers
- Be exposed to architectural styles and views
- Be familiar with architectures for emerging technologies

UNIT I INTRODUCTION AND ARCHITECTURAL DRIVERS 9

UNIT II QUALITY ATTRIBUTE WORKSHOP 9
Quality Attribute Workshop – Documenting Quality Attributes – Six part scenarios – Case studies.

UNIT III ARCHITECTURAL VIEWS 9

UNIT IV ARCHITECTURAL STYLES 9
Introduction – Data flow styles – Call-return styles – Shared Information styles – Event styles – Case studies for each style.

UNIT V DOCUMENTING THE ARCHITECTURE 9
Good practices – Documenting the Views using UML – Merits and Demerits of using visual languages – Need for formal languages – Architectural Description Languages – ACME – Case studies. Special topics: SOA and Web services – Cloud Computing – Adaptive structures

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
- Explain influence of software architecture on business and technical activities
- Summarize quality attribute workshop
- Identify key architectural structures
- Use styles and views to specify architecture
- Design document for a given architecture

REFERENCES:
OBJECTIVES:
- To learn the security issues network layer and transport layer.
- To be exposed to security issues of the application layer.
- To be familiar with forensics tools.
- To analyze and validate forensics data.
- To perform digital forensic analysis based on the investigator’s position.

UNIT I INTRODUCTION

UNIT II ANTI-FORENSICS & LEGAL

UNIT III EVIDENCE COLLECTION

UNIT IV COMPUTER FORENSICS

UNIT V NETWORK FORENSICS & MOBILE DEVICE FORENSICS

TOTAL: 45 PERIODS
OUTCOME:
Upon Completion of the course, the students will be able to
- Explain digital forensic process and role of forensic examiner.
- Explore Legal amendments.
- Demonstrate evidence collection
- Explore computer forensics, network forensics and mobile device forensics.
- Make Use forensics tools.

REFERENCES:
OBJECTIVES:
- To gain knowledge on data mining and the need for pre-processing.
- To characterize the kinds of patterns that can be discovered by association rule mining.
- To implement classification techniques on large datasets.
- To analyze various clustering techniques in real world applications.
- To get exposed to the concepts of data warehousing architecture and implementation.

UNIT I DATA MINING & DATA PREPROCESSING

UNIT II ASSOCIATION RULE MINING AND CLASSIFICATION BASICS
Introduction to Association rules – Association Rule Mining – Mining Frequent Itemsets with and without Candidate Generation – Mining Various Kinds of Association Rules - Classification versus Prediction – Data Preparation for Classification and Prediction.

UNIT III CLASSIFICATION AND PREDICTION TECHNIQUES
Classification by Decision Tree – Bayesian Classification – Rule Based Classification – Bayesian Belief Networks – Classification by Back Propagation – Support Vector Machines – K-Nearest Neighbor Algorithm –Linear Regression, Nonlinear Regression, Other Regression-Based Methods

UNIT IV CLUSTERING TECHNIQUES

UNIT V DATA WAREHOUSE

TOTAL: 45 PERIODS

OUTCOMES:
On completion of the course, the students will be able to:
1. Identify data mining techniques in building intelligent model.
2. Illustrate association mining techniques on transactional databases.
3. Apply classification and clustering techniques in real world applications.
4. Evaluate various mining techniques on complex data objects.
5. Design, create and maintain data warehouses.

REFERENCES:
OBJECTIVES:

- To understand the categories of data quality principles.
- To describe data through visual representation.
- To provide basic knowledge about how large datasets are represented into visual graphics and easily understand about the complex relationships within the data.
- To design effective visualization techniques for any different problems.

UNIT I INTRODUCTION

UNIT II VISUALIZATION FOUNDATIONS

UNIT III DESIGNING EFFECTIVE VISUALIZATION
Steps in Designing Visualization – problems in Designing Effective Visualization – Comparing and evaluating visualization techniques – Visualization Systems.

UNIT IV INFORMATION DASHBOARD DESIGN

UNIT V VISUALIZATION SYSTEMS

TOTAL: 45 PERIODS
OUTCOME:
On completion of the course the student should be able to:

- Describe principles of visual perception
- Apply visualization techniques for various data analysis tasks – numerical data
- Apply visualization techniques for various data analysis tasks – Non numerical data
- Design effective visualization techniques for different problems
- Design information dashboard.

REFERENCES:
OBJECTIVES:
- To provide the concept and an understanding of basic concepts in Operations Research techniques for Analysis and Modeling in Computer Applications.
- To understand, develop and solve mathematical model of linear programming problems
- To understand, develop and solve mathematical model of Transport and assignment problems
- To understand network modeling for planning and scheduling the project activities

UNIT I  LINEAR PROGRAMMING MODELS  9
Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables: big-M method, degeneracy and unbound solutions.

UNIT II  TRANSPORTATION AND ASSIGNMENT MODELS  9

UNIT III  SCHEDULING BY PERT AND CPM  9
Introduction - Rules to frame a Network - Fulkerson’s Rule to numbering of events - Activity, Times - Critical Path Computation - Slack and Float - PERT- Steps and computing variance, Merits and demerits of PERT, CPM - Time estimating & Limitations, Comparison between PERT & CPM.

UNIT IV  QUEUEING MODELS  9
Characteristics of Queueing Models - Poisson Queues - (M / M / 1) : (FIFO / ∞ / ∞), (M / M / N) : (FIFO / N / ∞), (M / M / C) : (FIFO / ∞ / ∞), (M / M / C) : (FIFO / N / ∞) models.

UNIT V  GAME THEORY  9
Competitive game, rectangular game, saddle point, minimax (maximin) method of optimal strategies - value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.

TOTAL: 45 PERIODS

OUTCOMES:
Upon Completion of the course, the students will be able to
- Understand and apply linear programming to solve operational problem with constraints
- Apply transportation and assignment models to find optimal solution
- To prepare project scheduling using PERT and CPM
- Identify and analyze appropriate queuing model to reduce the waiting time in queue.
- To choose the best strategy using decision making methods under game theory.

REFERENCES:

75
OBJECTIVES:
- To understand the concepts of computer ethics in work environment.
- To understand the threats in computing environment
- To Understand the intricacies of accessibility issues
- To ensure safe exits when designing the software projects

UNIT I INTRODUCTION TO ETHICS
Definition of Ethics- Right, Good, Just- The Rational Basis of Ethics -Theories of Right: Intuitionist vs. End-Based vs. Duty-Based -Rights, Duties, Obligations -Theory of Value -Conflicting Principles and Priorities -The Importance of Integrity -The Difference Between Morals, Ethics, and Laws -Ethics in the Business World - Corporate Social Responsibility -Creating an Ethical Work Environment -Including Ethical Considerations in Decision Making

UNIT II ETHICS IN INFORMATION TECHNOLOGY, INTERNET CRIME

UNIT III FREEDOM OF EXPRESSION, PRIVACY

UNIT IV FREEDOM OF EXPRESSION, INTELLECTUAL PROPERTY RIGHTS

UNIT V SOCIAL NETWORKING ETHICS AND ETIQUETTES

TOTAL: 45 PERIODS
OUTCOMES:
Upon Completion of the course, the students will be able to

- Helps to examine situations and to internalize the need for applying ethical principles, values to tackle with various situations.
- Develop a responsible attitude towards the use of computer as well as the technology.
- Able to envision the societal impact on the products/ projects they develop in their career
- Understanding the code of ethics and standards of computer professionals.
- Analyze the professional responsibility and empowering access to information in the work place.

REFERENCES:
OBJECTIVE:
- To provide basic knowledge of concepts, principles, tools and techniques of Marketing.
- To provide an exposure to the students pertaining to marketing strategies, which they are expected to possess when they enter the industry as practitioners.
- To give them an understanding of the various marketing Strategies used in consumer and industrial marketing.

UNIT I  INTRODUCTION TO MARKETING MANAGEMENT  9

UNIT II  MARKETING ENVIRONMENT  9

UNIT III  CONSUMER AND BUSINESS BUYER BEHAVIOUR  9

UNIT IV  SEGMENTATION, TARGETING AND POSITIONING  9

UNIT V  INTERNATIONAL MARKETING MANAGEMENT & RECENT TRENDS  9
Introduction - Nature of International Marketing - International Marketing Concept – International Market Entry Strategies - Approaches to International Marketing - Cause related marketing - Ethics in marketing –Online marketing trends.

TOTAL: 45 PERIODS

OUTCOMES:
- Knowledge of basic understanding in solving marketing related problems.
- Awareness of marketing management process, strategies and the marketing mix elements.
- Clear understanding of functional area of marketing
- Demonstrating conceptual knowledge and analytical skills in analyzing the marketing environment.
- Develop skills in recent trends in global marketing.

REFERENCES:

79
OBJECTIVE:

- The objective is to enable the students to understand the Organizational Behavior, and Organizational Change and dynamic of groups.

UNIT I  
ORGANISATIONAL BEHAVIOUR  
Organization Behaviour – Definition – Scope and Application in Management – Contributions of Other Disciplines to OB. Emerging Issues in Organizational Behaviour- Organizational behaviour models

UNIT II  
INDIVIDUAL PROCESSES  

UNIT III  
LEADERSHIP AND POWER  

UNIT IV  
GROUP DYNAMICS  

UNIT V  
ORGANISATIONAL CHANGE AND DEVELOPMENT  

TOTAL: 45 PERIODS

OUTCOMES:
On completion of the course should be able to:

- Students will have a better understanding of human behavior in organization.
- They will know the framework for managing individual and group performance.
- Characteristics of attitudes and components of attitudes — A brief discussion
- List the determinants of personality
- List the characteristics of various leadership styles.

REFERENCES:

OBJECTIVES:

- To understand the basics of business analytics and its life cycle.
- To gain knowledge about fundamental business analytics.
- To learn modeling for uncertainty and statistical inference.
- To understand analytics using Hadoop and Map Reduce frameworks.
- To acquire insight on other analytical frameworks.

UNIT I  OVERVIEW OF BUSINESS ANALYTICS


UNIT II  ESSENTIALS OF BUSINESS ANALYTICS


UNIT III  MODELING UNCERTAINTY AND STATISTICAL INERENCE


UNIT IV  ANALYTICS USING HADOOP AND MAPREDUCE FRAMEWORK

Introducing Hadoop – RDBMS versus Hadoop – Hadoop Overview – HDFS (Hadoop Distributed File System) – Processing Data with Hadoop – Introduction to MapReduce – Features of MapReduce – Algorithms Using MapReduce: Matrix-Vector Multiplication, Relational Algebra Operations, Grouping and Aggregation – Extensions to MapReduce

UNIT V  OTHER DATA ANALYTICAL FRAMEWORKS

Overview of Application development Languages for Hadoop – Pig Latin – Hive – Hive Query Language (HQL) – Introduction to Pentaho, JAQL – Introduction to Apache: Sqoop, Drill and Spark, Cloudera Impala – Introduction to NoSQL Databases – Hbase and MongoDB.

TOTAL: 45 PERIODS
OUTCOMES:

On completion of the course, the student will be able to:

- Identify the real world business problems and model with analytical solutions.
- Solve analytical problem with relevant mathematics background knowledge.
- Convert any real world decision making problem to hypothesis and apply suitable statistical testing.
- Write and Demonstrate simple applications involving analytics using Hadoop and MapReduce
- Use open source frameworks for modeling and storing data.

REFERENCES:

Objectives:
- To understand the basics of Blockchain
- To understand the basics of Cryptocurrency
- To understand the working of digital tokens and wallets
- To understand the working of contracts
- To understand the working of block chain platforms

UNIT I  OVERVIEW OF BLOCKCHAIN:  9

UNIT II  CRYPTOCURRENCY  9

UNIT III  HYPERLEDGER  9

UNIT IV  SOLIDITY  9

UNIT V  BLOCKCHAIN PLATFORMS  9

TOTAL:45 PERIODS
OUTCOME:
Upon Completion of the course, the students will be able to

- describe the Basics of Block chain Technology concepts and its applications
- know about the implementation of Crypto currency
- identify the different ways to achieve Block chain Technology
- Illustrate how to design and build smart contracts using various platforms
- understand about the future of Block chain technology

REFERENCES:

MOOC Website references (Example website references are only given; it’s not an exhaustive list)
1. www.coursera.org
   a. Blockchain
   b. Blockchain and cryptocurrency explained
   c. Blockchain revolution
   d. Bitcoin and Cryptocurrency technologies
   e. Blockchain basics
   f. Introduction to Blockchain
   g. Introduction to Blockchain technologies
   h. Blockchain foundations and use cases
2. www.udemy.com
   a. Build a blockchain and cryptocurrency from scratch
   b. The Basics of Blockchain
   c. Blockchain advanced level
   d. Learn Blockchain technology and cryptocurrency in Java
   e. Full Cryptocurrency courses: Ethereum, bitcoin and blockchain
OBJECTIVES:
The student should be made:
- To understand the theme underlying IPv6 Structure and addressing methods
- To understand and analyse the protocols for IPv6 Implementation
- To identify and provide solutions for QoS and Security Issues with IPv6
- To learn about Software Defined concepts, architectures, protocols and applications
- To explore the significance of Network Function Virtualization

UNIT I IPv6 STRUCTURE AND ADDRESSING

UNIT II IPv6 NETWORKING

UNIT III QoS, PROVISIONING AND SECURITY WITH IPv6

UNIT IV SOFTWARE DEFINED NETWORKING

UNIT V NETWORK FUNCTION VIRTUALIZATION

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the student should be able to:

- Understand the fundamentals of IPv6 and IPv6 Protocols
- Analyze the need for separation of data and control plane
- Understand the functionality of NFV
- Be Conversant with the latest networks and its architecture
- Gain an in-depth coverage of various networking technologies

REFERENCES:

OBJECTIVES:

- To gain knowledge of soft computing theories and its fundamentals.
- To design a soft computing system required to address a computational task.
- To learn and apply artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms in problem solving and use of heuristics based on human experience.
- To introduce the ideas of fuzzy sets, fuzzy logic and to become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems.
- To familiarize with genetic algorithms and other random search procedures while seeking global optimum in self – learning situations.

UNIT I  Fuzzy Computing  

UNIT II  Fundamentals of Neural Networks  

UNIT III  Backpropagation Networks  

UNIT IV  Competitive Neural Networks  
Kohenen’s Self Organizing Map – SOM Architecture, learning procedure – Application; Learning Vector Quantization – learning by LVQ; Adaptive Resonance Theory – Learning procedure – Applications.

UNIT V  Genetic Algorithm  

TOTAL: 45 PERIODS
OUTCOMES:
On completion of the course, the students will be able to:
- Identify and describe soft computing techniques and their roles in building intelligent machines.
- Recognize the feasibility of applying a soft computing methodology for a particular problem.
- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
- Apply genetic algorithms to optimization problems.
- Design neural networks to pattern classification and regression problems using soft computing approach.

REFERENCES:
OBJECTIVES:

- To understand how to represent the high-dimensional data, such as images, text, and data.
- To explain convolution neural network.
- To introduce major deep learning algorithms and their applications to solve real-world problems.
- To explore about optimization and generalization in Deep learning.
- To understand about deep reinforcement learning.

UNIT I  NEURAL NETWORK  9

UNIT II  CONVOLUTION NEURAL NETWORK  9
Introduction-Filter and Feature Maps-Full Description of CNN-Max Pooling-Full Architectural Description of CNN-Image Preprocessing Pipeline Enable More Robust Models-Accelerating Training with Batch Normalization-Visualizing Learning with Convolution Network-Leveraging and Learning Convolution Filters - Predefined Convolutional Filters Network (PCFNet)- Transfer Learning with Convolutional Neural Networks.

UNIT III  DEEP NETWORKS  9

UNIT IV  OPTIMIZATION AND GENERALIZATION  9

UNIT V  DEEP REINFORCEMENT LEARNING  9
Markov Decision Processes-Explore versus Exploit-Policy versus Value Learning-Pole-Cart with Policy Gradients-Q Learning and Deep Q Networks- Improving and Moving Beyond DQN

TOTAL: 45 PERIODS
OUTCOME:
On completion of the course, the students will be able to

- Describe the fundamental concepts of Neural Networks
- Apply Convolution Neural Network techniques to solve problems in image processing
- Summarize the characteristics of deep Learning
- Comprehend the Optimization and Generalization in Deep Learning
- Interpret the concepts of Deep Reinforcement Learning to solve real world problems.

REFERENCES
OBJECTIVES:
- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data.
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.

UNIT I  INTRODUCTION TO BIG DATA  9

UNIT II  CLUSTERING AND CLASSIFICATION  9

UNIT III  ASSOCIATION AND RECOMMENDATION SYSTEM  9

UNIT IV  STREAM MEMORY  9

UNIT V  NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION  9

TOTAL: 45 PERIODS
OUTCOMES:
Upon completion of the course, the students will be able to:

- Work with big data tools and its analysis techniques
- Analyze data by utilizing clustering and classification algorithms
- Learn and apply different mining algorithms and recommendation systems for large volumes of data
- Perform analytics on data streams
- Learn NoSQL databases and management.

REFERENCES:


MOOC REFERENCES:

2. www.coursera.org: Big Data Essentials: HDFS, MapReduce and Spark RDD
3. www.udemy.com: Big Data and Hadoop: Interactive Intense Course
DMC6030  NATURAL LANGUAGE PROCESSING  L T P C  3 0 0 3

OBJECTIVES:
- To learn the fundamentals of natural language processing
- To understand word level and syntactic analysis.
- To understand the role of semantics of sentences and pragmatics
- To get knowledge about the machine translation.

UNIT I  INTRODUCTION OF BASIC TEXT PROCESSING  9

UNIT II  LANGUAGE MODELLING AND SMOOTHING  9

UNIT III  SYNTAX, PARSING, SEMANTICS  9

UNIT IV  TOPIC MODELS AND INFORMATION EXTRACTION  9

UNIT V  TEXT SUMMARIZATION & TEXT CLASSIFICATION  9
Optimization Based models for summarization – Evaluation- Text classification – sentiment analysis - Affective lexicon -Learning affective lexicons - computing with affective lexicons

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to:
- To tag a given text with basic Language features
- To design an innovative application using NLP components
- To implement a rule based system to tackle morphology/syntax of a language
- To design a tag set to be used for statistical processing for real-time applications
- To apply NLG and machine translation

REFERENCES: