**Vignana Bharathi Institute of Technology, Aushapur, Ghatkesar**

**B. Tech in COMPUTER SCIENCE AND ENGINEERING**

**(DATA SCIENCE)**

**Course Structure and Syllabus – R22**

**III YEAR I SEMESTER**

| S. No. | Course Code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | 22CS3111 | Design and Analysis of Algorithms | PC | 3 | 0 | 0 | 3 |
| 2 | 22DS3111 | Fundamentals of Data Science | PC | 3 | 0 | 0 | 3 |
| 3 | 22DS3112 | DevOps | PC | 3 | 0 | 0 | 3 |
| 4 | **Professional Elective - I** | | | 3 | 0 | 0 | 3 |
| | 22AM3173 | Image Processing | PE | | | | |
| | 22CS3171 | Computer Graphics | PE | | | | |
| | 22DS3171 | Data Warehousing and Data Mining | PE | | | | |
| | 22DS3172 | Computer Networks | PE | | | | |
| 5 | **Professional Elective - II** | | | 3 | 0 | 0 | 3 |
| | 22DS3173 | Software Project Management | PE | | | | |
| | 22DS3174 | Artificial Intelligence | PE | | | | |
| | 22DS3175 | Spatial and Multimedia Databases | PE | | | | |
| | 22DS3176 | Computer Vision and Robotics | PE | | | | |
| 6 | 22DS3151 | R Programming Lab | PC | 0 | 0 | 3 | 1.5 |
| 7 | 22DS3152 | DevOps Lab | PC | 0 | 0 | 3 | 1.5 |
| 8 | 22HS3151 | Advanced English Communication Skills Lab | HS | 0 | 0 | 2 | 1 |
| 9 | 22MC0005 | Intellectual Property Rights | MC | 3 | 0 | 0 | 0 |
| 10 | 22DS3153 | Skill Development Course (ETL-Talend) | PC | 0 | 0 | 2 | 1 |
| **Total Credits** | | | | **18** | **0** | **10** | **20** |

**III YEAR II SEMESTER**

| S. No. | Course Code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | 22IT3211 | Automata Theory and Compiler Design | PC | 3 | 0 | 0 | 3 |
| 2 | 22DS3211 | Big Data Analytics | PC | 3 | 0 | 0 | 3 |
| 3 | 22CS3211 | Machine Learning | PC | 3 | 0 | 0 | 3 |
| 4 | **Professional Elective – III** | | | 3 | 0 | 0 | 3 |
| | 22CS3271 | Scripting Languages | PE | | | | |
| | 22DS3271 | Web Technologies | PE | | | | |
| | 22DS3272 | Data Visualization Techniques | PE | | | | |
| | 22DS3273 | Cryptography and Network Security | PE | | | | |
| 5 | **Open Elective - I** | | OE | 3 | 0 | 0 | 3 |
| 6 | 22DS3251 | Machine Learning Lab | PC | 0 | 0 | 2 | 1 |
| 7 | 22DS3252 | Big Data Analytics Lab | PC | 0 | 0 | 2 | 1 |
| 8 | 22DS3253 | Skill Development Course (UI design-Flutter) | PC | 0 | 0 | 2 | 1 |
| 9 | 22MC0002 | Environmental Science | MC | 3 | 0 | 0 | 0 |
| 10 | 22DS3281 | Industry Oriented Mini Project | PW | 0 | 0 | 4 | 2 |
| **Total Credits** | | | | **18** | **0** | **10** | **20** |

**Environmental Science in III Yr II Sem Should be registered by Lateral Entry Students Only.**

# 22CS3111: DESIGN AND ANALYSIS OF ALGORITHMS

**B.Tech. III Year I Sem.** **L T P C**
**3 - - 3**

**Prerequisites:**

- A course on "C Programming"
- A course on "Data Structures"

**Course Objectives:**

- To analyse performance of algorithms
- To understand and choose the appropriate algorithm design technique for a specified application
- To solve problems using algorithm design techniques such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
- To analyse the impact of algorithm design techniques on each application solved
- To introduce and understand P and NP classes

**Course Outcomes:** After the completion of the course student will be able to

- Analyse the different algorithm design techniques for a given problem.
- Design algorithms for various computing problems.
- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyze the limitations of algorithms.
- Explain about coping with the limitations of algorithms.

**UNIT - I**

**Notation of an Algorithm**: Fundamentals of Algorithmic Problem Solving, Fundamentals of the Analysis of Algorithm Efficiency–Order Notations and its properties, Mathematical analysis for Recursive -Towers of Hanoi and Non-recursive algorithms

**Divide and conquer-** General method-Control abstraction, Solving Recurrence Relation using Substitution method and Master's Theorem, applications - Binary search, Merge sort, Quick sort, Strassen's Matrix Multiplication, Finding Maximum and Minimum element.

**UNIT - II**

**Greedy Method**- General method-Control abstraction, applications- Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Single source shortest path problem.

**UNIT - III**

**Dynamic Programming:** General Method, applications-Multi Stage Graphs, Chained matrix multiplication, All pairs shortest path problem, Optimal binary search trees, 0/1 knapsack problem, Reliability design, Traveling sales person problem.

**UNIT - IV**

**Backtracking:** General method-Control abstraction, applications-The 8-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

**UNIT-V**

**Branch and Bound:** General Method-Control abstraction, applications-15-Puzzle Problem - LC search,0/1 Knapsack problem-LC Branch and Bound solution, FIFO Branch and Bound solution, Travelling sales person problem.

**NP-Hard and NP-Complete problems:** Basic concepts, Non-deterministic algorithms, NP – Hard and NP-Complete classes, Cook's theorem- proof of reduction.

**TEXT BOOKS:**


1. Ellis Horowitz, SatrajSahni and S Rajasekharam, Fundamentals of Computer Algorithms, Galgotia publishers
2. M.T. Goodrich, Robert Tamassia, Algorithm design: Foundations, Analysis and Internet examples,Wiley student Edn, John Wiley &sons.
3. Parag Himanshu Dave,Himanshu Bhalchandra Dave, Design and Analysis algorithms PearsonPublication.


**REFERENCES:**


1. Allen Weiss, Data structures and Algorithm Analysis in C++, 2nd Edn, Pearson Education
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited.
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education.

# 22DS3111: FUNDAMENTALS OF DATA SCIENCE

**B.Tech. III Year I Sem.** **L T P C**
**3 - - 3**

**Prerequisites:**

- A Course on Computer Oriented Statistical Methods.
- Basic Knowledge of Programming languages.

**Course Objectives:**

- Learn the Basic Skill sets needed for a Data Science with Basics of R Programming
- Learn the control and conditional statements.
- An overview of simple statistical models and the basics of machine learning techniques.
- Learn the R concepts of vectors, matrices, factors and data frames.
- Identify the importance of Data Reduction and Data Visualization Techniques.

**Course Outcomes:** After completion of the course, the student should be able to

- Describe what Data Science is and the skill sets needed to be a data scientist, Basics of R
- Understand the conditional and control statements, Functions and Loading of a package using R
- Describe the data using various statistical Measures.
- Understand the concepts of Vectors, Matrices, Factors and Data Frames using R.
- Perform Data Reduction and apply visualize techniques

**UNIT – I**

**Introduction:** Definition of Data Science- Big Data and Data Science hype – and getting past the hype- Datafication - Current landscape of perspectives - Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model – Over fitting. Basics of R: Introduction, R-Environment Setup, Programming with R, Basic Data Types.

**UNIT – II**

**Conditionals and Control Flow:** Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements. Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List. Functions in

R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Function in R.

**UNIT – III**

**Data Types & Statistical Description Types of Data:** Attributes and Measurement, What is an Attribute? The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, and Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes.

**Basic Statistical Descriptions of Data:** Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Inter- quartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

**UNIT – IV**

**Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting, Matrices:** Creating and Naming Matrices, Matrix Sub setting, Arrays, and Class. Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, sub setting of Data Frames, Extending Data Frames, and Sorting Data Frames.

**Lists: Introduction, creating a List:** Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, and Converting Lists to Vectors.

**UNIT – V**

**Data Reduction:** Overview of Data Reduction Strategies, Wavelet Transforms, Principal Components Analysis, Attribute Subset Selection,

**Regression and Log-Linear Models:** Parametric Data Reduction, Histograms, Clustering, Sampling, Data Cube Aggregation**.**

**Data Visualization:** Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

**TEXT BOOKS:**

1. Doing Data Science, Straight Talk from the Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014

2. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed.

The Morgan Kaufmann Series in Data Management Systems.

3. K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

**REFERENCE BOOKS:**

1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson

Education.

2. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.

3. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.

4. Paul Teetor, "R Cookbook", O'Reilly, 2011.

# 22DS3112: DEVOPS

**B.Tech. III Year I Sem.** **L T P**

**Prerequisites:** **3 - - 3**

- Software Engineering.
- Software Project Management.

**Course Objectives:**

- To describe the agile model.
- To understand the skill sets and functioning's of teams involved in DevOps and related methods to reach a continuous delivery and continuous integration.
- To implement automated system of DevOps lifecycle.
- To illustrate the types of version control systems, continuous integration tools, continuous monitoring tools.
- To analyze the concepts of test automation and deployment automation tools.

**Course Outcomes:** On successful completion of this course, students will be able to:

- Identify components of Devops environment.
- Describe Software development models and architectures of DevOps.
- Apply different project management, integration and testing tools.
- Apply different code deployment tools.
- Assemble and adopt Devops in real-time projects.

**UNIT - I**

**Introduction:** Introduction, Agile development model, DevOps, and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

**UNIT - II**

**Software development models and DevOps:** DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing.

**DevOps influence on Architecture:** Introducing software architecture, the monolithic scenario, Architecture rules of thumb, the separation of concerns, Handling database migrations, Micro services, and the data tier, DevOps, architecture, and resilience.

**UNIT - III**

**Introduction to project management:** The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, Git Lab.

**UNIT - IV**

**Integrating the system:** Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

**UNIT - V**

**Testing Tools and automation:** Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development

**Deployment of the system:** Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker.

**TEXT BOOKS:**


1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.


**REFERENCE BOOKS:**


1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications.
2. 2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley.

# 22AM3173: IMAGE PROCESSING

**(Professional Elective – I)**

**B.Tech. III Year I Sem.** **L T P C**

**3 - - 3**

**Prerequisites**

- A course on "Linear algebra".
- A course on "Probability theory".
- A course on "Computational Mathematics".
- A course on "Computer Oriented Statistical Methods".

**COURSE OBJECTIVES: The objective of this course is to:**

- Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts
- Provides the knowledge of image acquisition, sampling and quantization.
- Preprocessing and enhancement.
- Image restoration, and segmentation.
- Knowledge of different image compression techniques.

**COURSE OUTCOMES: At the end of the course, student will be able to:**

- Understand the theoretical and mathematical foundations of Digital Image Processing.
- Explain different image acquisition, sampling and quantization methods.
- Perform Preprocessing and image enhancement operations on given images.
- Apply different Image restoration, and segmentation techniques
- Perform different image compression techniques.

**UNIT - I**

**Digital Image Fundamentals:** Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

**UNIT - II**

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

**UNIT - III**

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

**UNIT - IV**

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

**UNIT - V**

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

**TEXT BOOKS:**


1. Digital Image Processing: R.C. Gonzalez & R. E. Woods, Addison Wesley/ Pearson nd Education, 2 Ed, 2004.
2. Fundamentals of Digital Image Processing: A. K. Jain, PHI.


**REFERENCE BOOKS:**


1. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Pearson Education India, 2004.
2. Digital Image Processing: William K. Pratt, John Wilely, 3rd Edition, 2004.
3. Image Processing, Analysis and Machine Vision, Second Edition, Milan Sonka, aclav Hlavac and Roger Boyle, Cengage learning.

# 22CS3171: COMPUTER GRAPHICS
## (Professional Elective – I)

**B.Tech. III Year I Sem.** **L T P C**
**Pre-requisites:** **3 - - 3**

- A Course on "C Programming"
- A Course on "Data Structures "

**Course Objectives**

- To make students understand about the fundamental concepts of computer
- graphics and explore line , circle drawing algorithms
- To make students understand about 2D, 3D geometrical transformations
- To make students understand about line & polygon clipping
- To make students understand about polygon rendering methods
- To make students understand about computer animation

**Course Outcomes**

- Be able to implement techniques for efficiently rendering straight line , circle & ellipse
- Acquire familiarity with the relevant mathematics of computer graphics : translation,scaling, rotation.
- Be able to design applications that display graphic images to given specifications.
- Implement 3-D geometric transformation and 3-D viewing.
- Apply Computer animation.

**UNIT- I**

**Introduction:** Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

**Output primitives**: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), midpoint circle and ellipse algorithms.

**Polygon Filling**: Scan-line algorithm, boundary-fill and flood-fill algorithms

**UNIT-II**

**2-D geometrical transforms**: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

**2-D viewing**: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgeman polygon clipping algorithm.

**UNIT-III**

**3-D object representation**: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Basic illumination models, polygon rendering methods.

**UNIT-IV**

**3-D Geometric transformations**: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

**3-D viewing**: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

**UNIT-V**

**Computer animation**: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications, morphing.

**Visible surface detection methods:**

Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods.

**TEXTBOOKS:**


1. Computer Graphics *C version*", Donald Hearn and M. Pauline Baker, Pearson Education
2. Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH


**REFERENCES:**


1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Spring

# 22DS3171: DATA WAREHOUSING AND DATA MINING
## (Professional Elective – I)

**B.Tech III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | - | - | 3 |

**Pre-Requisites:**

- A Course on DBMS.

**Course Objectives:**

- To describe the concepts related to data warehousing, On-Line Analytical Processing (OLAP).
- To understand stages in building a Data Mining.
- To analyze and evaluate performance of algorithms for Association Rules.
- To analyze classification algorithms and evaluate prediction techniques.
- To describe methods for data-clustering approaches.

**Course Outcome:**

- Construct Multidimensional data models to represent data cubes and perform characterization and generalization tasks on data cubes.
- Ability to identify the need and importance of preprocessing techniques.
- Compute associations and correlations among items by mining frequent patterns from transactional databases.
- Build model to classify unknown data objects.
- Build clusters using various clustering techniques and evaluate clusters formed.

### UNIT- I:

**Data Warehouseand OLAP:** Introduction to Data Warehouse, Data Warehouse Architecture, OLAP, OLTP, OLAP Servers- (ROLAP, MOLAP, HOLAP).
**Multidimensional Data Model**: Data cube, efficient methods for Data cube computation, schemas, OLAP Operations.

### UNIT- II:

**Introduction to data mining and its issues:** Data, Types of data, Need for data mining,KDD process, Transactional databases, Data Mining functionalities, Applications, Classification of data mining systems, Data Mining Task Primitives, Major issues in Data Mining.

**Data Preprocessing:** Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, measures of similarity and dissimilarity-basics.

### UNIT- III:

**Mining Association rules in large databases**: Mining Frequent Patterns, Associations and Correlations: Market Basket Analysis, Association rule mining, Mining Frequent Item sets- Apriori algorithm, compact representation of frequent item set-maximal frequent item set, closed frequent item set, FP-growth algorithms.

**UNIT - IV**

**Classification and Prediction:** Basic concepts, Decision tree induction, Bayesian classification, Naive Bayes Classification, classification by Back propagation, Support vector machines, Lazy learners, other classification methods, Classification accuracy, Prediction.

**UNIT - V**

**Clustering:** Types of Data in Cluster Analysis, Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, and Density based method, Strengths and Weaknesses, Outlier Analysis.

## TEXT BOOKS:


1. Data Mining – Concepts and Techniques - Jiawei Han &Micheline Kamber, Elsevier
2. Pang-Ning Tan & Michael Steinbach, ―Introduction to Data Mining‖,Vipin Kumar, Pearson
3. Data Warehousing, Data Mining &OLAP- Alex Berson and Stephen J. Smith- Tata McGraw-Hill Edition, Tenth reprint 2007


## REFERENCE BOOKS:


1. Data Mining Introductory and Advanced topics–Margaret H Dunham, Pearson Education.
2. Arun K Pujari, Data Mining Techniques, (2017), University Press.
3. Mohammed J. Zaki, Wagner Meira, Jr ,‖Data Mining and Analysis - Fundamental Concepts and Algorithms‖, Oxford

# 22DS3172: COMPUTER NETWORKS
## (Professional Elective-I)

**B.Tech. III Year I Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | - | - | 3 |

**Course Objectives:**

- The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
- Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.
- Analyze the contents in a given Data Link layer packet, based on the layer concept.
- Decide routing entries given a simple example of network topology.
- Analyze the contents in a given Application Layer, based on the layer concept.

**Course Outcomes:**

- Gain the knowledge of the basic computer network technology.
- Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
- Obtain the skills of subnetting and routing mechanisms.
- Familiarity with the essential protocols of computer networks, and how they can be applied innetwork design and implementation.
- Specify and identify deficiencies in existing protocols and then to onto formulate new and better protocols.

**UNIT - I**

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet. Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

**UNIT - II**

**Data link layer:** Design issues, framing, Error detection and correction. Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error- free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

**Medium Access sub layer:** The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching

**UNIT - III**

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Internetworking, The Network layer in the internet.

**UNIT - IV**

**Transport Layer:** Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols, Quality of Service.

**UNIT - V**

**Application Layer** –Domain name system, SNMP, Electronic Mail; the World Wide Web, HTTP,

**TEXT BOOK:**

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. PearsonEducation/PHI
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

**REFERENCE BOOKS:**

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data communications and Networks by william stallings

# 22DS3173: SOFTWARE PROJECT MANAGEMENT
## (Professional Elective – II)

**B.Tech. III Year I Sem.** **L T P C**
**3 - - 3**

**Course Objectives**

- To acquire knowledge on software process management
- To acquire managerial skills for software project development
- To understand software economics, workflows and frameworks.
- To understand management and Technical perspective.
- Review the economics for the next generation software.

**Course Outcomes**

- Understand the software economics to improve various phases of development.
- Examine the life cycle phases, artifacts, workflows and checkpoints of a process.
- Demonstrate the software project framework components.
- Analyze the need for various software management disciplines and metrics.
- Analyze the process control and process discrimination.

**UNIT - I**

**Software Management Renaissance:** Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics-Software economics, pragmatic software cost estimation. Improving Software Economics- Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

**UNIT – II**

**A Software Management Process Framework-I:** The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process. Life cycle phases- Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process- The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

**UNIT – III**

**A Software Management Process Framework-II** Model based software architectures- A Management perspective and technical perspective. Work Flows of the process- Software process workflows, Iteration workflows. Checkpoints of the process Major milestones, Minor Milestones, Periodic status assessments**.**

**UNIT – IV**

Software Management Discipline-I Iterative Process Planning- Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. Project Organizations and Responsibilities Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process
Automation: Automation building blocks, The Project Environment.

**UNIT – V**

Software Management Discipline-II Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. Tailoring the
Process: Process discriminates. Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process transitions. Case Study: The command Center Processing and Display system- Replacement (CCPDS-R).

**TEXT BOOK:**

1. Software Project Management, Walker Royce, Addison-Wesley Pearson Education, 2005.

**REFERENCE BOOKS:**

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education. 2005.

# 22DS3174: ARTIFICIAL INTELLIGENCE

## (Professional Elective-II)

**B.Tech. III Year I Sem**

| L | T | P | C |
|---|---|---|---|
| 3 | - | - | 3 |

**Course Objectives:**

- Understand the difference between various intelligent agents and environments including solving problems by searching the solution space.
- Understand adversarial search and propositional logic to find the solutions of constraint satisfaction problems.
- Reference using first order logic and describe knowledge representation.
- Design solutions to a problem in the real world environment
- Learn to infer in uncertain domains using probabilistic learning models.

**Course Outcomes:** Differentiate various intelligent agents and environments.

- Also solve problems by searching the solution space.
- Use adversarial search and propositional logic to solve constraint satisfaction problems
- Use first order logic to infer and describe knowledge representation
- Plan solutions for problems in the real world environment.
- Infer in uncertain domains using probabilistic learning models

**UNIT - I:**

Problem Solving by Search-I & II Introduction to AI, Intelligent Agents, Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search.

**UNIT – II**

Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions. Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs. Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

**UNIT - III:**

Logic and Knowledge Representation First-Order Logic: Representation, Syntax and Semantics of First- Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic. Inference in First- Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Back- ward Chaining, Resolution. Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories.

**UNIT - IV:**

Planning Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches.

Planning and Acting in the Real World: Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent planning.

**UNIT - V:**

Uncertain knowledge and Learning Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory..

**TEXT BOOK:**


1. Artificial Intelligence a Modern Approach, Stuart Russell and Peter Norvig, 4th Edition, PearsonEducation, 2020.


**REFERENCE BOOKS:**


1. Artificial Intelligence, E.Rich and K.Knight, , 3rd Edition, TMH, 2009.
2. Artificial Intelligence, Patrick Henny Winston, 3rd Edition, Pearson Education, 2015.
3. Artificial Intelligence, ShivaniGoel, Pearson Education, 2013. .
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education, 2005

# 22DS3175: SPATIAL AND MULTIMEDIA DATABASES
## (Professional Elective – II)

**B.Tech. III Year I Sem.** **L T P C**
**3 - - 3**

**Prerequisites:**
- A Course on Database Management Systems
- A Course on Advanced Data Structures

**Course Objective:**
- Introduce the basic concepts of Spatial Databases.
- Understand spatial storage and indexing.
- Understand the concepts of Image databases, Image representation and processing.
- To understand audio, video and multimedia databases.
- Understand distributed multimedia presentations.

**Course Outcomes:**
- Understand the concepts of spatial databases.
- The learner will be able to use spatial indexing.
- Represent image database, representation.
- Store and retrieve multimedia data.
- Use multimedia presentations.

**UNIT - I**

**Introduction to Spatial Databases**: Overview, beneficiaries, GIA and SDBMS, users, SpaceIntroduction to Spatial Databases: Overview, beneficiaries, GIA and SDBMS, users, Space

Taxonomy, query language, query processing, query optimization. Spatial Concepts and Data Models: Models of Spatial information, three step database design, extending the ER model with spatial concept, object- oriented data modeling. Spatial Query Languages.

**UNIT - II**

**Spatial Storage and Indexing**: Storage-disks and files, spatial indexing, TR*, spatial join index.Query processing and optimization – Evaluation of Spatial operations, query optimization, Analysis of Spatial index structures, distributed and parallel spatial database system. Multidimensional Data Structures: k-d Trees, Point Quadtrees, The MX-Quadtree, R- Trees, comparison of Different Data Structures.

**UNIT - III**

**Image Databases:** Raw Images, Compressed Image Representations, Image Processing: Segmentation, Similarity-Based Retrieval, Alternative Image DB Paradigms, Representing Image DBs with Relations, Representing Image DBs with R-Trees, Retrieving Images By Spatial Layout, Implementations.

**Text/Document Databases**: Precision and Recall, Stop Lists, Word Stems, and Frequency Tables, Latent Semantic Indexing, TV-Trees, Other Retrieval Techniques.

**UNIT - IV**

**Video Databases**: Organizing Content of a Single Video, Querying Content of Video Libraries, Video Segmentation, video Standards.

**Audio Databases**: A General Model of Audio Data, Capturing Audio Content through Discrete Transformation, Indexing Audio

**Data Multimedia Databases**: Design and Architecture of a Multimedia Database, Organizing Multimedia Data Based on the Principle of Uniformity, Media Abstractions, Query Languages for Retrieving Multimedia Data, Indexing SMDSs with Enhanced Inverted Indices, Query Relaxation/Expansion.

**UNIT - V**

**Creating Distributed Multimedia Presentations:** Objects in Multimedia Presentations, Specifying Multimedia Documents with Temporal Constraints, Efficient Solution of Temporal Presentation Constraints, Spatial Constraints.

Distributed Media Servers: Distributed multimedia server architecture, distributed retrieval plans, optimal distributed retrieval plans.

**TEXT BOOKS:**

1. Shashi Shekhar, Sanjiv Chawla, Spatial Databases-A Tour, Pearson Education.
2. V.S. Subrahmanian, Principles of Multimedia Database Systems, Morgan Kauffman.

**REFERENCE BOOK:**

1. Multimedia Databases: An object relational approach, Lynne Dunckley, Pear-sonEducation.
2. Multimedia Database Systems, Prabhakaran, Springer.

# 22DS3176: COMPUTER VISION AND ROBOTICS
## (Professional Elective-II)

**B.Tech. III Year I Sem.** **L T P C**
**3 - - 3**

**Pre-Requisites:**

- A knowledge on Linear algebra, vector calculus, and probability.
- A course on Data structures.

**Course Objectives:**

- To introduce students the fundamentals of image formation;
- To introduce students the major ideas, methods, and techniques of computer vision andpattern recognition;
- To develop an appreciation for various issues in the design of computer vision and objectrecognition systems
- To provide the student with programming experience from implementing computer visionand object recognition applications.
- To Develop and Use software tools for visualizing robots

**Course Outcomes:**

- Implement fundamental image processing techniques required for computer vision.
- Implement boundary tracking techniques.
- Apply chain codes and other region descriptors, Hough Transform for line, circle,and ellipse detections.
- Apply 3D vision techniques and Implement motion related techniques.
- Develop applications using computer vision techniques.

**UNIT - I**

**CAMERAS:** Pinhole Cameras. **Radiometry – Measuring Light:** Light in Space, Light Surfaces, Important Special Cases.
**Sources, Shadows, and Shading:** Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Inter reflections: Global Shading Models.
**Color:** The Physics of Color, Human Color Perception, Representing Color, a Model for ImageColor, Surface Color from Image Color.

**UNIT - II**

**Linear Filters:** Linear Filters and Convolution, Shift Invariant Linear Systems, SpatialFrequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates.
**Edge Detection:** Noise, Estimating Derivatives, Detecting Edges

**Texture:** Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

**UNIT – III**

**The Geometry of Multiple Views**: Two Views.
**Stereopsis**: Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras.
**Segmentation by Clustering:** What Is Segmentation? Human Vision: Grouping and Getstalt,

Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering.

**UNIT - IV**

**Segmentation by Fitting a Model:** The Hough Transform, Fitting Lines, Fitting Curves, Fittingas a Probabilistic Inference Problem, Robustness

**Segmentation and Fitting Using Probabilistic Methods:** Missing Data Problems, Fitting, and Segmentation, the EM Algorithm in Practice.

**Tracking with Linear Dynamic Models:** Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples

**UNIT - V**

**Introduction to Robotics:** Social Implications of Robotics, Brief history of Robotics, Attributes of hierarchical paradigm, Closed world assumption and frame problem, Representative Architectures, Attributes of Reactive Paradigm, Subsumption Architecture, Potential fields and Perception

**Common sensing techniques for Reactive Robots:** Logical sensors, Behavioral Sensor Fusion, Pro- prioceptive sensors, Proximity Sensors, Topological Planning and Metric Path Planning

**TEXT BOOKS:**


1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning(Indian Edition), 2009.
2. Robin Murphy, Introduction to AI Robotics, MIT Press


**REFERENCE BOOKS:**


1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities,Elsevier (Academic Press), 4th edition, 2013.
2. R. C. Gonzalez and R. E. Woods "Digital Image Processing" Addison Wesley 2008.
3. Richard Szeliski "Computer Vision: Algorithms and Applications" Springer-VerlagLondon Limited 2011.

# 22DS3151: R PROGRAMMING LAB

**B.Tech. III Year I Sem.** **L T P C**
**- - 3 1.5**

**Prerequisites:**

- A course on Computer Oriented Statistical Methods
- Basic knowledge on Programming Skills.

**COURSE OBJECTIVES:**

- Data Science is a fast-growing interdisciplinary field, focusing on the analysis of data to extract knowledge and insight.
- This course will introduce students to the collection.
- Preparation, analysis, modeling and visualization of data, covering both conceptual and practical issues.
- Examples and case studies from diverse fields will be presented and hands-on use of statistical and data manipulation software will be included.
- Independently carry out research investigation and development work to solve practical problems.

**COURSE OUTCOMES** :

- Recognize the various discipline that contribute to a successful data science effort
- Understand the processes of data science identifying the problem to be solved, data collection, preparation, modeling, evaluation and visualization.
- Be aware of the challenges that arise in data sciences
- Be able to identify the application of the type of algorithm based on the type of the problem.
- Be comfortable using commercial and open source tools such as the R/python language and its associated libraries for data analytics and visualization.

**LIST OF EXPERIMENTS:**

1. Download and install R-Programming environment and install basic packages using Install. Packages () command in R.
2. Learn all the basics of R-Programming (Data types, Variables, Operators etc,.)
3. Write R command to

i) Illustrate summation, subtraction, multiplication, and division operations on vectors using vectors.

ii) Enumerate multiplication and division operations between matrices and vectors in R console

4. Write R command to

i) Illustrates the usage of Vector subsetting and Matrix subsetting

ii) Write a program to create an array of 3×3 matrixes with 3 rows and 3 columns.

5. Write an R program to draw i) Pie chart ii) 3D Pie Chart, iii) Bar Chart along with chart legend by considering suitable CSV file
6. Create a CSV file having Speed and Distance attributes with 1000 records. Write R program to

draw i) Box plots , ii) Histogram , iii) Line Graph ,iv) Multiple line graphs ,v) Scatter plot to demonstrate the relation between the cars speed and the distance.

7. Implement different data structures in R (Vectors, Lists, Data Frames)

8. Write an R program to read a csv file and analyze the data in the file using EDA (Explorative Data Analysis) techniques.

9. Write an R program to illustrate Linear Regression and Multi linear Regression considering suitable

CSV file

**TEXT BOOKS:**

1. R Programming for Data Science by Roger D. Peng

2. The Art of R Programming by Norman Matloff Cengage Learning India.

REFERENCE BOOKS:

1. Hadley Wickham, Garrett Grolemund, R for Data Science: Import, Tidy, Transform, Visualize,

and Model Data 1st Edition, O'Reilly

2. Tilman M. Davies, The book of R a first course in programming and statistics, no starch press

# 22DS3152: DEVOPS LAB

**B.Tech. III Year I Sem.** **L T P C**

- - 3 1.5

**Course Objectives:**

- Describe the agile relationship between development and IT operations.
- Understand the skill sets and high-functioning teams involved in
- DevOps and related methods to reach a continuous delivery capability
- Implement automated system update and DevOps lifecycle
- To understand virtualization and performance

**Course Outcomes:**

- Identify components of Devops environment
- Apply different project management, integration, testing and code deployment tool
- Investigate different DevOps Software development, models
- Demonstrate continuous integration and development using Jenkins.
- Analyze data to detect anomalies

**List of Experiments:**

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code written in exercise.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application developed in exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

**TEXT BOOKS:**


1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN-10: 1788392574
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's View-point.Wiley publications. ISBN: 9788126579952


**REFERENCE BOOKS / LEARNING RESOURCES:**


1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect’s Perspective. Addison Wesley.
2. Edureka DevOps Full Course - https://youtu.be/S_0q75eD8Yc.

# 22HS3151: ADVANCED ENGLISH COMMUNICATION SKILLS LAB

**B.Tech. III Year I Sem.** **L T P C**
**- - 2 1**

**Course Objectives**

This lab focuses on using Multi-media instruction as well as stimulating peer group activities for language development to meet the following targets:

- To improve students fluency in spoken English.
- To enable them to listen to English spoken at normal conversational speed.
- To help students develop their vocabulary.
- To read and comprehend texts in different contexts.
- To communicate their ideas relevantly and coherently in writing**.**

**Course Outcomes:**

- Acquire vocabulary and Grammar and use them contextually.
- Listen and speak effectively, and present themselves effectively.
- Develop proficiency in academic reading and writing.
- Communicate confidently in formal and informal contexts.
- Increase their job opportunities.

The following course activities will be conducted as part of the *Advanced English Communication Skills (AECS) Lab:*

**Unit I**

Vocabulary and Grammar: Vocabulary Building – Word Formation: Prefixes and Suffixes - Synonyms, and Antonyms, One-word Substitutes, Idioms, Phrases, Collocations, and Compound Words.

**Grammar** – Articles, Prepositions, Tenses, Subject-Verb Agreement, Voice and Speech- Spotting Errors - Correction of Sentences,

**Unit II**

**Advanced Reading Comprehension:** Argumentative Analysis of (with reference to) GRE, TOEFL, IELTS – Jumbled Sentences and Sentence Completion.

**Unit III**

**Writing Skills**– Structure and Different Types of Writings – Argumentative Writing – Letter Writing - Resume Writing - Technical Report Writing

**Creating and Using LinkedIn Profile** - Netiquette - Statement of Purpose (SOP) - Letter of Recommendation

**Unit IV**

**Presentation Skills** -_Oral Presentations (Group/Individual) and Written Presentations – PPTs/ Posters (Virtual/Offline) – Projects, Reports and Assignments - Introducing Oneself Virtually (Making a Video on Oneself and Analyzing it critically).

**Unit V**

**Group Dynamics & Interviews:** Group Discussion - Dos and Don'ts - Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas – Debate: Concept and Process - Difference between Group Discussions and Debates- Rubrics of Evaluation - Interviews and Types of Interviews - Pre-interview Planning, Opening Strategies, Answering Strategies - Introducing Self - Oral Interviews (face-to-face) –Virtual Interviews - Mock Interviews - Handling Technical Glitches.

**References**


1. Kumar, Sanjay and Pushp Lata. *English for Effective Communication*, Oxford University Press, 2015.
2. Konal, Nira. *English Language Laboratories- A Comprehensive Manual*, PHI Learning Pvt. Ltd. 2011.
3. *The Official Guide to the GRE General Test*. Tamil Nadu: McGra Hills Education (India) 3rd Edition, 2017.

## 22MC0005: INTELLECTUAL PROPERTY RIGHTS

**III B.Tech I Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 0 |

**Course Objectives:**

- To know the concept of intellectual property
- To study about trade marks
- To study about law of copyrights and law of patents.
- To impart the knowledge on trade secrets
- To know new developments in IPR laws at national and international level.

**Course Outcomes:** At the end of this course, students will demonstrate the ability to

- Distinguish and Explain various forms of IPRs
- Identify criteria to fit one's own intellectual work in particular form of IPRs
- Apply statutory provisions to protect particular form of IPRs.
- Explain about trade secrets
- Appraise new developments in IPR laws at national and international level

**UNIT – I:**

**INTRODUCTION TO INTELLECTUAL PROPERTY:** Introduction, types of intellectual property ternational organizations, agencies and treaties, importance of intellectual property rights.

**UNIT – II:**

**TRADE MARKS:** Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes**.**

**UNIT – III:**

**LAW OF COPYRIGHTS:** Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

**LAW OF PATENTS:** Foundation of patent law, patent searching process, ownership rights and transf

**UNIT – IV:**

**TRADE SECRETS:** Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

**Unfair competition:** Misappropriation right of publicity, false advertising.

**UNIT – V:**

**NEW DEVELOPMENT OF INTELLECTUAL PROPERTY:** new developments in trade mark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

**TEXT BOOK:**

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

**REFERENCE BOOK:**

1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

# 22DS3153: Skill Development Course (ETL- Talend)

**B.Tech. III Year I Sem.** **L T P C**
**- - 2 1**

**Prerequisites:**

- A course on Java
- A Course on DBMS

**Course Objectives:**

- Learns installation of Talend Open Studio and will get an Overview of ETL Technologies.
- Creates a new project, job and business models in Talend
- Work with Metadata and Data Integration using Talend.
- Use Big Data, Java, Hadoop, Hive and Pig in Talend.
- Use Database and Data Quality Components in Talend.

**Course Outcomes:**

- Install Talend Open Studio for Big Data and Data Integration.
- Create a new Project, Job and Business Models in Talend.
- Create a schema with Metadata and how to integrate the data using Talend.
- Use of Big Data Analytics, Hadoop, Hive and Pig in Talend.
- Connect Database Components and Data Quality Components**.**

**EXPERIMENTS:**

1. a) Installation of Talend: Talend Open Studio for Big Data and Data Integration.
   b) Studio definitions, starting the studio.
   c) Configuring your own talend view, creating the project, creating an example job.
2. Designing a Business Models in talend
3. Talend - Metadata in detail.
4. Talend using data integration.
5. Talend - Big Data, Hadoop Distributed File System
6. Talend - Map Reduce, Working with Pig
7. Talend - Hive in detail.
8. Using Java in Talend, Creating Routines in Talend, Using Custom Code in Talend, Using tJava component, using tJavaRow component, using tJavaFlex component.
9. Usage of Database Components in Talend tDBConnection, tDBInput , tDBoutput, tDBRow, tMySqlColumnList.
10. Usage of Data Quality Components in Talend: tUniqRow, tReplaceList, tSchemaComplianceCheck.

**Web References:**

1. https://help.talend.com/r/en-US/7.3/studio-getting-started-guide-open-studio-for-data-integration/downloading-talend-open-studio

2. https://help.talend.com/r/en-US/7.3/studio-user-guide/creating-business-model

3. https://help.talend.com/r/en-US/8.0/creating-using-metadata-talend-studio

# 22IT3211: AUTOMATA THEORY AND COMPILER DESIGN

**B.Tech. III Year II Sem.** **L T P C**
**3 - - 3**

**Prerequisites:**

- Digital logic design
- Computer Organization

**Course Objectives**

- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- To understand deterministic and non-deterministic machines and the differences between decidability and undecidability.
- Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
- Emphasize the concept of phases of compiler, parsing, syntax directed translation, type checking use of symbol tables.
- To learn about Intermediate code generation.

**Course Outcomes**

- Able to employ finite state machines for modeling and solving computing problems.
- Able to design context free grammars for formal languages.
- Able to distinguish between decidability and undecidability.
- Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis and acquire skills in using lex tool and design LR parsers.
- Determine the different Syntax directed translations and code generation techniques.

**UNIT - I**

**Introduction to Finite Automata:** Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.

**Nondeterministic Finite Automata:** Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

**Deterministic Finite Automata:** Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA.

**UNIT - II**

**Regular Expressions:** Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

**Pumping Lemma for Regular Languages:** Statement of the pumping lemma, Applications of the Pumping Lemma.

**Context-Free Grammars:** Definition of Context-Free Grammars, Derivations Using a Grammar,

Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.

**UNIT - III**

**Push Down Automata:** Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence
Of PDA's and CFG's, Acceptance by final state

**Turing Machines:**
Introduction to Turing Machine, Formal Description, Instantaneous description, The language of aTuring machine

**Undecidability:** Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines

**UNIT - IV**

**Introduction:** The structure of a compiler

**Lexical Analysis:** The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The
Lexical- Analyzer Generator Lex

**Syntax Analysis:** Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing,
Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers

**UNIT - V**

**Syntax-Directed Translation:** Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax Directed Translation Schemes, Implementing L-Attributed SDD's.

**Intermediate-Code Generation:** Variants of Syntax Trees, Three-Address Code
Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap
Management

**TEXT BOOKS:**

1. Introduction to Automata Theory, Languages, and Computation, 3rd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science- Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.

**REFERENCE BOOKS:**

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.
2. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
3. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
4. Lex & YACC – John R. Levine, Tony Mason, Doug Brown, O'reilly
5. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

# 22DS3211: BIG DATA ANALYTICS

**B.Tech. III Year II Sem.** **L T P C**
**3 - - 3**

**Prerequisites:**

- A Course on Data warehousing
- Knowledge on Quantitative Aptitude and Statistics

**Course Objectives**

- Provide the knowledge of principles and techniques for Big data Analytics and give an exposure of the frontiers of big data Analytics.
- This course is also designed to give an exposure of the frontiers of Big data Analytics
- Provide an overview of Apache Hadoop & HDFS Concepts and Interfacing with HDFS
- Understand Map Reduce Jobs
- Exposure to Data Analytics with R.

**Courses Outcomes**

- Understand the importance of big data analytics and its types
- Perform analytics on big data
- Proficiency in big data storage and processing in Hadoop
- Data analytics through MongoDB
- Data analytics through R .

**UNIT - I**

**Types of Digital data:** Classification of Digital Data,

**Introduction to Big Data:** Evolution of Big Data, definition of big data, Traditional Business Intelligence vs Big Data, Coexistence of Big Data and Data Warehouse.

**Big Data Analytics:** introduction to Big Data Analytics, What Big Data Analytics Isn't, Sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data, Top Challenges Facing Big Data, Big Data Analytics Importance, Data Science, Terminologies used in Big Data Environments.

**UNIT - II**

**Hadoop:** Features of Hadoop, Key advantages of hadoop, versions of hadoop, overview of hadoop

ecosystem, Hadoop distributions. Need of hadoop, RDBMS vs Hadoop, Distribution computing

Challenges, History of hadoop, Hadoop overview, HDFS .

**UNIT - III**

Processing data with hadoop, introduction to map reduce programming, mapper, reducer, combiner, Partitioner.

**NoSQL:** Types of NoSQL Databases, advantages of NoSQL, Use of NoSQL in industry, SQL vs NoSQL, newSQL, comparison of Nosql, sql and newsql**.**

**UNIT - IV**

MongoDB, necessity of mongodb, terms used in mongodb and RDBMS, data types in mongo DB,

Mongodb query language.

**UNIT - V**

Introduction to R programming, operators, control statements and functions, interfacing with R, vectors, matrices, lists, data frames, factors and tables, accessing input and output, graphs in R,

R apply family

**TEXT BOOKS:**

1. Big Data Analytics, Seema Acharya, Subhashini Chellappan, Wiley 2015.

2. R programming for beginners, sandhya arora, latesh malik, university press.

**REFERENCE BOOKS:**

1. chandramouli subramanian, Asha A Geroge, C R Rene Robin, big data analytics, University

press.

2. Big Data, Big Analytics: Emerging Business Intelligence and Analytic

Trends for Today's Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga

Dhiraj, Wiley CIO Series, 2013.

3. Hadoop: The Definitive Guide, Tom White, 3rd Edition, O'Reilly Media, 2012.

4. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition,

IBM Corporation, 2012.

# 22CS3211: MACHINE LEARNING

**B.Tech. III Year II Sem.** **L T P C**
**3 - - 3**

**Prerequisites:**

- A Course on "Data Analytics"
- A Course on "Computer Oriented Statistical methods"

**Course Objectives**

- Define Machine Learning and understand the basic theory underlying machine learning.
- Understand the basic concepts of learning and decision trees.
- Understand neural networks and Bayesian techniques for problems appear in machine learning
- Understand the instance based learning and reinforced learning
- Perform statistical analysis of machine learning techniques

**Course Outcomes:** After the completion of the course student will be able to

- Illustrate the learning techniques and investigate concept learning
- Apply the characteristics of decision tree to solve associated problems
- Use and Apply Ensemble and Un-Supervised Learning Techniques.
- Apply effectively neural networks for appropriate applications
- Evaluate hypothesis and investigate instant based learning and reinforced learning

**UNIT-I**

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias, Gradient Descent Algorithm and its variants.

**UNIT-II**

Supervised Learning- Regression: Linear-Simple, Multiple, Logistic Regression. Classification- Naive Bayes Classifier, k-NN classifier, Support Vector Machines -Linear, Non Linear Ensemble Techniques I-Decision Trees-ID3(Iterative Dichotomiser3), CART(Classification and Regression Tree)

**UNIT-III**

Ensemble Techniques II- C4.5, CHAID (Chi-Square Automatic Interaction Detection), Random Forest Algorithm Unsupervised Learning-Clustering: Measures of distance, k-means, Gaussian

Mixture Model Clustering, Hierarchical Learning- Divisive, Agglomerative Clustering.

**UNIT-IV**

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multi-layer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, an illustrative example: face recognition, advanced topics in artificial neural networks.

**UNIT - V**

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms. Reinforcement Learning – Introduction, the learning task, Q–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

**TEXT BOOK:**

1. Machine Learning – Tom M. Mitchell, - MGH.
2. Introduction to Machine Learning with Python, Author – Andreas C. Müller, Sara h Guido,
   Edition – First Edition, Publisher – O'Reilly Media, Inc.

**REFERENCE BOOK:**

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.
2. Mathematics for Machine learning, Author – Marc Peter Deisenroth, Edition –
   First Edition, Publisher – Cambridge University Press.

# 22CS3271: SCRIPTING LANGUAGES:

## (Professional Elective –III)

**B.Tech. III Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | - | - | 3 |

**Prerequisites:**

- A course on "Computer Programming and Data Structures"
- A course on "Object Oriented Programming Concepts"

**Course Objectives:** This course will enable students to

- Learn the basics of Ruby
- Understand the embedding Ruby to other langiages
- Learn the language PERL
- To gain in-depth knowledge of programming features of Perl.
- To Learn TCL and Tk.

**Course Outcomes:** After the completion of the course student will be able to

- Develop Ruby programs and CGI scripts
- To implement the design of programs by embedding Ruby to other Languages.
- To write and apply Perl scripts.
- Create internet applications using PERL.
- Write programs using TCL and Tk

**UNIT - I**

Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBY GEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services.

Ruby Tk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

**UNIT - II**

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

**UNIT - III**

Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

**UNIT - IV**

Advanced perl : Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

**UNIT – V**

**TCL:** TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk: Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

**TEXT BOOKS:**

1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Progamming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

**REFERENCE BOOKS:**

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

# 22DS3271: WEB TECHNOLOGIES
## (Professional Elective –III)

**B.Tech. III Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | - | - | 3 |

**Course Objectives**

- To introduce Client-side scripting with Java script and AJAX.
- To introduce PHP language for server-side scripting
- To introduce XML and processing of XML Data with Java
- To introduce Server-side programming with Java Servlets
- To introduce Server-side Programming with JSP

**Course Outcomes**

- Understand basics of HTML and CSS and Design and Development of Dynamic Web Pages (using Validations) with Java Script and AJAX programming
- Understand Server-side Scripting with PHP language.
- Analyse what is XML and how to parse and use XML data with JAVA
- Develop Server side Application with Servlets (Sessions and Cookies).
- Create JSP pages with Database Server**.**

**UNIT-I: HTML Common tags**- List, Tables, images, forms, Frames; Cascading Style sheets; **Client-side Scripting:** Introduction to JavaScript, JavaScript language – declaring variables, scope of variables, functions, event handlers (onclick, on submit etc.), Document Object Model, Form validation.

**UNIT-II: XML:** XML: Introduction to XML, XML document structure, DTD, Namespaces and XML Schemas.

**Web Application Frameworks**: Introduction to AngularJS, ReactJS, NodeJS, JQuery.

Web Robot: Eg: WayBack Machine, PGF Cyber policing Case Study

**UNIT - III: Introduction to Servlets:** Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Session tracking, Cookies and Sessions, connecting to a database using JDBC.

**UNIT-IV: Introduction to JSP:** The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

**UNIT-V: Introduction to PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, and lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies

**File Handling in PHP:** File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

**TEXT BOOKS:**

1. Web Technologies, UttamK Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

**REFERENCES:**

1. Web Programming, building internet applications, Chris Bates 2″ edition, WileyDreamtech
2. Java Server Pages —Hans Bergsten, SPDO'Reilly,
3. Java Script,D.Flanagan
4. Beginning Web Programming-Jon DuckettWROX.
5. Programming World Wide Web, R.W.Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web — How to program. Dietel and Nieto, Pearson.

# 22DS3272: DATA VISUALIZATION TECHNIQUES

## (Professional Elective –III)

**B.Tech. III Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | - | - | 3 |

**Prerequisites:**

- Basic knowledge on python program.

**Course Objective:**

- To learn about different Visualization Techniques
- To study the Interaction techniques in information visualization fields
- To understand various abstraction mechanisms
- To create interactive visual interfaces
- To learn data modeling and data processing

**Course Outcomes:**

- Visualize the objects in different dimensions.
- Design and process the data for Virtualization.
- Apply the visualization techniques in physical sciences, computer science, applied mathematics and medical science.
- Apply core skills for visual analysis
- Apply visualization techniques for various data analysis tasks.

**UNIT - I**

Introduction, A Brief History of Data Visualization, Good Graphics, Static Graphics.

**UNIT - II**

Data Visualization Through Their Graph Representations, Graph-theoretic Graphics, High-dimensional Data Visualization, Multivariate Data Glyphs: Principles and Practice, Linked Views for Visual Exploration, Linked Data Views, Visualizing Trees and Forests.

**UNIT - III**

Multidimensional Scaling, Huge Multidimensional Data Visualization, Multivariate Visualization by Density Estimation, Structured Sets of Graphs, Structural Adaptive Smoothing by Propagation–
Separation Methods, Smoothing Techniques for Visualization.

**UNIT - IV**

Data Visualization via Kernel Machines, Visualizing Cluster Analysis and Finite Mixture Models,
Visualizing Contingency Tables, Mosaic Plots and their Variants.

**UNIT - V**

Parallel Coordinates: Visualization, Exploration and Classification of High- Dimensional Data, Matrix Visualization, Visualization in Bayesian Data Analysis.

**TEXT BOOKS:**

1. Handbook of Data Visualization by Chun-houh Chen, 2008.
2. Matthew Ward, Georges Grinstein and Daniel Keim, “Interactive Data Visualization Foundations, Techniques, Applications”, 2010.
3. Colin Ware, “Information Visualization Perception for Design”, 2nd edition, Margon Kaufmann
Publishers, 2004.

**REFERENCE BOOKS:**

1. Robert Spence “Information visualization – Design for interaction”, Pearson Education, 2nd Edition, 2007.
2. Alexandru C. Telea, “Data Visualization: Principles and Practice,” A. K. Peters Ltd, 2008.

# 22DS3273: CRYPTOGRAPHY AND NETWORK SECURITY
## (Professional Elective –III)

**B.Tech. III Year II Sem**

| L | T | P | C |
|---|---|---|---|
| 3 | - | - | 3 |

**Prerequisites:** Should have knowledge of computer networks.

**Course Objectives:**

- Explain the objectives of information security.
- Explain the importance and application of each of confidentiality, integrity, authentication and availability.
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks.
- Describe public-key cryptosystem.

**Course Outcomes:**

- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- Ability to identify information system requirements for both of the m such as client and server.
- Ability to understand the current legal issues towards information security.
- Provide security of the data over the network.
- Implement various networking protocols

**UNIT-I**

**Security Concepts:** Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security.

**Cryptography Concepts and Techniques:** Introduction, plaintext and cipher text, substitution techniques, transposition techniques, encryption and ecryption,symmetric and asymmetric key cryptography,steganography,key range and key size, possible types of attacks.

**UNIT-II**

**Symmetric key Ciphers:** Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

**Asymmetric key Ciphers:** Principles of public cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

**UNIT-III**

**Cryptographic Hash Functions:** Message Authentication, Secure Hash Algorithm (SHA-512), **Message authentication codes:** Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

**Key Management and Distribution:** Symmetric Key Distribution Using Symmetric &Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509AuthenticationService, Public–Key Infrastructure.

**UNIT-IV**

**Transport-level Security:** Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

**Wireless Network Security:** Wireless Security, Mobile Device Security, IEEE802.11WirelessLAN, IEEE802.11iWirelessLAN Security.

**UNIT–V**

**E-Mail Security:** Pretty Good Privacy, S/MIMEIP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, Internet Key Exchange

**Case Studies on Cryptography and security:** Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

**TEXTBOOKS:**

1. Crypto graphy and Network Security-Principles and Practice: William-Stallings,PearsonEducation,6th Edition
2. Cryptography and Network Security:AtulKahate,McGrawHill,3rd Edition

**REFERENCEBOOKS:**

1. Cryptography and Network Security: CK Shyamala, NHarini, Drv TR Pad-manabhan, Wiley India, 1stEdition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw-Hill, 3rdEdition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGELearning.

Network Security and Cryptography: BernardMenezes, CENGAGELearning

# OPEN ELECTIVE -I

**B.Tech. III Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| 3 | - | - | 3 |

# 22DS3251: MACHINE LEARNING LAB

**B.Tech. III Year II Sem.**

| L | T | P | C |
|---|---|---|---|
| - | - | 2 | 1 |

**Prerequisites:**

- A Course on "Data Analytics"
- A Course on "Computer oriented Statistical methods"

**Course Objectives**

- Define Machine Learning and understand the basic theory underlying machine learning.
- Understand the basic concepts of learning and decision trees.
- Understand neural networks and Bayesian techniques for problems appear in machine learning
- Understand the instance based learning and reinforced learning
- Perform statistical analysis of machine learning techniques

**Course Outcomes:** After the completion of the course student will be able to

- Illustrate the learning techniques and investigate concept learning
- Apply the characteristics of decision tree to solve associated problems
- Use and Apply Ensemble and Un-Supervised Learning Techniques.
- Apply effectively neural networks for appropriate applications
- Evaluate hypothesis and investigate instant based learning and reinforced learning

**List of Experiments**

1. Write a python program to compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for ML application such as Pandas and Matplotlib
4. Write a Python program to implement Simple Linear Regression
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
6. Implementation of Decision tree using sklearn and its parameter tuning
7. Implementation of KNN using sklearn
8. Implementation of Logistic Regression using sklearn
9. Implementation of K-Means Clustering
10. Performance analysis of Classification Algorithms on a specific dataset (Mini Project)

**TEXT BOOK:**

1. Machine Learning – Tom M. Mitchell, - MGH.

**REFERENCE BOOK:**

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Fra

# 22DS3252: BIG DATA ANALYTICS LAB

**B.Tech. III Year II Sem.** **L T P C**

**- - 2 1**

**Course Objectives:**

- To introduce the raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of distance sensor on IoT devices

**Course Outcomes:**

- Ability to introduce the concept of M2M (machine to machine) with necessary protocols andget awareness in implementation of distance sensor
- Get the skill to program using python scripting language which is used in many IoT devices

**List of Experiments:**

1. Create a Hadoop cluster.

2. Implement a simple map-reduce job that builds an inverted index on the set of input documents

(Hadoop).

3. Process big data in HBase.

4. Store and retrieve data in Pig.

5. Perform data analysis using MongoDB.

6. Using Power Pivot (Excel) Perform the following on any dataset.

a. Big Data Analytics.

b. Big Data Charting.

**TEXT BOOKS:**

1. Big Data Analytics, Seema Acharya, Subhashini Chellappan, Wiley 2015.

2. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's

Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga Dhiraj, Wiley CIO Series, 2013.

3. Hadoop: The Definitive Guide, Tom White, 3rd Edition, O"Reilly Media, 2012.

4. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition,

IBM Corporation, 2012.

**REFERENCE BOOKS:**

1. Big Data and Business Analytics, Jay Liebowitz, Auerbach Publications, CRC press (2013)

2. Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop, Tom Plunkett, Mark Hornick, McGraw-Hill/Osborne Media (2013), Oracle press.

3. Professional Hadoop Solutions, Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Wiley, ISBN: 9788126551071, 2015.

4. Understanding Big data, Chris Eaton, Dirk deroos et al., McGraw Hill, 2012.

5. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007.

6. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks, 1st Edition, Wiley and SAS Business Series, 2012.

# 22DS3253: Skill Development Course (UI design- Flutter)

**B.Tech. III Year II Sem.** **L T P C**

**- - 2 1**

**Course Objectives:**

- Learns to Implement Flutter Widgets and Layouts
- Understands Responsive UI Design and with Navigation in Flutter
- Knowledge on Widges and customize widgets for specific UI elements, Themes
- Understand to include animation apart from fetching data.
- Work with APIs and databases in Flutter applications.

**Course Outcome**

- Implements Flutter Widgets and Layouts
- Responsive UI Design and with Navigation in Flutter
- Create custom widgets for specific UI elements and also Apply styling using themes and custom styles.
- Design a form with various input fields, along with validation and error handling
- Fetches data and write code for unit Test for UI components and also animation

**List of Experiments: Students need to implement the following experiments**

1. a) Install Flutter and Dart SDK.

b) Write a simple Dart program to understand the language basics.

2. a) Explore various Flutter widgets (Text, Image, Container, etc.).

b) Implement different layout structures using Row, Column, and Stack widgets.

3. a) Design a responsive UI that adapts to different screen sizes.

b) Implement media queries and breakpoints for responsiveness.

4. a) Set up navigation between different screens using Navigator.

b) Implement navigation with named routes.

5. a) Learn about stateful and stateless widgets.

b) Implement state management using set State and Provider.

6. a) Create custom widgets for specific UI elements.

b) Apply styling using themes and custom styles.

7. a) Design a form with various input fields.

b) Implement form validation and error handling.

8. a) Add animations to UI elements using Flutter's animation framework.

b) Experiment with different types of animations (fade, slide, etc.).

9. a) Fetch data from a REST API.

b) Display the fetched data in a meaningful way in the UI.

10. a) Write unit tests for UI components.

b) Use Flutter's debugging tools to identify and fix issues.

**TEXT BOOK:**

1. Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development

**22MC0002: ENVIRONMENTAL SCIENCE**
**(Only for Lateral Entry students)**

| | L | T | P | C |
|---|---|---|---|---|
| **III B.Tech II Semester** | **3** | **0** | **0** | **0** |

**Course Objectives:**

- To study and Understand the importance of ecosystems.
- To impart knowledge on various natural resources.
- To know about biodiversity and biotic resources
- To impart knowledge on environmental pollution and control technologies
- To study and understand the environmental policies and regulations.

**Course Outcomes:** At the end of this course students will demonstrate the ability to

- Explain the importance of ecosystems.
- Discuss about various natural resources.
- Describe the importance biodiversity and biotic resources
- Discuss about environmental pollution and control technologies
- Explain the environmental policies and regulations.

**UNIT - I**

**ECOSYSTEMS:** Definition, Scope and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II**

**NATURAL RESOURCES: Classification of Resources:** Living and Non-Living resources,
**Water Resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.
**Mineral Resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land Resources:** Forest resources
**Energy Resources**: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

**UNIT - III**

**BIODIVERSITY AND BIOTIC RESOURCES:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity:habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV**

**ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES:**
**Environmental Pollution:** Classification of pollution
**Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.
**Water Pollution**: Sources and types of pollution, drinking water quality standards.
**Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil.
**Noise Pollution:** Sources and Health hazards, standards

**Solid Waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management.

**Pollution Control Technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation.

**Global Environmental Problems and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

**UNIT - V**

**ENVIRONMENTAL POLICY, LEGISLATION & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. **EIA:** EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socioeconomical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

**Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

**TEXT BOOKS:**

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

**REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning
Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

# 22DS3281: INDUSTRIAL ORIENTED MINI PROJECT

**B.Tech III Year II Sem.** **L T P C**

**- - 4 2**