Dept. of CSE (Data Science) R21

III YEAR I-SEMESTER

S. No	Course Code	Course Title	Category	L	T	P	C
1	21CS3111	Computer Networks	PC	3	-	-	3
2	21DS3111	Introduction to Data Science	PC	3	-	-	3
3	21DS3112	Artificial Intelligence	PC	3	-	-	3
Professional Elective -I							
4	21DS3171	Automata and Compiler Design	PE	3	-	-	3
	21DS3172	Computer Graphics	PE				
	21BU3173	Software Engineering	PE				
	21CS3174	Distributed system	PE				
5	**Open Elective-I**		OE	3	-	-	3
Practical							
6	21DS3151	Introduction to Data ScienceLab	PC	-		3	1.5
7	21DS3152	Artificial Intelligence Lab	PC	-		3	1.5
8	21HS3153	Advanced English Communication Skills Lab	HS	-		2	1
9	21MC0006	Aptitude and Logical Reasoning	MC	3	-	-	0
10	21DS3181	Summer Internships	PW	-	-	2	1
Total Credits				**18**		**10**	**20**

***Note:** Summer Internship to be carried out during summer break after II Yr II Semester

III YEAR II-SEMESTER

S. No	Course Code	Course Title	Category	L	T	P	C
1	21CS3213	Machine Learning	PC	3	-	-	3
2	21DS3211	Knowledge Representation and Reasoning	PC	3	1	-	4
3	21DS3212	Web Technologies	PC	3	-	-	3
Professional Elective -II							
4	21CS3272	Software Project Management	PE	3	-	-	3
	21DS3271	Cryptography and Network Security	PE				
	21DS3272	DevOps	PE				
	21DS3273	Robotics Process Automation	PE				
5	**Open Elective-II**			3	-	-	3
Practical							
6	21CS3253	Machine Learning Lab	PC	-	-	3	1.5
7	21DS3251	Programming for Data Analysis Lab	PC	-	-	3	1.5
8	21DS3253	Web Technologies Lab	PC	-	-	2	1
9	21MC0007	Yoga and Indian Philosophy	MC	3	-	-	0
Total Credits				**18**	**1**	**8**	**20**

21CS3111: COMPUTER NETWORKS

B.Tech. III Year I Sem.

L	T	P	C
3	-	-	3

Prerequisites

- A course on "Programming for problem-solving"
- A course on "Data Structures"

Course Objectives

- To introduce an overview of the concepts and fundamentals of computer networks.
- To Study Data Link Layer Concepts, Design issues, and protocols.
- Familiarize the working mechanism of the network layer.
- Understanding of Transport Layer Concepts and Protocols.
- To Explore the concepts of DNS,E-Mail, WWW, and various application layer Protocols.

Course Outcomes

- Gain knowledge of basic computer network technology.
- Gain knowledge of the functions of each layer in the OSI and TCP/IP reference model.
- Obtain skills in subnetting and routing mechanisms.
- Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.
- Gain Knowledge of E-Mail Protocols, Streaming Audio, and Video on the Web.

UNIT – I: Introduction: 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-for protocol for an error-free channel.
Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat.
Medium Access sub layer: The Channel Allocation Problem, Multiple Access Protocols: ALOHA, Carrier Sense Multiple Access Protocols.

UNIT – III :Network Layer: Design issues, Routing Algorithms: Shortest Path Routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service.

UNIT – IV: Transport Layer: Transport Services, Elements of Transport protocols, Congestion Control, Connection management, TCP and UDP protocols.

UNIT – V: Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:

1. Computer Networks - Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI.

REFERENCES:

1. An Engineering Approach to Computer Networks-S. Keshav, 2 nd Edition, Pearson Education.
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

21DS3111: INTRODUCTION TO DATA SCIENCE

B.Tech. III Year I Sem.

L	T	P	C
3	-	-	3

COURSE OBJECTIVES:

1. Learn concepts, techniques and tools they need to deal with various facets of data science Practice, including data collection and integration
2. Understand the basic types of data and basic statistics
3. Identify the importance of data reduction and data visualization techniques
4. Skills in the use of tools such as python, IDE
5. Understanding of the basics of the Supervised learning

COURSE OUTCOMES: After completion of the course, the student should be able to

1. Understand basic terms what Statistical Inference means.
2. Identify probability distributions commonly used as foundations for statistical modeling. Fita Model to data
3. Describe the data using various statistical measures
4. Utilize R elements for data handling
5. Perform data reduction and apply visualization 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

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 - III

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 - IV
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 - 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.

21DS3112: ARTIFICIAL INTELLIGENCE

B.Tech. III Year I Sem

L	T	P	C
3	-	-	3

COURSE OBJECTIVES: Develop ability to

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

COURSE OUTCOMES: Differentiate various intelligent agents and environments.

1. Also solve problems by searching the solution space.
2. Use adversarial search and propositional logic to solve constraint satisfaction problems
3. Use first order logic to infer and describe knowledge representation
4. Plan solutions for problems in the real world environment.
5. 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, Simulated annealing 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, the Structure of Problems. 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, Backward Chaining, Resolution. Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT - IV:

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

Approaches to Uncertain Reasoning; Dempster-Shafer theory. Learning: Forms of Learning, Knowledge in Learning: Logical Formulation of Learning, the Semantics of
Bayesian Networks.

TEXT BOOK:

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

21DS3171: AUTOMATA AND COMPILER DESIGN
(Professional Elective-I)

B.Tech. III Year I Sem

L	T	P	C
3	-	-	3

COURSEOBJECTIVES:

1. To get familiar with regular expressions to describe a language using automata.
2. Usage of context free grammars to describe the syntax of a language
3. To learn different parsing techniques
4. To provide techniques for syntactic, semantic language analysis, intermediate code Generation and optimization
5. Emphasize the concepts learnt in lexical analysis, syntax analysis, semantic analysis, intermediate code generation and type checking process through several programming exercises

COURSE OUTCOMES:

1. Read and write finite automata and grammars for programming language constructs.
2. Understand the functionality of parsing mechanisms.
3. Construct syntax trees and generate intermediate code.
4. Understand the concepts of storage administration for different programming environments
5. Understand the concepts of optimization and generate the machine code

UNIT - I

Formal Language And Regular Expressions : Languages, Operations On Languages, Regular Expressions, Identity Rules For Regular Expressions, Finite Automata – DFA, NFA, Conversion Of Regular Expression to NFA, NFA To DFA. Introduction to Compilers: Phases of the Compiler.

UNIT- II

Syntax Analysis: Context Free Grammars, Top-Down Parsing, Recursive Descent Parsers: LL (K) Parsers. Bottom-Up Parsing: Shift Reduces Parser, LR Parsers: SLR, CLR, and LALR.

UNIT- III

Syntax Directed Translation: Syntax Directed Definition, Construction of Syntax Trees, L-Attributed Definitions. Intermediate Code Generation: Intermediate Languages, Translation of Assignment Statements and Boolean Expressions.

UNIT- IV

Type Checking: Specification of Simple Type Checker, Equivalence of Type Expressions, Type Conversions Runtime Environments: Storage Organization, Storage Allocation Strategies, Access to Non Local Names, Parameter Passing, Symbol Table, Dynamics Storage Allocation Techniques.

UNIT- V

Code Optimization: Principal Sources Of Optimization, Optimization Of Basic Blocks, Loops In Flow Graphs, Global Data Flow Analysis, Peephole Optimization. Code Generation: Issues in Design of Code Generator, Simple Code Generator, Register Allocation and Assignment, DAG Representation of Basic Block, Generating Code from DAGs.

Text Books:

1. Compilers Principles, Techniques and Tools, Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, PEA.
2. Introduction to Automata Theory Languages & Computation, 3 rd Edition, Hopcroft, Ullman, PEA .

Reference Books:

1. Theory of Computer Science, Automata Languages and Computation, 2nd Edition, Mishra, Chandra Shekaran, PHI. 2. Elements of Compiler Design, A.Meduna, Auerbach Publications, Taylor and Francis Group. E-Learning Resources:

1.http://www.Practice/Interactionspoint.com/compiler_design/compiler_design_finite_automata.htm

2. nptel.ac.in/courses/106108113/ 3. nptel.ac.in/courses/106108113/11.

Introduction to Formal Languages and Automata Theory and Computation - Kamala Krithivasan and Rama R, Pearson.Modern Compiler Design, D. Grune and others, Wiley-India.

A Text book on Automata Theory, S. F. B. Nasir, P. K. Srimani, Cambridge Univ. Press.

Automata and Language, A. Meduna, Springer.

21DS3172: COMPUTER GRAPHICS
(Professional Elective-I)

B.Tech. III Year I Sem

L	T	P	C
3	-	-	3

COURSE OBJECTIVES:

1. The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
2. Topics covered include graphics systems and input devices; geometric representations.
3. Topics and 2D/3D transformations; viewing and projections; illumination and colour models.
4. Animation; rendering and implementation; visible surface detection.
5. The course further allows students to develop programming skills in computer graphics through programming assignments.

COURSE OUTCOMES:

1. Acquire familiarity with the relevant mathematics of computer graphics.
2. Be able to design basic graphics application programs, including animation.
3. Be able to design applications that display graphic images to given specifications.
4. Implement 3-D geometric transformation and 3-D viewing.
5. 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, Liang- Bersky line clipping algorithm, Hidden Line Elimination algorithm, Sutherland –Hodgeman polygon clipping algorithm.

UNIT-III

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermit Curve, Bezier curve and B-Spline curves, Basic illumination models, Colour Models.

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, Visible Surface Detection Methods.

UNIT-V

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

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 McGraw hill, 2nd edition.

2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.

3. Principles of Computer Graphics, ShaliniGovil, Pai, 2005, Spring.

21BU3173: SOFTWARE ENGINEERING
(Professional Elective-I)

B.Tech. III Year I Sem

L	T	P	C
3	-	-	3

Prerequisites:

Computer Programming ,Database Management Systems

Course Objectives:

1. To understand fundamental principles of Software engineering, and their application in the development of software products.
2. To understand and create the software requirements specifications document.
3. To understand and use unified modeling language for specifying, analysis and designing.
4. To understand testing strategies for testing software applications
5. To understand Software metrics and Risk Management strategies to identify potential problems before they occur.

COURSE OUTCOMES:

1. Able to apply the software engineering lifecycle phases communication, planning, analysis, design, construction, and deployment.
2. Ability to translate end-user requirements into system and software requirements into Software Requirements specification Document (SRS)
3. Able to apply UML in object-oriented software modeling to develop computer software.
4. Able to identify problems in software and will be able to develop a simple testing report.
5. To understand Software Metrics, potential risk and how to manage them though RMMM plan.

UNIT – I

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, legacy software, Software myths.

A Generic view of process: Software engineering- A layered technology, process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models, COCOMO Model.

Process models: The waterfall model, Incremental process models, Agile Models, Evolutionary process models.

UNIT - II: **Software Requirements**

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management, Software Requirement Specification (SRS)

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT - III:

Modeling Techniques using UML: The Unified Approach to Modeling, Structural and Behavioral Diagrams.

Design Engineering: Data Flow Diagrams, Design process and Design quality, Design concepts, the design model, pattern-based software design.

Creating an architectural design: Architectural styles and patterns, Architectural Design, assessing alternative architectural designs..

UNIT - IV: Implementation and Quality Assurance

Implementation: Structured coding Techniques, Coding Styles-Standards and Guidelines. **Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, Regression Testing, Unit Testing, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Quality Management: Quality concepts, software quality assurance, software reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

UNIT - V: Metrics for Process and Products

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance. **Risk management:** Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan, **Current trends in Software Engineering:**
Software Engineering for projects and products. Introduction to Web Engineering and Agile process

TEXT BOOKS

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modelling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, and Pearson Education.

REFERENCE BOOKS

1. "Software Engineering", Ian Sommerville, Addison-Wesley, 9th Edition, 2010, ISBN- 13: 978- 0137035151.
2. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.
4. Software testing techniques by Boris Beizer, dreamtech.
5. Software Engineering, an Engineering approach- James F. Peters, WitoldPedrycz, John Wiley.
6. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

21CS3174: DISTRIBUTED SYSTEM
(Professional Elective-I)

B.Tech. III Year I Sem

L	T	P	C
3	-	-	3

COURSE OBJECTIVES

1. To understand the foundations of distributed systems.
2. To learn issues related to clock Synchronization and the need for global state in distributed systems.
3. To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.
4. To introduce the concepts of distributed file systems, shared memory and message passing systems, synchronization and resource management.
5. To introduce the concepts of Transactions and Concurrency Control and Distributed deadlocks

COURSEOUTCOMES:

1. Distinguish distributed computing paradigm from other computing paradigms.
2. Able to explain various distributed algorithms, such as logical clocks and leader election.
3. Illustrate the mechanisms of inter process communication in distributed system.
4. Explain name services and distributed shared memory.
5. The students will be able to define, explain and illustrate fundamental principles of concurrent transaction processing.

UNIT I

Characterization of Distributed Systems: Introduction, Examples of Distributed systems, Resource sharing and web, challenges.

System Models: Introduction, Architectural and Fundamental models.

UNIT II

Time and Global States: Introduction, Clocks, Events and Process states, synchronizing physical clocks, Logical time and Logical clocks, Global states, Distributed Debugging. Coordination and Agreement: Introduction, Distributed mutual exclusion, Elections, Multicast Communication, Consensus and Related problems.

UNIT III

Inter Process Communication: Introduction, The API for the internet protocols, External Data
Representation and Marshaling, Client-Server Communication, Group Communication, Case Study: IPC in UNIX.
Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications, Case study-Java RMI.

UNIT IV

Distributed File Systems: Introduction, File service Architecture, Case Study1: Sun Network File System, Case Study 2: The Andrew File System.Name Services: Introduction, Name Services and the Domain Name System, Directory Services, Case study of the Global Name Service.
Distributed Shared Memory: Introduction Design and Implementation issues, Sequential consistency and Ivy case study, Release consistency and Munin case study, other consistency models.

UNIT V

Transactions and Concurrency Control: Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for Concurrency control.
Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery

TEXT BOOK:

1. Distributed Systems, Concepts and Design, George Coulouris, JDollimore and Tlm-Kindberg, Pearson Education, 4h Edition, 2009.

REFERENCE BOOKS:

1. Distributed Systems, Principles and paradigms, Andrew S.Tanenbaum, Maarten Van
2. Steen, Second Edition, PHI.
3. Distributed Systems, An Algorithm Approach, SikumarGhosh, Chapman & Hall/CRC,
4. Taylor &Fransis Group, 2007.
5. Distributed Systems, Principles and Paradigms, Andrew S.Tanenbaum, Maarten Van Steen, 2d Edition, PHl.
6. Distributed Systems, An Algorithm Approach, SukumarGhosh,Chapman&HalyCRC, Taylor &Fransis Group, 2007.

Open Elective -I

B.Tech. III Year I Sem

L	T	P	C
3	-	-	3

21DS3151: INTRODUCTION TO DATA SCIENCE LAB

B.Tech. III Year I Sem

L	T	P	C
3	-	-	1.5

COURSE OBJECTIVES:

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

COURSE OUTCOMES :

1. Recognize the various discipline that contribute to a successful data science effort
2. Understand the processes of data science identifying the problem to be solved, data collection, preparation, modeling, evaluation and visualization.
3. Be aware of the challenges that arise in data sciences
4. Be able to identify the application of the type of algorithm based on the type of the problem.
5. 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. R Environment setup: Installation of R and R Studio in Windows

2. Write R commands for

i. Variable declaration and retrieving the value of the stored variables,

ii. Write an R script with comments, iii. Type of a variable using class () Function.

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. Illustrate the usage of Vector sub setting& Matrix sub setting

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

iii. Write a program to create a class, object, and function

5. Write a command in R console I. to create a tshirt_factor, which is ordered with levels 'S', 'M', and 'L'. Is it possible to identify from the examples discussed earlier, if blood type 'O' is greater or less than blood type 'A'? ii. Write the command in R console to create a new data frame containing the 'age' parameter from the existing data frame. Check if the result is a data frame or not. Also R commands for data frame functions cbind (), rbind (), sort ()

6. Write R command for i. Create a list containing strings, numbers, vectors and logical values ii. To create a list containing a vector, a matrix, and a list. Also give names to the elements in the list and display the list also access the list elements iii. To add a new element at the end of the list and delete the element from the middle display the same IV. To create two lists, merge two lists. Convert the lists into vectors and perform addition on the two vectors. Display the resultant vector.

7. Write R command for i. logical operators—AND (&), OR (|) and NOT (!). ii. Conditional Statements iii. Create four vectors namely patientid, age, diabetes, and status. Put these four vectors into a data frame patientdata and print the values using a for loop& While loop iv. Create a user-defined function to compute the square of an integer in R

v. Create a user-defined function to compute the square of an integer in R vi. Recursion function for a) factorial of a number b) find nth Fibonacci number

8. Write R code for i) Illustrate Quick Sort ii) Illustrate Binary Search Tree

9. Write R command to i. illustrate Mathematical functions & I/O functions ii. Illustrate Naming of functions and sapply (), lapply (), tapply () &mapply()

10. Write R command for

i. Pie chart 3D Pie Chart, Bar Chart to demonstrate the percentage conveyance of various ways for traveling to office such as walking, car, bus, cycle, and train

ii. Using a chart legend, show the percentage conveyance of various ways for traveling to office such as walking, car, bus, cycle, and train.

a. Walking is assigned red color, car – blue color, bus – yellow color, cycle – green color, and train – white color; all these values are assigned through cols and lbls variables and the legend function.

b. The fill parameter is used to assign colors to the legend. c. Legend is added to the top-right side of the chart, by assigning

iii. Using box plots, Histogram, Line Graph, Multiple line graphs and scatter plot to demonstrate the relation between the cars speed and the distance taken to stop, Consider the parameters data and x Display the speed and dist parameter of Cars data set using x and data parameters

TEXT BOOK:

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

21DS3152: ARTIFICIAL INTELLIGENCE LAB

B.Tech. III Year I Sem

L	T	P	C
3	-	-	1.5

COURSE OBJECTIVES: Course Objectives Develop ability to

1. Learn the difference between optimal reasoning and human like reasoning.
2. Know about basic concepts of state space representation, exhaustive search, and heuristic search together with the time and space complexities.
3. Obtain a thorough knowledge of various knowledge representation techniques.
4. Study about various reasoning techniques.
5. Know about various applications of AI, namely game playing

COURSE OUTCOMES (COS) : At the end of the course, student would be able to

1. Formulate an efficient problem space for a given problem.

2. Identify a suitable search algorithm to search the solution of a problem in view of its characteristics namely time and space complexities.

3. Represent the knowledge of the given problem domain using rules and appropriate knowledge representation technique.

4. Exploring AI techniques for solving problems with Reasoning and Uncertain models.

5. Possess the skill to apply AI techniques to solve problems of Game playing.

List of Experiments

Week-1

a. Write a python program to print the multiplication table for the given number?

b. Write a python program to check whether the given number is prime or not?

c. Write a python program to find factorial of the given number?

Week-2

a. Write a python program to demonstrate the usage of List operations. (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing, Add, Append, Extend & Delete)

b. Write a Python Program to Remove Duplicate Element from a List.

Week-3

Write a python program to implement Water Jug Problem?

Week-4

Write a python program to implement Breadth-first search and Depth-first search

Week-5

Write a Python code to implement 8-puzzle Problem.

Week-6

Write a python program to implement Tic-Tac-Toe game.

Week-7

(a)Write a python program to implement constraint satisfaction problem.

Week-8

Write a python program to implement Greedy best-first search.

Week-9

Write a Python code to implement alpha–beta pruning.

Week-10

Write a python program to construct a Bayesian network by considering any example data.

Week-11

Write a Python program to implement A* search.

Week-12

Write a Python code to solve traveling salesman problem

21HS3153: ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B.Tech. III Year I Sem

L	T	P	C
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INTRODUCTION:

1. The introduction of the Advanced Communication Skills Lab is considered essential at 3 rd year level.
2. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.
3. The proposed course should be a laboratory course to enable students to use 'good'
4. English and perform the following: Gathering ideas and information to organize ideas relevantly and coherently. Engaging in debates. Participating in group discussions. Facing interviews. Writing project/research reports/technical reports. Making oral presentations.
5. Writing formal letters. Transferring information from non-verbal to verbal texts and vice-versa. Taking part in social and professional communication.

OBJECTIVES:

1. This Lab focuses on using multi-media instruction for language development to meet the following targets:
2. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
3. Further, they would be required to communicate their ideas relevantly and coherently in writing.
4. To prepare all the students for their placements.

SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. Activities on Fundamentals of Interpersonal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. Activities on Reading Comprehension –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading effective googling.

3. Activities on Writing Skills – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

4. Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/emails/assignments etc.

5. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

MINIMUM REQUIREMENT:

1. The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab: Spacious room with appropriate acoustics. Round Tables with movable chairs Audio-visual aids LCD Projector Public Address system P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ T. V, a digital stereo & Camcorder Headphones of High quality

SUGGESTED SOFTWARE: The software consisting of the prescribed topics elaborated above should be procured and used. Oxford Advanced Learner's Compass,

7 th Edition DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice. Lingua TOEFL CBT Insider, by Dream tech TOEFL& GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

1. Effective Technical Communication by M AsharafRizvi. McGraw Hill Education (India) Pvt. Ltd.2 nd Edition 2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5 thEdition. REFERENCE BOOKS: 1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar andHemalathaNagarajan. Pearson 2007

2. Professional Communication by ArunaKoneru, McGraw Hill Education (India) Pvt. Ltd, 2016.

3. Technical Communication by Meenakshi Raman &Sangeeta Sharma, Oxford University Press2009.

4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt.Ltd. New Delhi.

5. English Vocabulary in Use series, Cambridge University Press 2008.

6. Handbook for Technical Communication by David A. McMurrey& Joanne Buckley. 2012.Cengage Learning.

7. Communication Skills by LeenaSen, PHI Learning Pvt Ltd., New Delhi, 2009.

8. Job Hunting by ColmDownes, Cambridge University Press 2008.

21MC0006: APTITUDE AND LOGICAL REASONING

B.Tech. III Year I Sem

L	T	P	C
-	-	2	0

21DS3181: SUMMER INTERNSHIPS

B.Tech. III Year I Sem

L	T	P	C
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III YEAR II-SEMESTER

21CS3213: MACHINE LEARNING

B.Tech. III Year II Sem

L	T	P	C
3	-	-	3

- Data Structures
- Knowledge on 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 should be able to

- Choose the learning techniques and investigate concept learning
- Identify the characteristics of decision tree and solve problems associated with Decision tree Learning
- Apply effectively Neural Networks for appropriate applications
- Apply Bayesian techniques and derive effectively learning rules
- Evaluate hypothesis and investigate instance based learning, reinforced learning and Analytical 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, multilayer 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, Sarah 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.

21DS3211: KNOWLEDGE REPRESENTATION AND REASONING

B.Tech. III Year II Sem.

L	T	P	C
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COURSE OBJECTIVES:

1. Express knowledge of a domain formally.
2. Explain the production systems, frames, inheritance systems and approaches to handle
3. Examine the principles of reasoning
4. Describe how knowledge based systems works
5. Illustrate knowledge based approaches to problem solving

COURSE OUTCOMES:

1. To get familiar with knowledge of a domain formally
2. Learn how to handle Uncertain or incomplete knowledge.
3. To learn the basics concepts of Resolution
4. To Learn basic concepts of Reasoning
5. To Emphasize the concepts of Procedural Control of Reasoning

UNIT-I

Introduction: The Key Concepts: Knowledge, Representation, and Reasoning, Why Knowledge Representation and Reasoning? Knowledge-Based Systems, Why knowledge Representation? Why Reasoning? The Role of Logic, Propositional Logic basics, Soundness & Completeness, Resolution Proof, Semantic Tableaux, Binary Decision Diagrams.

UNIT-II

The Language of First-Order Logic: Introduction, the Syntax, the Semantics, Interpretations, Denotation, Satisfaction and Models, Logical Consequence Why We Care, Explicit and Implicit Belief, Knowledge-Based Systems. Expressing Knowledge. Knowledge Engineering , Vocabulary, Basic Facts, Complex Fact, Terminological Fact, Entailments, Abstract Individuals , Other Sorts of Facts.

UNIT-III

Resolution: The Propositional Case, Resolution Derivations, An Entailment Procedure, Handling Variables and Quantifiers, First-Order Resolution, Answer Extraction., Skolemization, Equality, Dealing with Computational Intractability, The First-Order Case, The Herbrand Theorem, The Propositional Case , The Implications , SAT Solvers, Most General Unifiers, Other Refinements .

UNIT-IV

Reasoning with Horn Clauses: Horn Clauses, Resolution Derivations with Horn Clauses, SLD Resolution, Goal Trees, Computing SLD Derivations, Backward Chaining, Forward Chaining, and the First-Order Case.

UNIT-V

Procedural Control of Reasoning: Facts and Rules , Rule Formation and Search Strategy, Algorithm Design, Specifying Goal Order , Committing to Proof Methods , Controlling Backtracking, Negation as Failure Dynamic Databases, The PLANNER Approach.

Reference Books:

1. Language, Proof and Logic, Jon Barwise& John Etchemendy, CSLI Publications (1999); ch 9-11.

2. Knowledge representation and Reasoning, Ronald J. Brachman& Hector J. Levesque, Elsevier (2004); ch2-6, 9, 11, 14, 15.

3. The Description Logic Handbook: Theory, implementation, and applications, Franz Baader, Deborah L.McGuinness, Daniele Nardi and Peter F. Patel-Schneider, Cambridge University Press (2010); ch 2, 5-6.

21DS3212: WEB TECHNOLOGIES

B.Tech. III Year II Sem

L	T	P	C
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Course Objectives

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

Course Outcomes

1. Understand basics of HTML and CSS and Design and Development of Dynamic Web Pages (using Validations) with Java Script and AJAX programming
2. Understand Server-side Scripting with PHP language.
3. Analyse what is XML and how to parse and use XML data with JAVA
4. Develop Server side Application with Servlets (Sessions and Cookies).
5. 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 toAngularJS, 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.

21CS3272: SOFTWARE PROJECT MANAGEMENT
(Professional Elective-II)

B.Tech. III Year II Sem

L	T	P	C
3	-	-	3

COURSE OBJECTIVES:

1. To understand the Software Project Planning and Evaluation techniques.
2. To plan and manage projects at each stage of the software development life cycle (SDLC).
3. To learn about the activity planning and risk management principles.
4. To manage software projects and control software deliverables.
5. To develop skills to manage the various phases involved in project management and people management.
6. To deliver successful software projects that support organization's strategic goals.

COURSE OUTCOMES: At the end of the course, the students should be able to:

1. Understand Project Management principles while developing software.
2. Gain extensive knowledge about the basic project management concepts, framework and the process models.
3. Obtain adequate knowledge about software process models and software effort estimation techniques.
4. Estimate the risks involved in various project activities.
5. Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.
6. Learn staff selection process and the issues related to people management.

UNIT-I

ConventionalSoftwareManagement: Thewaterfallmodel,conventionalsoftwareManagementperformance. OverviewofProjectPlanning – StepwiseProject Planning.

ImprovingSoftwareEconomics: ReducingSoftwareproductsize,improvingsoftwareprocesses, improving team effectiveness, improving automation, Achieving required quality,peerinspections.

UNIT-II

Theoldwayandthenewway: TheprinciplesofconventionalsoftwareEngineering,principlesofmodern softwaremanagement, transitioningtoan iterativeprocess.

Life cycle phases: Engineering and production stages, Inception, Elaboration,Construction,Transition phases.

Artifactsoftheprocess: Theartifactsets,Managementartifacts,Engineeringartifacts,programmatic artifacts.

UNIT–III

Work Flows of the process: Software process workflows, Iteration workflows. **Checkpointsof the process: Major**milestones,Minor Milestones, Periodicstatusassessments.

IterativeProcessPlanning:Workbreakdownstructures,planningguidelines,costandscheduleestimating,Iteration planningprocess, Pragmatic planning.

UNIT–IV

ProcessAutomation:AutomationBuildingblocks.

ProjectControlandProcessinstrumentation: TheseVencorMetrics,Managementindicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metricsautomation.

TailoringtheProcess: Processdiscriminants.

UNIT–V

ProjectOrganizationsandResponsibilities: Line-of-BusinessOrganizations,UnderstandingBehavior–OrganizationalBehavior**FutureSoftwareProjectManagement:**ModernProjectProfiles,NextgenerationSoftwareeconomics, modern process transitions.

CaseStudy: ThecommandCenterProcessingandDisplaysystem-Replacement(CCPDS-R).

TEXTBOOKS:

1.SoftwareProjectManagement,WalkerRoyce:PearsonEducation,2005.

REFERENCES:

1. SoftwareProjectManagement,BobHughes andMikeCotterell:TataMcGraw-HillEdition.
2. SoftwareProjectManagement,JoelHenry,PearsonEducation.
3. SoftwareProjectManagementinpractice,PankajJalote,PearsonEducation.

21DS3271: CRYPTOGRAPHY & NETWORK SECURITY
(Professional Elective-II)

B.Tech. III Year II Sem.

L	T	P	C
3	-	-	3

COURSE OBJECTIVES:

1. Explain the objectives of information security.
2. Explain the importance and application of each of confidentiality, integrity, authentication and availability.
3. Understand various cryptographic algorithms.
4. Understand the basic categories of threats to computers and networks.
5. Describe public-key cryptosystem.
6. Describe the enhancements made to IPv4byIPSec.
7. Understand Intrusions and intrusion detection.

COURSE OUTCOMES:

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

UNIT-I

SecurityConcepts: Introduction,Theneedforsecurity,Securityapproaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security**CryptographyConceptsandTechniques:**Introduction,plaintextandciphertext,substitutiontechniques,transpositiontechniques,encryptionanddecryption,symmetricandasymmetrickeycryptography,steganography,key range and key size, possible types of attacks.

UNIT-II

SymmetrickeyCiphers: BlockCipherprinciples,DES,AES,Blowfish,RC5,IDEA,Blockcipheroperation,Streamciphers,RC4.

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

UNIT-III

Cryptographic HashFunctions: 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 graphyandNetworkSecurity-PrinciplesandPractice: William-Stallings,PearsonEducation,6th Edition
2. Cryptography and Network Security:AtulKahate,McGrawHill,3rd Edition

REFERENCEBOOKS:

1. Cryptography and Network Security: CKShyamala, NHarini, DrvTRPad-manabhan, Wiley India, 1stEdition.
2. CryptographyandNetwork Security: ForouzanMukhopadhyay, McGraw-Hill, 3rdEdition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. PrinciplesofComputer Security: WM.Arthur Conklin, Greg White, TMH.
5. IntroductiontoNetworkSecurity: NealKrawetz, CENGAGELearning.
6. NetworkSecurityand Cryptography: BernardMenezes, CENGAGELearning.

21DS3272: DEVOPS

(Professional Elective-II)

B.Tech. III Year II Sem

L	T	P	C
3	-	-	3

Course Objectives: The main objectives of this course are to

1. Describe the agile relationship between development and IT operations.
2. Understandtheskillsetsandhigh-functioningteamsinvolvedinDevOpsandrelated methods to reach a continuous delivery capability
3. Implement automated system update and DevOps lifecycle

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

1. Identify components of Devops environment
2. Describe Software development models and architectures of DevOps
3. Applydifferentprojectmanagement,integration,testingandcodedeploymenttool
4. Investigate different DevOps Software development models
5. Assess various Devops practices
6. Collaborate 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, bottle necks, 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, these parathion 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 sourcecodemanagement,Rolesandcode,sourcecodemanagementsystemandmigrations,Sharedauthentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit,The pull request model,GitLab.

UNIT-IV

Integrating the system: Build systems, Jenkins build server, Managing build dependencies, Jenkinsplgins, 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,Buildphases,Alternativebuildservers,Collatingqualitymeasures.

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-drivendevelopment,REPL-drivendevelopment

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

TEXTBOOKS:

1. JoakimVena.PracticalDevops,SecondEdition.Ingramshorttitle;2ndedition(2018) .ISBN-10:1788392574
2. DeepakGawad,ViralThakkar.DevOpsToolsfromPractitioner'sViewpoint.Wiley publications.ISBN:9788126579952

REFERENCEBOOK:

1.LenBass,IngoWeber,LimingZhu.DevOps:ASoftwareArchitect'sPerspective.Addison Wesley;ISBN-10.

21DS3273: ROBOTICS PROCESS AUTOMATION

B.Tech. III Year II Sem

L	T	P	C
3	-	-	3

COURSE OBJECTIVES:

1. Aim of the course is to make learners familiar with the concepts of Robotic Process Automation.

COURSE OUTCOMES:

1. Describe RPA, where it can be applied and how it's implemented.
2. Identify and understand Web Control Room and Client Introduction
3. Understand how to handle various devices and the workload.
4. Understand Bot creators, Web recorders and task editors

UNIT-I

Introduction to Robotic Process Automation & Bot Creation Introduction to RPA and Use cases AutomationAnywhereEnterprisePlatformAdvancedfeaturesandcapabilities– WaystocreateBots.

UNIT-II

Web Control Room and Client Introduction-Features Panel-Dashboard (Home, Bots, Devices, Audit, Workload, Insights) - Features Panel – Activity (View Tasks in Progress and Scheduled Tasks) - Bots (View Bots Uploaded and Credentials).

UNIT-III

Devices (View Development and Runtime Clients and Device Pools) - Workload (Queues and SLA Calculator) - Audit Log (View Activities Logged which are associated with Web CR) - Administration (Configure Settings, Users, Roles, License and Migration) - Demo of Exposed API's – Conclusion –Client introduction and Conclusion.

UNIT-IV

Bot Creator Introduction–Recorders–Smart Recorders–Web Recorders Screen Recorders-Task Editor – Variables - Command Library – Loop Command – Excel Command – Database Command –String Operation Command -XML Command.

UNIT-V

Terminal Emulator Command- PDF Integration Command- FTP Command-PGP Command-Object Cloning Command - Error Handling Command - Manage Windows Control Command – Workflow Designer –Report Designer.

TEXTBOOKS:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots with the leading RPA tool–UiPath Kindle Edition.

REFERENCES:

1. Robotic ProcessAutomationACompleteGuide-2020EditionKindleEdition.

21CS3253: MACHINE LEARNING LAB

B.Tech. III Year II Sem.

L	T	P	C
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CourseDescription

- Machine Learning is concerned with computer programs that automatically improve theirperformancethroughexperience.
- Thiscourse covers thetheory andpracticalalgorithmsfor machine learningfromavarietyof perspectives.
- This course covers topics such as FIND-S, Candidate Elimination Algorithm, Decisiontree (ID3 Algorithm), Back propagation Algorithm, Naïve Bayesian classifier, BayesianNetwork, k-MeansAlgorithm, k-NearestNeighborAlgorithm, LocallyWeightedRegressionAlgorithm.

CourseObjectives

- MakeuseofDatasetsinimplementingthemachinelearningalgorithms
- Implementthemachinelearningconceptsandalgorithmsinanysuitable-languageofchoice.

CourseOutcomes

- Understandtheimplementation proceduresforthemachine learningalgorithms
- DesignJava/PythonprogramsforvariousLearningalgorithms.
- Applyappropriatedata setsto theMachineLearningalgorithms
- Identifyand applyMachineLearningalgorithmsto solve real world problems

List of Experiments

1. ImplementanddemonstratetheFIND-Salgorithmforfindingthemostspecifichypothesisbased onagiven setof training datasamples.Read the training datafroma.CSV file.
2. Foragivensetoftrainingdataexamplesstoredina.CSVfile,implementanddemonstrate the Candidate-Elimination algorithm to output a description of the set of allhypothesesconsistent with the trainingexamples
3. Write a program to demonstrate the working of the decision tree basedID3 algorithm.Use an appropriate data set for building the decision tree and apply this knowledge toclassifyanewsample
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm andtestthe same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data setstored as a .CSV file. Compute the accuracy of the classifier, considering few test datasets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifiermodel to perform this task. Built-in Java classes/API can be used to

write the program.Calculatetheaccuracy, precision,and recall foryourdata set.

7. Write a program to construct a Bayesian network considering medical data. Use thismodeltodemonstratethediagnosisofheartpatientsusingstandard-HeartDiseaseData.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data setfor clustering using k-Means algorithm. Compare the results of these two algorithms andcomment on the quality of clustering. You canadd Java/Python ML library classes/APIintheprogram.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set.Print both correct and wrong predictions. Java/Python ML library classes can be used forthis problem.
10. Implementthenon-parametricLocallyWeightedRegressionalgorithminordertofitdatapoints.Select appropriatedata setforyour experimentand draw graphs

TEXTBOOK:

1. MachineLearning,TomMMichel,McGrawHill,1997.

REFERENCEBOOKS:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor &Francis
2. https://towardsdatascience.com/tagged/model-evaluation
3. https://github.com/topics/handwriting-recognition?l=python

21DS3251: PROGRAMMING FOR DATA ANALYSIS LAB

B.Tech. III Year II Sem.

L	T	P	C
-	-	3	1.5

Course Objectives:

1. Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization
2. To discern patterns and relationships in the data.
3. To build Dashboard applications.
4. To communicate the results clearly and concisely.
5. To be able to work with different formats of data sets.

Course Outcomes: At the end of the course a student should be able to

1. Understand How to import data into Tableau.
2. Understand Tableau concepts of Dimensions and Measures.
3. Develop Programs and understand how to map Visual Layouts and Graphical Properties.
4. Create a Dashboard that links multiple visualizations.
5. Use graphical user interfaces to create Frames for providing solutions to real world problems.

Lab Problems:

1**.** Installation of Tableau.

2. Understanding Data, What is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?

3. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts(line, bar charts, Tree maps),Using the Show me panel.

4. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields.

5. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.

6. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.

7. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.

8. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, Customizing filters, Using and customizing tooltips, formatting your data with colors.

9. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.

10. Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.

11. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

12. Case Study on Tableau (Consider any Dataset and create visualizations with the help of Charts).

REFERENCE BOOKS:

1. Getting Started with Tableau 2019.2 (Second Edition)– by Tristan Guillevin.
2. Mastering Tableau 2019.1 (Second edition)– by Marleen Meier, David Baldwin
3. Learning Tableau 2019 (Third edition)– by Joshua N. Milliga

21DS3253: WEB TECHNOLOGIES LAB

B.Tech. III Year II Sem.

L	T	P	C
-	-	2	1

COURSE OBJECTIVES:

1. To enable the student to program web applications using the following technologies HTML, Java script , AJAX, PHP, Tomcat Server, Servlets ,JSP.

COURSE OUTCOMES:

1. USE LAMP / XAMP for Web Applications
2. Simple Applications with Technologies like HTML, JavaScript and AJAX
3. Design web application using PHP
4. Parse XML Files using JAVA(DOM AND SAX Parsers)
5. Use Tomcat Server for Servlets and connect to Database
6. Develop JSP Applications using Tomcat Server and Java Bean development

List of Experiments

1. Write an HTML code to demonstrate a) Lists b) Tables (rowspan and colspan) c) Cascading Style Sheets

2. Design a web page to demonstrate a) Divisions b) Frames c) Embedding Images

3. Develop static pages (use Only HTML) of an online book store. The pages should resemble: www.amazon.com. The website should consist the following pages. a) Home page b) Registration and user Login c) User Profile Page d) Books catalog e) Shopping Cart f) Payment By credit card g) Order Conformation

4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).

5. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

6. Build an application on a) React JS b) Angular JS c) Node.js and JSON.

7. Write the following XML Programs a) Create a DTD document to validate the XML document. b) Create a XML Schema document to validate the XML document

8. Install the following on the local machine a) Apache Tomcat Web Server b) Install MySQL/Oracle (if not installed) d) Install PHP and configure it to work with Apache web server and MySQL .

9. a) Write a Servlet program to read the parameters from user interface and display Welcome message. b) Write a Servlet program to read initialization parameters using ServletConfig and ServletContext object.

10. Write Servlet programs to work with the following session tracking techniques. a) Http Session b) Cookies c) Hidden form controls

11. Develop a dynamic web page which contains Registration and Login Forms using servlet with Oracle database .Validate the login page.

12. a) Write a JSP Program to handle the exceptions. b) Write a JSP Program to access bean information using useBean tag.

13. Develop a dynamic web page which contains Registration and Login Forms using JSP with Oracle database .Validate the login page.

14. Write a PHP script that reads data from one file and write into another file.

15. Develop a dynamic web page which contains Registration and Login Forms in PHP with MySQL database .Validate the login page.

TEXT BOOKS:

1. A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCES: 1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.

2. J2EE: The complete Reference By James Keogh, McGraw-Hill

3. Bai and Ekedhi, the Web Warrior Guide to Web Programming, Thomson

4. Paul Dietel and Harvey Deitel," Java How to Program", Prentice Hall of India, 8thEdition 5. Web technologies, Black Book, Dreamtech press

21MC0007: YOGA AND INDIAN PHILOSOPHY

B.Tech. III Year II Sem.

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Unit-I

Bhagavad Gita, chapter 2 Sankhya Yoga slokas 54-72 about emotional intelligence (Stitaprajnata)

Unit-II

Bhagavad Gita, chapters 3-7

Unit-III

Bhagavad Gita, chapters 8-11

Unit-IV

Bhagavad Gita, chapters 12-15

Unit-V

Bhagavad Gita, chapters 16-18

10 quotes from each chapter of ref.(2)

References:

1) Bhagavad Gita By Swami Swarupananda, R K Math Publication
2) Vivekananda-His Call to the Nation, R K Math Publication