



Sreyas Institute of Engineering and Technology

An Autonomous Institution

Approved by AICTE, Affiliated to JNTUH

Accredited by NAAC-A Grade, NBA (CSE, ECE, ME) & ISO 9001:2015 Certified

B.Tech.inCOMPUTERSCIENCEANDENGINEERING(DATASCIENCE) COURSE

STRUCTURE & SYLLABUS (R22 Regulations)

ApplicablefromAY2022-23Batch

III YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	A1606	AutomataTheoryandCompilerDesign	3	0	0	3
2	A1701	IntroductiontoDataScience	3	0	0	3
3	A1524	ComputerNetworks	3	0	0	3
4		ProfessionalElective–I	3	0	0	3
5		ProfessionalElective–II	3	0	0	3
6	A1702	RProgrammingLab	0	0	2	1
7	A1525	ComputerNetworksLab	0	0	2	1
8	A1019	Advanced English Communication Skills Lab	0	0	2	1
9	A1019	IntellectualPropertyRights	3	0	0	0
10	A1703	SkillDevelopmentCourse (ETL-Kafka/Talend)	0	0	2	1
11	A1021	LogicalReasoning-I	0	0	2	1
		Total	18	0	10	20

III YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	A1704	AlgorithmsDesignandAnalysis	3	0	0	3
2	A1611	MachineLearning	3	0	0	3
3	A1705	BigDataAnalytics	3	0	0	3
4		ProfessionalElective–III	3	0	0	3
5		OpenElective–I	3	0	0	3
6	A1612	MachineLearningLab	0	0	2	1
7	A1706	BigDataAnalyticsLab	0	0	2	1
8		ProfessionalElective-III Lab	0	0	2	1
9	A1022	LogicalReasoning-II	0	0	1	1
10	A1707	Industrial-OrientedMini Project/Summer Internship	0	0	1	1
		Total	15	0	10	20



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Professional Elective-I

A1751	Data Warehousing and Business Intelligence
A1551	Artificial Intelligence
A1655	Soft Computing
A1554	Image Processing
A1752	Computer Graphics

Professional Elective-II

A1753	Spatial and Multimedia Databases
1558	Information Retrieval Systems
A1754	Data Mining
A1755	DevOps
A1756	Cloud Computing

Professional Elective-III

A1757	Web Technologies
A1759	Data Visualization Techniques
A1564	Scripting Languages
A1566	Mobile Application Development
A1761	Cryptography and Network Security

Open Elective-I

A1791	Fundamentals of Data Science
A1792	R Programming



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ApplicablefromAY2022-23Batch

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9	A1019	IntellectualPropertyRights	3	0	0	0
10	A1703	SkillDevelopmentCourse (ETL-Kafka/Talend)	0	0	2	1
11	A1021	LogicalReasoning-I	0	0	2	1
		Total	18	0	10	20

ProfessionalElective-I

	DataWarehousing andBusiness Intelligence
	ArtificialIntelligence
	SoftComputing
	ImageProcessing
	ComputerGraphics

ProfessionalElective-II

	SpatialandMultimediaDatabases
	InformationRetrievalSystems
	DataMining
	DevOps
	CloudComputing

AUTOMATA THEORY AND COMPILER DESIGN

B.Tech.III Year I Sem.

LTPC
3003

Prerequisite: Nil

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.
- To introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directed translation, type checking use of symbol tables, 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.
- Acquire skills in using lex tool and design LR parsers

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 Processes Strings, The language of DFA, Conversion of NFA with ϵ -transitions to NFA without ϵ -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

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

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing 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,



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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

TEXTBOOKS:

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 Chandrashekar, 2nd Edition, PHI.

REFERENCE BOOKS:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey 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 Compiler Construction, Kenneth C. Loudon, Thomson. Course Technology.

INTRODUCTION TO DATA SCIENCE

B.Tech.III Year I Sem.

LTPC

3003

Course Objective:

- Learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration
- Understand the basic types of data and basic statistics
- Identify the importance of data reduction and data visualization techniques

Course Outcome:

- Understand basic terms of statistical modeling and data science
- Implementation of R programming concepts
- utilize R elements for data visualization and prediction

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 – Overfitting. 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, Attribute, The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, 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 Interquartile 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 Subsetting, Arrays, Class, Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of Data Frames, Extending Data Frames, Sorting Data Frames.
Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, 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 Functions in R.

UNIT-V

Charts and Graphs: Introduction, Pie Chart: Chart Legend, Bar Chart, Box Plot, Histogram, Line Graph: Multiple Lines in Line Graph, Scatter Plot. Regression: Linear Regression Analysis, Multiple Linear Regression



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TEXTBOOKS:

1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014.
2. KG Srinivas, GMSiddesh, "Statistical programming in R", Oxford Publications.

REFERENCE BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed. The Morgan Kaufmann Series in Data Management Systems.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education.
3. Brian S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4th ed., 2014.
4. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
5. Paul Teetor, "R Cookbook", O'Reilly, 2011.

COMPUTER NETWORKS

B.Tech.III Year I Sem.

LTPC

300

3

Prerequisites

1. A course on "Programming for problem solving"
2. A course on "Data Structures"

Course Objectives

- 1. The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
- 2. 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.

Course Outcomes

- 1. Gain the knowledge of the basic computer network technology.
- 2. 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.
- 3. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

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. Data link layer: Design issues, framing, Error detection and correction.

UNIT-II

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for a 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 sublayer: 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, Quality of Service, Internetworking, The Network layer in the internet.

UNIT-IV

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

UNIT-V

Application Layer – Domain name system, SNMP, Electronic Mail; the World Wide Web, HTTP, Streaming audio and video.

TEXTBOOK:

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

REFERENCE BOOKS:

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

DATA WAREHOUSING AND BUSINESS INTELLIGENCE

(Professional Elective – I)

B.Tech. III Year I Sem

LTPC

3003

Course Objectives:

- ▮ This course is concerned with extracting data from the information systems that deal with the day-to-day operations and transforming it into data that can be used by businesses to drive high-level decision making
- ▮ Students will learn how to design and create a data warehouse, and how to utilize the process of extracting, transforming, and loading (ETL) data into data warehouses.

Course Outcomes:

- ▮ Understand architecture of data warehouse and OLAP operations. Understand
- ▮ Fundamental concepts of BI
- ▮ Application of BI Key Performance Indicators
- ▮ Understand Utilization of Advanced BI Tools and their Implementation.
- ▮ Implementation of BI Techniques and BI Ethics.

UNIT-I

Data Warehouse, Data Warehouse Modelling, OLAP operations, Data Cube Computation methods

UNIT-II

Business Intelligence Introduction – Definition, Leveraging Data and Knowledge for BI, BI Components, BI Dimensions, Information Hierarchy, Business Intelligence and Business Analytics. BI Life Cycle. Data for BI - Data Issues and Data Quality for BI.

UNIT-III

BI Implementation - Key Drivers, Key Performance Indicators and Performance Metrics, BI Architecture/Framework, Best Practices, Business Decision Making, Styles of BI - Event-Driven alerts - A cyclic process of Intelligence Creation. The value of Business Intelligence - Value driven and Information use.

UNIT-IV

Advanced BI - Big Data and BI, Social Networks, Mobile BI, emerging trends, Description of different BI-Tools (Pentaho, KNIME)

UNIT-V

Business Intelligence and integration implementation - connecting in BI systems - Issues of legality - Privacy and ethics - Social networking and BI.

TEXTBOOKS:

1. Data Mining – Concepts and Techniques- JIAWEI HAN & MICHELINE 4th Edition. KAMBER, Elsevier,
2. Rajiv Sabherwal “Business Intelligence” Wiley Publications, 2012.

REFERENCE BOOKS:

1. Efraim Turban, Ramesh Sharda, Jay Aronson, David King, Decision Support and Business Intelligence Systems, 9th Edition, Pearson Education, 2009.



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2. David Loshin, Business Intelligence-The Savy Manager's Guide Getting Onboard with Emerging IT, Morgan Kaufmann Publishers, 2009.
 3. Philo Janus, Stacia Misner, Building Integrated Business Intelligence. Solutions with SQL Server, 2008 R2 & Office 2010, TMH, 2011.
 4. Business Intelligence Data Mining and Optimization for decision making [Author: Carlo-Verellis] [Publication: (Wiley)]
 5. Data Warehousing, Data Mining & OLAP-Alex Berson and Stephen J. Smith-Tata McGraw-Hill Edition, Tenth reprint 2007
 6. Building the Data Warehouse-W.H. Inmon, Wiley Dreamtech India Pvt. Ltd.
 7. Data Mining Introductory and Advanced topics-Margaret H Dunham, PEA.

ARTIFICIAL INTELLIGENCE

(Professional Elective-I)

B.Tech. III Year I Sem

LTPC

3003

Prerequisites:

1. Programming for problem solving, Data Structures.

Course Objective:

- To learn the distinction between optimal reasoning Vs. human like reasoning
- To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Course Outcome:

- Understand search strategies and intelligent agents
- Understand different adversarial search techniques
- Apply propositional logic, predicate logic for knowledge representation
- Apply AI techniques to solve problems of game playing, and machine learning.

UNIT-I

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, Local Search in Continuous Spaces

UNIT-II

Problem Solving by Search-II and Propositional Logic 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.

UNIT-IV

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information. Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches



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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.

TEXTBOOK:

1. Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Richard K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henry Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert Systems – Patterson, Pearson Education

SOFT COMPUTING (Professional Elective-I)

B.Tech. III Year I Sem

LTPC
3003

Pre-requisites: Fundamental Mathematics.

Course Objectives: The objectives of this course are

- To learn various types of soft computing techniques and their applications.
- To acquire the knowledge of neural network architectures, learning methods and algorithms.
- To understand Fuzzy logic, Genetic algorithms and their applications.

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

- Understand various soft computing techniques.
- Understand various learning models and Neural Network Architectures.
- Understand approximate reasoning using fuzzy logic.
- Analyse and design Genetic algorithms in different applications.
- Apply soft computing techniques to solve different applications.

UNIT-I

Soft computing vs. Hard computing, Various types of soft computing techniques. **Artificial Neural Networks:** Fundamental concepts, Evolution of neural networks, Basic models of artificial neural network, important terminologies of ANNs. McCulloch - Pitts neuron, linear separability, Hebb network.

UNIT-II

Supervised Learning Neural Networks: Perceptron networks, Adaptive linear neuron (Adaline), Multiple Adaptive linear neuron (Madaline), Back propagation network.

UNIT-III

Unsupervised Learning Neural Networks: Kohonen Self Organising networks, Adaptive resonance theory.

Associate Memory Networks: Bidirectional associative memory network, Hopfield networks.

UNIT-IV

Fuzzy Logic: Introduction to classical sets and Fuzzy sets, Fuzzy relations, Tolerance and equivalence relations, Membership functions, Defuzzification.

UNIT-V

Genetic Algorithms: Introduction, Basic operators and terminology, Traditional algorithm vs. genetic algorithm, Simple genetic algorithm, General genetic algorithm, Classification of genetic algorithm, Genetic programming, Applications of genetic algorithm.

TEXTBOOKS:

1. S.N. Sivanandam & S.N. Deepa, "Principles of soft computing", Wiley publications, 2nd Edition, 2011.

REFERENCE BOOKS:

1. S. Rajasekaran & G.A. Vijayalakshmi, "Neural Networks, Fuzzy logic & Genetic Algorithms, Synthesis & Applications", PHI publication, 2008.
2. Li Min Fu, "Neural Networks in Computer Intelligence", McGraw-Hill edition, 1994.



IMAGEPROCESSING (Professional Elective –I)

B.Tech. III Year I Sem

LTPC
3003

Course Objectives:

1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge of digital signal processing is desirable.
2. A course on “Computational Mathematics”
3. A course on “Computer Oriented Statistical Methods”

Course Objectives

- 1. Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts. The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

Course Outcomes

- 1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
- 2. Demonstrate the knowledge of filtering techniques. Demonstrate the knowledge of 2D transformation techniques.
- 3. Demonstrate the knowledge of image enhancement, segmentation, restoration and 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.

TEXTBOOK:

1. Digital Image Processing: R.C.Gonzalez & R.E.Woods, Addison Wesley/ Pearson Education, 2nd Ed, 2004.



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REFERENCEBOOKS:

1. Fundamentals of Digital Image Processing: A.K. Jain, PHI.
2. Digital Image Processing using MATLAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wiley, 3rd Edition, 2004.

COMPUTER GRAPHICS

(Professional Elective-I)

B.Tech.III Year I Sem.

LTPC

3003

Prerequisites

Programming for problem solving and Data Structures

Course Objectives

Provide the basics of graphics systems including Points and lines, line drawing algorithms, 2D, 3D objective transformations

Course Outcomes

- i Explore applications of computer graphics
- ii Understand 2D, 3D geometric transformations and clipping algorithms
- iii Understand 3D object representations, curves, surfaces, polygon rendering methods, color models
- iv Analyze animation sequence and visible surface detection methods

UNIT-I

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scans systems, random-scans systems, graphics monitors and workstations and input devices

Output primitives: Points and lines, line drawing algorithms (DDA and Bresenham's Algorithm) circle- generating algorithms and ellipse-generating algorithms

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

UNIT-II

2-D geometric transformations: 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, clipping operations, point clipping, Line clipping-Cohen Sutherland algorithms, Polygon clipping-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, Bezier and B-Spline surfaces, Polygon rendering methods, color models and color applications.

UNIT-IV

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

viewing: Viewing pipeline, viewing coordinates, projections, view volume and general projection transforms and clipping.



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UNIT-V

Computer animation: Design of animation sequence, general computer animation functions, raster animations, computer animation languages, keyframe systems, motion specifications.

Visible surface detection methods: Classification, back-face detection, depth-buffer method, BSP-tree method, area subdivision method and octree method.

TEXTBOOKS:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education

SPATIAL AND MULTIMEDIA DATABASES (Professional Elective-II)

B.Tech. III Year I Sem

LTPC

3003

Objective:

- Introduce the basic concepts, data models and indexing structures for spatial data, multimedia data.

Course Outcomes:

- Understand data models, storage, indexing and design of spatial databases. Evaluate multidimensional data structures
- Represent image database with R-tree
- Store and retrieve audio, video and multimedia data.

UNIT-I

Introduction 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 databases system.

Multidimensional Data Structures: k-d Trees, Point Quadrees, 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 SMDs 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.

TEXTBOOKS:

- Shashi Shekhar, Sanjiv Chawla, Spatial Databases - A Tour, Pearson Education.



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2. V.S.Subrahmanian Principles of Multimedia Database Systems, Morgan Kaufman.

REFERENCE BOOKS:

1. Multimedia Databases: An object relational approach, Lynne Dunckley, Pearson Education.
2. Multimedia Database Systems, Prabhakaram, Springer.



INFORMATION RETRIEVAL SYSTEMS (Professional Elective-II)

B.Tech. III Year I Sem

LTPC
3003

Prerequisites:

1. Data Structures Course Objectives:

- To learn the concepts and algorithms in Information Retrieval Systems
- To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course Outcomes:

- Ability to apply IR principles to locate relevant information on large collections of data
- Ability to design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

UNIT-I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT-II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models.

UNIT-III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

UNIT-IV

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext
Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

UNIT-V

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems
Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXTBOOK:

1. Information Storage and Retrieval Systems—Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer



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REFERENCEBOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval by Robert Korfhage—John Wiley & Sons.
3. Modern Information Retrieval by Yates and Neto Pearson Education.

DATAMINING

(Professional Elective–II)

B.Tech.III Year I Sem.

LTPC

3003

Pre-Requisites:

- i Database Management System
- ii Probability and Statistics

Course Objectives:

Students will become acquainted with both the strengths and limitations of various data mining techniques like Association, Classification, Cluster and Outlier analysis.

Course Outcomes:

- i Understand the need of data mining and pre-processing techniques.
- ii Perform market basket analysis using association rule mining.
- iii Utilize classification techniques for analysis and interpretation of data.
- iv Identify appropriate clustering and outlier detection techniques to handle complex data.
- v Understand the mining of data from web, text and time series data.

UNIT-I

Introduction to Data Mining:

What Data mining? Kinds of Data, Knowledge Discovery process, Data Mining Functionalities, Kinds of Patterns, Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity, Data Pre-processing: Major Tasks in Data Pre-processing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT-II

Association Analysis: Basic Concepts, Market Basket Analysis, Apriori Algorithm, FP-growth, From Association Analysis to Correlation Analysis, Pattern Mining in Multilevel Associations and Multidimensional Associations.

UNIT-III

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Metrics for Evaluating Classifier Performance, Ensemble Methods, Multilayer Feed-Forward Neural Network, Support Vector Machines, k-Nearest-Neighbor Classifiers.

UNIT-IV

Cluster Analysis: Requirements for Cluster Analysis, Overview of Basic Clustering Methods, Partitioning Methods-k-Means, k-Medoids, Hierarchical Methods-AGENES, DIANA, BIRCH, Density-Based Method-DBSCAN, Outlier Analysis: Types of Outliers, Challenges of Outlier Detection, and Overview of Outlier Detection Methods

UNIT-V

Advanced Concepts: Web Mining- Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining- Spatial Data Overview, Spatial Data Mining Primitives, Spatial Rules, Spatial Classification Algorithm, Spatial Clustering Algorithms, Temporal Mining- Modeling Temporal Events, Time Series, Pattern Detection, Sequences, Temporal Association Rules.

TEXTBOOKS:

- 1) Jiawei Han, Micheline Kamber, Jian Pei., Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann/Elsevier, 2012.
- 2) Margaret H Dunham, Data Mining Introductory and Advanced Topics, 2nd Edition, Pearson Education, India, 2006.



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REFERENCEBOOKS:

- 1) Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
- 2) Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, Introduction to Data Mining, 2nd Edition, Pearson Education India, 2021.
- 3) Amitesh Sinha, Data Warehousing, Thomson Learning, India, 2007.

DEVOPS **(Professional Elective–II)**

B.Tech. III Year I Sem

LTPC
3003

Pre-Requisites:

1. Software Engineering
2. Software Project Management

Course Objective:

- Understand the skill sets and high-functioning teams involved in Agile, DevOps and related methods to reach a continuous delivery capability.
- Implement automated system update and DevOps lifecycle.

Course Outcomes:

- Understand the various components of DevOps environment. Identify
- Software development models and architectures of DevOps Use
- different project management and integration tools.
- Select an appropriate testing tool and deployment model for project.

UNIT-I

Introduction to DevOps:

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

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, GitLab.

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 Deployment: 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.

TEXTBOOK:

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

REFERENCE BOOKS:

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

CLOUD COMPUTING

(Professional Elective–II)

B.Tech. III Year I Sem

LTPC
3003

Pre-requisites:

1. A course on “Computer Networks”
2. A course on “Operating Systems”
3. A course on “Distributed Systems”

Course Objectives:

- This course provides an insight into cloud computing
- Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.

Course Outcomes:

- i Ability to understand various service delivery models of a cloud computing architecture.
- ii Ability to understand the ways in which the cloud can be programmed and deployed.
- iii Understanding cloud service providers.

UNIT-I

Computing Paradigms: High performance computing, parallel computing, Distributed computing, cluster computing, Grid computing, Cloud computing, Bio computing, Mobile computing, Quantum computing, optical computing, Nano computing

UNIT-II

Cloud computing fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Definition of Cloud computing, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models, on-demand services like Elastic resource pooling using Amazon Elastic Compute Cloud (EC2) as example, Rapid elasticity using Amazon EBS, Amazon EFS, Amazon S3, Amazon LEX, Amazon Lambda, overview of Docker CLI commands cloud deployment using Docker

UNIT-III

Cloud computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Managing the cloud application, Managing the cloud infrastructure using AWS CloudFront, Managing the cloud application, Migrating Application to cloud, Phases of cloud migration, Approaches for Cloud Migration, Managing Identity and Access (IAM)

UNIT-IV

Cloud service models: Infrastructure as service, characteristics of IaaS, Suitability of IaaS, pros and cons of IaaS, summary of IaaS Providers, Platform as a Service with examples of with example of Amazon DynamoDB, characteristics of PaaS, Suitability of PaaS, pros and cons of PaaS, summary of PaaS Providers, software as service, characteristics of SaaS, Suitability of SaaS, pros and cons of SaaS, summary of SaaS Providers.

UNIT-V

Organizational readiness and Data security AWS cloud: Organizational readiness and change management in the cloud age, Data Security in the cloud, legal issues in cloud computing. Amazon Rekognition using serverless API
Introduction to Google Cloud Platform and Azure: Create and deploy a static web app, execute Google Compute engine, Microsoft Azure, Services and Applications.



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TEXTBOOKS:

1. Essentials of Cloud Computing - k. Chandrasekharan, 2014.
2. Cloud computing principles and paradigms by Rajkumar Buyya, 2013.
3. Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud - by Mark Wilkins, Kindle E Textbook, 1st edition, 2019.
4. Microsoft Azure for Dummies by Timothy L. Warner, Wiley publications, 1st Edition, 2021.

REFERENCE BOOKS:

1. Microsoft Azure for Dummies by Timothy L. Warner, Wiley publications, 1st Edition, 2021.
2. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

R PROGRAMMING LAB

B.Tech. III Year I Sem.

**LTPC
0021**

Pre-requisites: Any programming language.

Course Objectives:

- Familiarize with R basic programming concepts, various data structures for handling datasets, various graph representations and Exploratory Data Analysis concepts

Course Outcomes:

- Setup R programming environment.
- Understand and use R – Data types and R – Data Structures.
- Develop programming logic using R – Packages.
- Analyze datasets using R – programming capabilities

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, Operator 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) Illustrate the usage of Vectors 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 plotto demonstrate the relation between the car 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 Multilinear Regression considering suitable CSV file

TEXTBOOKS:

1. R Programming for Data Science by Roger D. Peng
2. The Art of R Programming by Norman Matloff Cengage Learning India.



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REFERENCEBOOKS:

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

COMPUTER NETWORKS LAB

B.Tech.III Year I Sem.

LTPC

0021

Course Objectives

- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology and observe its performance
- To analyze the traffic flow and the contents of protocol frames

Course Outcomes

- Implement data link layer framing methods
- Analyze error detection and error correction codes.
- Implement and analyze routing and congestion issues in network design.
- Implement Encoding and Decoding techniques used in presentation layer
- To be able to work with different network tools

List of Experiments

1. Implement the data link layer framing methods such as character, character stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC-CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijkstra's algorithm to compute the shortest path through a network
5. Make an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting techniques used in buffers.
10. Wireshark
 - i. Packet Capture Using Wireshark
 - ii. Starting Wireshark
 - iii. Viewing Captured Traffic
 - iv. Analysis and Statistics & Filters.

How to Operating System Detection using Nmap Do the

following using NS2 Simulator

- i. NS2 Simulator Introduction
- ii. Simulate to Find the Number of Packets Dropped
- iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
- iv. Simulate to Find the Number of Packets Dropped due to Congestion
- v. Simulate to Compare Data Rate & Throughput.
- vi. Simulate to Plot Congestion for Different Source/Destination
- vii. Simulate to Determine the Performance with respect to Transmission of Packets

TEXTBOOK:

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



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REFERENCEBOOKS:

1. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.
2. Data Communications and Networking – Behrouz A. Forouzan, 3rd Edition, TMH.

ADVANCED ENGLISH COMMUNICATIONS SKILLS LAB

B.Tech III Year I Sem.

**LTPC
002 1**

1. INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. 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.

The proposed course should be a laboratory course to enable students to use 'good' 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.
- ☐ Writing formal letters.
- ☐ Transferring information from non-verbal to verbal texts and vice-versa. Taking
- ☐ part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- ☐ 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.
- ☐ Further, they would be required to communicate their ideas relevantly and coherently in writing. To
- ☐ prepare all the students for their placements.

3. SYLLABUS:

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

1. Activities on Fundamentals of Inter-personal 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/ e-mails/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.

4. MINIMUM REQUIREMENT:

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–80GB, RAM–512MB Minimum, Speed–2.8GHZ
- ☐ T.V, digital stereo & Camcorder
- ☐ Headphones of High quality

5. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

- ☐ Oxford Advanced Learner's Compass, 7th 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)

TEXTBOOKS:

1. Effective Technical Communication by M Ashraf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCE BOOKS:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
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 Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata McGraw-Hill 2009.

INTELLECTUAL PROPERTY RIGHTS

B.Tech.III Year I Sem.

**LTPC
3000**

Course Objective:

- Significance of intellectual property and its protection
- Introduce various forms of intellectual property

Course Outcome:

- 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.
- Appraise new developments in IPR laws at national and international level

UNIT-I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II

Trade Marks: Purpose and function of trademarks, acquisition of trademark rights, protectable matter, selecting, and evaluating trademark, trademark registration processes.

UNIT-III

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, right 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 transfer

UNIT-IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriation 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 trademark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international-trademark law, copyright law, international patent law, and international development in trade secrets law.

TEXTBOOK:

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.

ETL-KAFKA/TALEND

B.Tech.IIIYearISem.

LTPC
0021

CourseObjectives:

- DevelopacomprehensiveunderstandingofExtract,Transform,Load(ETL)processes using Apache Kafka and Talend.
- Understandhow to scaleKafkaclustersseamlesslyto handlegrowingdata volumes, ensuringoptimalperformancefor ETL operations.

CourseOutcomes:

- Learn todesign and deploy fault-tolerant Kafka clusters, ensuring data integrity and availability in real-world scenarios.
- Gainpracticalexperienceincluster management,topiccreation,and basic operations such as producing and consuming messages.

LISTOFEXPERIMENTS:

1. InstallApacheKafkaonasinglenode.
2. Demonstratesettingup asingle-node,single-brokerKafkaclusterandshowbasic operations such as creating topics and producing/consuming messages.
3. Extendtheclustertomultiplebrokersonasinglenode.
4. Write a simple Javaprogramto createa Kafkaproducerand Producemessagesto a topic.
5. Implementsendingmessages bothsynchronouslyandasynchronouslyinthe producer.
6. Developa Java programto createa Kafkaconsumer and subscribeto atopicanand consume messages.
7. Writeascripttocreateatopicwithspecificpartitionandreplicationfactorsettings.
8. Simulate fault tolerance by shutting downonebrokerand observing the cluster behavior.
9. Implement operations such as listing topics, modifying configurations, and deleting topics.
10. IntroduceKafkaConnectanddemonstratehow touse connectorsto integratewith externalsystems.
11. ImplementasimplewordcountstreamprocessingapplicationusingKafkaStream
12. ImplementKafkaintegrationwiththeHadoopecosystem.

TEXTBOOK:

1. Neha Narkhede, Gwen Shapira, ToddPalino, Kafka – The Definitive Guide: Real-timedataandstreamprocessingatscale,O'Reilly



LOGICAL REASONING – I

B.Tech.III Year I Sem.

LTPC

0021

Quantitative Aptitude

1. **Simple Interest:** Definitions, Problems on interest and amount, Problems, when rate of interest and time period are numerically equal. **Compound Interest:** Definition and formula for amount in compound interest, Difference between simple interest and compound interest for 2 years on the same principle and time period.
2. **Profit & Loss:** Cost price, selling price, marked/list price, profit/gain, discount, use of false scale for selling an article, discount series and net selling price, successive Selling.
3. **Percentages, Ratio & Proportions:**
Calculating a percentage, calculating increase or decrease, calculating percent change, calculating successive percentages, definition of ratio and proportions, direct proportion, Inverse or reciprocal proportion, continued proportion, Mean proportion, Third proportion, Fourth proportion, compound ratio.
4. **Averages:** Definition of Average, Rules of Average, Problems on Average, Problems on Weighted Average, Finding average using assumed mean method.
5. **Time and Distance:** Relation between speed, distance and time, converting km/h into m/s and vice versa, Problems on average speed, Problems on relative speed, Problems on trains.
6. **Time and Work:** Problems on Unitary method, Relation between Men, Days, Hours and Work, Problems on Man-Day-Hours method, Problems on alternate days, Problems on Pipes and Cisterns.

Logical Reasoning:

7. **Logical Connectives:** Definition of simple statement, Definition of compound statement, finding the implications for compound statements, finding the negations for compound statements.
8. **Syllogism:** Definition of statement/premises and conclusion, explanation through Venn diagram, problems on two/three statements and one/two conclusions, identification of statements and conclusions from the given set of statements. **Statements and Arguments:** Types of arguments, Strong argument, weak argument, identifying strong/weak arguments from a given statement.
9. **Analogy Classifications:** Definition of Analogy, Problems on number analogy, Problems on letter analogy, Problems on verbal analogy.
10. **Non Verbal Reasoning:** Identification of continued figure or odd figure by using analogy, series, rotation in clockwise and rotation in anticlockwise, vertical, horizontal, alternative rotation, addition, subtraction.
11. **Blood Relations:** Blood relations on Family Tree concepts (relationships in the family), paternal side relations, maternal side relations, simple and direct relationships, relation puzzles, coded relations.



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12. **Binary Logic:** Definition of a truth-teller, Definition of a liar, Definition of an alternator, solving problems using method of assumptions, solving analytical puzzles using binary logic.

Text Books:

1. A Modern Approach to Logical Reasoning, R. S. Agarwal, S. Chand Publications, 2013.
2. Quantitative Aptitude for Competitive Examinations, Dinesh Khattar, Pearson Education 4th Edition, 2019.

Reference Books:

1. Quantitative Aptitude and Reasoning, R. V. Praveen, PHI Learning Private Ltd, 2nd Edition, 2013.
2. Quantitative Aptitude for competitive examinations, Abhijith Guha, McGraw Hill Education, 6th Edition, 2017.
3. Analytical & Logical Reasoning, Peeyush Bhardwaj, Arihant Publications, 4th Edition, 2015.
4. Logical Reasoning for the CAT, Arun Sharma, McGraw Hill Education, 2nd Edition 2014.

Note:

- 1) This course is an Activity Based Non-Laboratory Course (NO LABORATORY REQUIRED).
- 2) This course is an Activity Based Non-Laboratory Course (NO LABORATORY REQUIRED).

**B.Tech.in COMPUTERSCIENCE AND ENGINEERING (DATA
SCIENCE) COURSE STRUCTURE & SYLLABUS (R22 Regulations)**

Applicable from AY 2023-24 Batch

III YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	A1704	Algorithms Design and Analysis	3	0	0	3
2	A1611	Machine Learning	3	0	0	3
3	A1705	Big Data Analytics	3	0	0	3
4		Professional Elective-III	3	0	0	3
5		Open Elective-I	3	0	0	3
6	A1612	Machine Learning Lab	0	0	2	1
7	A1706	Big Data Analytics Lab	0	0	2	1
8		Professional Elective-III Lab	0	0	2	1
9	A1022	Logical Reasoning-II	0	0	1	1
10	A1707	Industrial-Oriented Mini Project/Summer Internship	0	0	1	1
Total			15	0	10	20

Environmental Science in III Yr II Sem should be Registered by Lateral Entry Students Only.

Professional Elective-III

	Web Technologies
	Data Visualization Techniques
	Scripting Languages
	Mobile Application Development
	Cryptography and Network Security

Open Elective-I

	Fundamentals of Data Science
	R Programming

ALGORITHM DESIGN AND ANALYSIS

B.Tech.III Year II Sem.

LTPC

3003

Prerequisites: Programming for problem solving and Data Structures

Course Objectives:

- Introduces the notations for analysis of the performance of algorithms.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
- Describes how to evaluate and compare different algorithms using worst, average, and best-case analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes:

1. Analyze the performance of algorithms
2. Choose appropriate data structures and algorithm design methods for a specified application
3. Understand the choice of data structures and the algorithm design methods

UNIT-I

Introduction: Algorithm, Performance Analysis- Space complexity, Time complexity, Asymptotic Notations- Big Oh notation, Omega notation, Theta notation and Little Oh notation.

Divide and conquer: General method, applications- Binary search, Quicksort, Mergesort, Strassen's matrix multiplication.

UNIT-II

Disjoint Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heapsort

Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph Coloring, Hamiltonian cycles.

UNIT-III

Dynamic Programming: General method, applications- Optimal binary search tree, 0/1 knapsack problem, All pair shortest path problem, Traveling salesperson problem, Reliability design.

UNIT-IV

Greedy method: General method, applications- Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected components, Biconnected components

UNIT-V

Branch and Bound: General method, applications- Travelling salesperson problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP-Hard and NP-Complete classes, Cook's theorem.

TEXTBOOK:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahnian and Rajasekharan, University Press.

REFERENCE BOOKS:



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1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson Education.
 2. Introduction to Algorithms, second edition, T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
 3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

MACHINE LEARNING

B.Tech.III Year II Sem.

LTPC
30 03

Prerequisites:

1. A course on "Computer Programming and Data Structures".
2. A course on "Python Programming".

Course Objectives:

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To have a thorough understanding of the Supervised and Unsupervised learning techniques
3. To study the various probability-based learning techniques

Course Outcomes:

- a. To introduce students to the basic concepts and techniques of Machine Learning.
- b. To have a thorough understanding of the Supervised and Unsupervised learning techniques
- c. To study the various probability-based learning techniques

UNIT-I

Learning, Types of Machine Learning, Supervised Learning, supervised, unsupervised, semi-supervised, Reinforcement Learning, Batch and Online Learning, Main Challenges of Machine Learning

UNIT-II

Regression: Introduction to Regression analysis, measure of linear relationship, Regression with stats models, determining coefficient, meaning and significance of coefficients, coefficient calculation with least square method, Types of regression, Simple Linear Regression, Using Multiple features, Polynomial Regression, Metrics for Regression: MSE, RMSE, MAE.

UNIT-III

Learning with Trees, Decision Trees, Constructing Decision Trees, Classification and Regression Trees, Ensemble Learning, Boosting, Bagging, Different ways to Combine Classifiers, Basic Statistics, Gaussian Mixture Models, Nearest Neighbor Methods, Unsupervised Learning, K means Algorithms

UNIT-IV

Classification: Classification problem, Probability based approach, Logistic Regression- log-odd, sigmoid transformation, Metrics: Confusion Matrix, Accuracy, Error Rate, Precision, Recall, ROC curve, F1 score, and introduction to gradient descent.

Evolutionary Learning, Genetic algorithms, Genetic Offspring:- Genetic Operators, Using Genetic Algorithms

UNIT-V

Non-Parametric&SVMclassification:AboutNonparametricclassification,DecisionTrees:

Entropy, gain ratio, Information Gain, Splitting criteria,

EnsembleMethod:IntroductiontoRandomForest,Accuracymeasure&performance

Instance basedlearning- Introduction, KNN algorithm, Distance measures, model building, locally weightedregression,radialbasisfunctions,SVMclassifier,hyper-plane,slackvariables,geometric transformation kernel trick, kernel transformation.

TEXTBOOKS:

1. Hands-OnMachineLearningwithScikit-LearnandTensorFlow-AurélienGéron,O'ReillyMedia,2017.
2. PracticalPythonDataVisualization:AFastTrackApproach toLearningDataVisualization with Python, Ashwin Pajankar,A Press.
3. Python:End-to-endDataAnalysis-PhuongVo.T.H,MartinCzygan,IvanIdris,MagnusVilhelm Persson,LuizFelipeMartins, Packet Pub.

REFERENCEBOOKS:

1. TomMMitchell,—MachineLearning,FirstEdition,McGrawHillEducation,2013.
2. Peter Flach, —MachineLearning:TheArt andScience ofAlgorithms that Make Sense of DataI,First Edition, Cambridge University Press, 2012.
3. JasonBell, —Machine learning, Hands on for DevelopersandTechnical ProfessionalsI,First Edition, Wiley, 2014
4. EthemAlpaydin,—IntroductiontoMachineLearning3e(AdaptiveComputationandMachine Learning Series), Third Edition,MIT Press, 2014

BIGDATAANALYTICS

B.Tech.IIIYearII Sem.

LTPC
30 03

CourseObjectives

- Provide the knowledge of principles and techniques for Big data Analytics and give an exposure of the frontiers of Big data Analytics

CoursesOutcomes

- 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 SQL

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

Introduction to Hadoop: Features of Hadoop, Key advantages of hadoop, versions of hadoop, overview of hadoop ecosystem, Hadoop distributions. Need of hadoop, History of hadoop, Hadoop overview, RDBMS vs Hadoop, Distribution computing challenges.

UNIT-III

Apache Hadoop & Hadoop Eco System, Processing data with Hadoop, introduction to MapReduce programming, mapper, reducer, combiner, partitioner, MapReduce Framework, Understanding inputs and outputs of MapReduce-Data Serialization, NoSQL

UNIT-IV

Hadoop Architecture: HDFS, HDFS Daemons, HDFS Architecture, Hadoop Configuration, Role of HBase in Big Data Processing, HIVE, PIG. Types of NoSQL Databases, advantages of NoSQL, Use of NoSQL in industry, SQL vs NoSQL, newSQL, comparison of Nosql, sql and newsql.

UNIT-V

MongoDB, necessity of mongodb, terms used in mongodb and RDBMS, data types in mongoDB, mongodb query language

TEXTBOOKS:

1. BigDataAnalytics, Seema Acharya, Subhashini Chellappan, Wiley 2015.
2. R programming for beginners, sandhya arora, latesh malik, university press.

REFERENCE BOOKS:

1. Chandramouli Subramanian, Asha A Geroje, 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, Michele 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.

WEBTECHNOLOGIES (Professional Elective–III)

B.Tech.III Year II Sem.

LTPC

3003

Course Objectives:

- 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 and JSP
- To introduce Client-side scripting with Javascript and AJAX.

Course Outcomes:

- gain knowledge of client-side scripting, validation of forms and AJAX programming
- understand server-side scripting with PHP language
- understand what is XML and how to parse and use XML Data with Java
- To introduce Server-side programming with Java Servlets and JSP

UNIT-I

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, list sets, 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.

UNIT-II

HTML Common tags: List, Tables, images, forms, Frames; Cascading Stylesheets;

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type

Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

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, Using 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

Client-side Scripting: Introduction to Javascript, Javascript language – declaring variables, scope of variables, functions. event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.



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TEXTBOOKS:

1. WebTechnologies, UttamKRoy, OxfordUniversity Press
2. TheCompleteReferencePHP—StevenHolzner, TataMcGraw-Hill

REFERENCEBOOKS:

1. WebProgramming, buildinginternetapplications, ChrisBates2" edition, WileyDreamech
2. JavaServerPages—HansBergsten, SPDO'Reilly,
3. JavaScript, D.Flanagan
4. BeginningWebProgramming- JonDuckettWROX.

DATA VISUALIZATION TECHNIQUES
(Professional Elective–III)

B.Tech.III Year II Sem.

LTPC
30 03

Course Objectives:

- To understand various data visualization techniques

Course Outcomes:

- Know the historical development and evolution of data visualization techniques.
- Analyze and visualize high-dimensional datasets using appropriate techniques.
- Visualize large multidimensional datasets using appropriate methods.
- Create insightful visual representations for diverse types of data.

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.

TEXTBOOKS:

1. Handbook of Data Visualization by Chun-hou 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, Morgan 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.

SCRIPTING LANGUAGES

(Professional Elective–III)

B.Tech.III Year II Sem.

LTPC
30 03

Prerequisites:

1. A course on “Computer Programming and Data Structures”.
2. A course on “Object Oriented Programming Concepts”.

Course Objectives:

- This course introduces the script programming paradigm
- Introduces scripting languages such as Perl, Ruby and TCL.
- Learning TCL

Course Outcomes:

- Comprehend the differences between typical scripting languages and typical system and application programming languages.
- Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
- Acquire programming skills in scripting language

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 Web servers, 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: Fine points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internetware 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 duplicate level commands, Namespaces, 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.

TEXTBOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pragmatic Programmers 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 Toolkit, Ousterhout, Pearson Education.
5. Perl Power, J.P. Flynt, Cengage Learning.

MOBILE APPLICATION DEVELOPMENT

(Professional Elective–III)

B.Tech.III Year II Sem.

LTPC

30 03

Prerequisites

1. Acquaintance with JAVA programming.
2. A Course on DBMS.

Course Objectives

- To demonstrate their understanding of the fundamentals of Android operating systems
- To improve their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

Course Outcomes

- Understand the working of Android OS Practically.
- Develop Android user interfaces
- Develop, deploy and maintain the Android Applications.

UNIT-I

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes, Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT-II

Android User Interface: Measurements – Device and pixel density independent measuring unit – sLayouts – Linear, Relative, Grid and Table Layouts
User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components
Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT-III

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting newActivity,Implicit Intents, Passing data to Intents, Getting results fromActivities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – UsingIntentfiltersto serviceimplicitIntents, ResolvingIntentfilters,findingandusing IntentsreceivedwithinanActivityNotifications–CreatingandDisplayingnotifications, Displaying Toasts

UNIT-IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating sharedpreferences,savingandretrievingdatausingSharedPreference

UNIT-V

Database– Introduction to SQLite database, creating and opening a database, creatingtables,insertingretrieving andetindelg data,Registering ContentProviders, Using content Providers (insert, delete, retrieve and update)

TEXTBOOK:

1. ProfessionalAndroid4 ApplicationDevelopment,Reto Meier,WileyIndia,(Wrox), 2012

REFERENCEBOOKS:

1. Android Application Development for Java Programmers, JamesC Sheusi, Cengage Learning,2013
2. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

CRYPTOGRAPHY AND NETWORK SECURITY
(Professional Elective–III)

B.Tech. III Year II Sem.

LTPC
3003

Course Objectives:

- 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.
- Describe the enhancements made to IPv4 by IPSec
- Understand intrusions and intrusion detection

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 them such as client and server.
- Ability to understand the current legal issues towards information security.

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, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, 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 key 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.509 Authentication Service, 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, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT-V

E-Mail Security: Pretty Good Privacy, S/MIME
IP 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, Crosssite Scripting Vulnerability.

TEXTBOOKS:

1. Cryptography and Network Security-Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, McGraw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: CK Shyamala, N Harini, Dr T Radmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw Hill, 3rd Edition
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, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

FUNDAMENTALS OF DATA SCIENCE
(Open Elective-I)

B.Tech.III Year II Sem.

LTPC
30 03

Course Objectives:

- Learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration
- Understand the basic types of data and basic statistics
- Identify the importance of data reduction and data visualization techniques

Course Outcomes:

- Understand basic terms of statistical modeling and data science Implementation
- of R programming concepts
- utilize R elements for data visualization and prediction

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, Attribute, The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, 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 Interquartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

UNIT-III

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector subsetting, Matrices: Creating and Naming Matrices, Matrix Subsetting, Arrays, Class.

Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of Data Frames, Extending Data Frames, Sorting Data Frames.

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

UNIT-IV

Conditionals and Control Flow: Relational Operators, Logical Operators, 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 Functions in R.

UNIT-V

Charts and Graphs: Introduction, Pie Chart: Chart Legend, Bar Chart, Box Plot, Histogram, Line Graph: Multiple Lines in Line Graph, Scatter Plot.

Regression: Linear Regression Analysis, Multiple Linear Regression

TEXTBOOKS:

1. Doing Data Science, Straight Talk from the Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014.
2. K G Srinivas, GM Siddesh, "Statistical programming in R", Oxford Publications.

REFERENCE BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed. The Morgan Kaufmann Series in Data Management Systems.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education.
3. Brian S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
4. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
5. Paul Teetor, "R Cookbook", O'Reilly, 2011.

RPROGRAMMING

(Open Elective-I)

B.Tech.III Year II Sem.

LTPC
30 03

Course Objectives:

- ▮ Understanding and being able to use basic programming concepts Automate
- ▮ data analysis
- ▮ Working collaboratively and openly on code
- ▮ Knowing how to generate dynamic documents
- ▮ Being able to use a continuous test-driven development approach

Course Outcomes:

- ▮ Understand to use and program in the programming language R
- ▮ Understand to use R to solve statistical problems
- ▮ Implement and describe Monte Carlo the technology
- ▮ Implement minimize and maximize functions using R

UNIT-I

Introduction: Overview of R, R data types and objects, reading and writing data, subsetting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

UNIT-II

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

UNIT-III

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATAFRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

UNIT-IV

Factors And Tables: Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables, Extracting a Subtable, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions

UNIT-V

Graphics: Creating Graphs, Customizing Graphs, Saving Graphs to Files, Customizing Graphs, Creating Three-Dimensional Plots.

Debugging: Fundamental Principles of Debugging, Why Use a Debugging Tool?, Using R Debugging Facilities, Moving Up in the World: More Convenient Debugging Tools, Ensuring Consistency in Debugging Simulation Code, Syntax and Runtime Errors, Running GDB on R Itself.

TEXTBOOKS:

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

REFERENCE BOOKS:

1. R Programming for Data Science by Roger D. Peng
2. Hadley Wickham, Garrett Grolemund, R for Data Science: Import, Tidy, Transform, Visualize, and Model Data 1st Edition, O'Reilly
3. Tilman M. Davies, The book of R: a first course in programming and statistics, no starch press.

MACHINE LEARNING LAB

B.Tech.III Year II Sem.

LTPC

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Course Objective:

- The objective of this lab is to get an overview of the various machine learning techniques and can demonstrate them using python.

Course Outcomes:

- i Understand modern notions in predictive data analysis
- ii Select data, model selection, model complexity and identify the trends
- iii Understand a range of machine learning algorithms along with their strengths and weaknesses
- iv Build predictive models from data and analyze their performance

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 applications 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)

TEXTBOOK:

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

REFERENCE BOOK:

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

BIGDATAANALYTICSLAB

B.Tech.IIIYearII Sem.

LTPC
0021

CourseObjectives

- ▯ Provide knowledge of Big data Analytics principles and techniques.
- ▯ Designed to give an exposure of the frontiers of Big data Analytics

CourseOutcomes

- ▯ Use Excel as an Analytical tool and visualization tool.
- ▯ Ability to program using HADOOP and Mapreduce
- ▯ Ability to perform data analytics using ML in R.
- ▯ Use MongoDB to perform data analytics

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

TEXTBOOKS:

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, Michele 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.

REFERENCEBOOKS:

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/OsborneMedia(2013), Oracle press.
3. Professional Hadoop Solutions, Boris Iubinsky, Kevin T. Smith, Alexey Yakubovich, Wiley, ISBN: 9788126551071, 2015.
4. Understanding Big Data, Chris Eaton, Dirk Derkroos 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.

WEBTECHNOLOGIES LAB
(Professional Elective–III)

B.Tech.III Year II Sem.

LTPC
0021

Web Technologies Experiments

1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
 - Find the length of a string.
 - Count the number of words in a string.
 - Reverse a string.
 - Search for a specific string.
3. Write a PHP script to merge two arrays and sort them as numbers in descending order.
4. Write a PHP script that reads data from one file and writes it into another file.
5. Develop static pages (using Only HTML) of an online book store. The pages should resemble: www.amazon.com. The website should consist of the following pages.
 - a. Homepage
 - b. Registration and user Login
 - c. User Profile Page
 - d. Books catalog
 - e. Shopping Cart
 - f. Payment By credit card
 - g. Order Confirmation
6. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
7. Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User ID as an input and returns the user details by taking the user information from the XML document.
8. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
9. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogues should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

TEXTBOOK:

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

REFERENCEBOOKS:

1. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.
2. Deitel H. M. and Deitel P. J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
3. J2EE: The complete Reference By James Keogh, McGraw-Hill
4. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
5. Paul Dietel and Harvey Deitel, "Java How to Program", Prentice Hall of India, 8th Edition
6. Web technologies, Black Book, Dreamtech press.
7. Gopalan N. P. and Akilandeswari J., "Web Technology", Prentice Hall of India

DATA VISUALIZATION TECHNIQUES LAB
(Professional Elective–III)

B.Tech.III Year II Sem.

LTPC
0021

Course Objectives:

- Understand the various types of data, apply and evaluate the principles of data visualization.
- Acquire skills to apply visualization techniques to a problem and its associated dataset.

Course Outcomes:

- Identify the different data types, visualization types to bring out the insight.
- Relate the visualization towards the problem based on the dataset to analyze and bring out valuable insight on a large dataset.
- Demonstrate the analysis of a large dataset using various visualization techniques and tools.
- Identify the different attributes and showcasing them in plots. Identify and create various visualizations for geospatial and table data.
- Ability to create and interpret plots using R/Python.

List of Experiments

1. Acquiring and plotting data.
2. Statistical Analysis – such as Multivariate Analysis, PCA, LDA, Correlation regression and analysis of variance
3. Financial analysis using Clustering, Histogram and Heat Map
4. Time-series analysis – stock market
5. Visualization of various massive dataset - Finance - Healthcare - Census - Geospatial
6. Visualization on Streaming dataset (Stock market dataset, weather forecasting)
7. Market-Basket Data analysis - visualization
8. Text visualization using web analytics

TEXTBOOKS:

1. Matthew Ward, Georges Grinstein and Daniel Keim, “Interactive Data Visualization Foundations, Techniques, Applications”, 2010.
2. Colin Ware, “Information Visualization Perception for Design”, 2nd edition, Morgan 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.

SCRIPTINGLANGUAGESLAB
(Professional Elective–III)

B.Tech.III Year II Sem.

LTPC
0021

Prerequisites: Any High level programming language (C, C++)

Course Objectives:

- To Understand the concepts of scripting languages for developing web based projects
- To understand the applications of Ruby, TCL, Perl scripting languages

Course Outcomes:

- Ability to understand the differences between Scripting languages and programming languages
- Gain some fluency programming in Ruby, Perl, TCL

LIST OF EXPERIMENTS:

1. Write a Ruby script to create a new string which is n copies of a given string where n is a non-negative integer
2. Write a Ruby script which accepts the radius of a circle from the user and computes the parameter and area.
3. Write a Ruby script which accepts the user's first and last name and prints them in reverse order with a space between them
4. Write a Ruby script to accept a filename from the user and print the extension of that
5. Write a Ruby script to find the greatest of three numbers
6. Write a Ruby script to print odd numbers from 10 to 1
7. Write a Ruby script to check two integers and return true if one of them is 20 otherwise return their sum
8. Write a Ruby script to check two temperatures and return true if one is less than 0 and the other is greater than 100
9. Write a Ruby script to print the elements of a given array
10. Write a Ruby program to retrieve the total marks where subject name and marks of a student are stored in a hash
11. Write a TCL script to find the factorial of a number
12. Write a TCL script that multiplies the numbers from 1 to 10
13. Write a TCL script for sorting a list using a comparison function
14. Write a TCL script to (i) create a list (ii) append elements to the list (iii) Traverse the list (iv) Concatenate the list
15. Write a TCL script to compare the file modification times.
16. Write a TCL script to copy a file and translate to native format.

17.
 - a) Write a Perl script to find the largest number among three numbers.
 - b) Write a Perl script to print the multiplication tables from 1-10 using subroutines.
18. Write a Perl program to implement the following list of manipulating functions
 - a) Shift
 - b) Unshift
 - c) Push
19.
 - a) Write a Perl script to substitute a word, with another word in a string.
 - b) Write a Perl script to validate IP address and email address.
20. Write a Perl script to print the file in reverse order using command line arguments

TEXTBOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming Language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pragmatic Programmers guide by Dave 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 Toolkit, Ousterhout, Pearson Education.
5. Perl Power, J.P. Flynt, Cengage Learning.

MOBILE APPLICATION DEVELOPMENT LAB
(Professional Elective–III)

B.Tech.III Year II Sem.

LTPC
0021

Course Objectives

- ▮ To learn how to develop Applications in an android environment.
- ▮ To learn how to develop user interface applications.
- ▮ To learn how to develop URL related applications.

Course Outcomes:

- ▮ Understand the working of Android OS Practically. Develop
- ▮ user interfaces.
- ▮ Develop, deploy and maintain the Android Applications.

LIST OF EXPERIMENTS:

1. a) Create an Android application that shows Hello + name of the user and run it on an emulator.
b) Create an application that takes the name from a textbox and shows hello message along with the name entered in the textbox, when the user clicks the OK button.
2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date picker), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) LinearLayout (b) Relative Layout and (c) Grid Layout or Table Layout.
3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a “Back” button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on the right fragment instead of these two screens with the back button. Use Fragment transactions and Rotation event listeners.
4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.
6. Create an application that uses a text file to store usernames and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and

if they match, show a dialog saying that login is successful. Otherwise, show the dialog with a Login Failed message.

7. Create a user registration application that stores the user details in a database table.
8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.
9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.
10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.
11. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.
12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.

TEXTBOOKS:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage, 2013.

REFERENCE BOOK:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

CRYPTOGRAPHY AND NETWORK SECURITY LAB
(Professional Elective–III)

B.Tech. III Year II Sem.

LTPC
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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.

Course Outcomes:

- Understand basic cryptographic algorithms, message and web authentication and security issues.
- Identify information system requirements for both of them such as client and server.
- Understand the current legal issues towards information security.

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and display the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
 - a. Caesar cipher
 - b. Substitution cipher
 - c. Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java keytool.
8. Write a Java program to implement the RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA

TEXTBOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, McGraw Hill, 3rd Edition

REFERENCEBOOKS:

1. CryptographyandNetworkSecurity:C KShyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography andNetworkSecurity: ForouzanMukhopadhyay, McGrawHill, 3rd Edition
3. InformationSecurity,Principles,andPractice:MarkStamp,WileyIndia.
4. PrinciplesofComputerSecurity:WM.ArthurConklin,GregWhite,TMH
5. IntroductiontoNetworkSecurity:NealKrawetz,CENGAGELearning
6. NetworkSecurityandCryptography:BernardMenezes,CENGAGELearning

LOGICAL REASONING–II

B.Tech.III Year IISem.

LTPC
0011

Quantitative Aptitude

1. **Permutation and Combinations:** Fundamental Principle of Counting, Counting Methods, Definition of permutation, Linear Permutations, Rank of a word, Circular Permutations, Definition of Combinations, Problems on Combinations.
2. **Probability:** Definitions of Probability, Addition and Multiplication theorem. Deductions: Introduction, expressing different types of statements using Venn diagrams, Definition of complementary pairs, finding the conclusions using Venn diagrams for two and more statements.
3. **Numbers system:** Classification of numbers, Divisibility rules, Finding the units digit, Finding remainders in divisions involving higher powers, LCM and HCF Models, Decimal fractions, Simplifications, Square Roots & Cube Roots, Surds and Indices.
4. **Allegation and Mixture:** Definition of allegation, mean price, rules of allegation on quantity and cost price, diagrammatic explanation, removal and replacement.

Logical Reasoning:

5. **Sitting Arrangement:** Problems on Linear arrangement, Problems on Circular arrangement, Problems on Double line-up, Problems on Selections, problems on Comparisons. **Coding and decoding:** Coding using same set of letters, Coding using different set of letters, Coding into a number Comparison & Elimination.
6. **Number and letter Series:** Difference series, Product series, Squares series, Cubes series, Alternate series, Combination series, miscellaneous series, Place values of letters.
7. **Day sequence/Calendars:** Definition of a Leap Year, Finding the number of Odd days, framing the year code for centuries, finding the day of any random calendar date.
8. **Alphabet Test:** Alphabetical order of verbs, letter-word problems, rule-detection, alphabetical quibble, word formation.
9. **Direction sense Test:** Direction from the initial point: directions, cardinal directions, problems on distances, problems on clocks, problems on angles, problems on shadows
10. **Clocks:** Finding the angle when the time is given, Finding the time when the angle is known, Relation between Angle, Minutes and Hours, Exceptional cases in clocks.
11. **Cubes:** Basics of a cube, finding the minimum number of cuts when the number of identical pieces are given, Finding the maximum number of pieces when cuts are given, Problems on painted cubes of same and different colours, Problems on cuboids, Problems on painted cuboids, Problems on Dice.

12. **Data Sufficiency:** Different models in Data Sufficiency, Problems on Data sufficiency, Problems on data redundancy. **Data Interpretation:** Problems on tabular form, Problems on Line Graphs, Problems on Bar Graphs, Problems on Pie Charts.

TEXTBOOKS:

1. A modern approach to Logical reasoning, RS Agarwal, S. Chand Publications, 2013.
2. Quantitative Aptitude for Competitive Examinations, Dinesh Khattar, Pearson Education, 4th Edition, 2019.

REFERENCE BOOKS:

1. Quantitative Aptitude and Reasoning, R. V. Praveen, PHI Learning Private Ltd, 2nd Edition, 2013.
2. Quantitative Aptitude for competitive examinations, Abhijith Guha, McGraw Hill Education, 6th Edition, 2017.
3. Analytical & Logical Reasoning, Peeyush Bhardwaj, Arihant Publications, 4th Edition, 2015.
4. Logical Reasoning for the CAT, Arun Sharma, McGraw Hill Education, 2nd Edition 2014.
4. A Modern Approach to Logical reasoning, RS Agarwal, S. Chand publications, 2013.
5. Quantitative Aptitude for Competitive examinations, Dinesh Khattar, Pearson Education 4th Edition, 2019.

ENVIRONMENTALSCIENCE

B.Tech.IIIYearIISem.

LTPC

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CourseObjectives:

- Understandingtheimportanceofecologicalbalanceforsustainabledevelopment.
- Understandingtheimpactsofdevelopmentalactivitiesandmitigationmeasures.
- Understandingtheenvironmentalpoliciessandregulations

CourseOutcomes:

- Basedonthiscourse,theEngineeringgraduatewillunderstand/evaluate/developtechnologies on the basis of ecological principles and environmental regulations which in turnhelps in sustainable development

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: benefitsand problems.**Mineral resources:**use and exploitation, environmental effects of extracting and usingmineral 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.Fieldvisit.Threatstobiodiversity:habitatloss,poachingofwildlife,man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situconservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **AirPollution:** Primary and secondarypollutants,Automobile and Industrial pollution,Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impactsofmodernagriculture,degradationofsoil.**NoisePollution:**SourcesandHealth

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 Issues 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. NAPCC-GoI Initiatives.

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 Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, 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.

TEXTBOOKS:

- 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. Textbook of Environmental Science and Technology- Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.