



DEPARTMENT
of
COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

III Year
SEM-I & SEM-II SYLLABUS



III YEAR – SEM-I



19CS3111: COMPUTER NETWORKS

B.Tech. III Year I Sem.

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Prerequisites

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

Course Objectives: The Objective of this Course is to:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area
3. Independently understand basic computer network technology.
4. Identify the different types of network topologies and protocols.
5. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer

Course Outcomes: At the end of the course, the students will be able to:

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.
3. Obtain the skills of sub netting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.
5. Analyze the contents in a given data link layer packet, based on the layer concept.

UNIT - I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

UNIT - II

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

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

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

UNIT - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, 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 WEB, HTTP.



TEXTBOOK:

1. Computer Networks—Andrew S Tanenbaum, David.j.Wetherall, 5th Edition. Pearson Education/PHI
2. Computer Networking With Internet Protocols And Technology Author: **William Stallings**

REFERENCEBOOKS:

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

R19-AI&ML



19CS3112: COMPILER DESIGN

B.Tech. III Year I Sem.

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Prerequisites

1. A course on "Formal Languages and Automata Theory".
2. A course on "Computer Organization and architecture".
3. A course on "Programming for problem solving".

Course Objectives: The course will provide

- An understanding of the fundamental principles in compiler design
- The skills needed for building compilers for various situations that one may encounter in a career in Computer Science.
- The major concepts of language translation and impart the knowledge of practical skills necessary for constructing a compiler.
- Basics for understanding phases of compiler, parsing, syntax directed translation, type checking use of symbol tables.
- Code optimization techniques, intermediate code generation, code generation and data flow analysis.

Course Outcomes: At the end of course, students will be able to,

- Demonstrate the ability to design a compiler given a set of language features.
- Demonstrate the the knowledge of patterns, tokens & regular expressions for lexical analysis.
- Acquire skills in using lex tool & yacc tool for developing a scanner and parser., design and implement LL and LR parsers
- Design algorithms to do code optimization in order to improve the performance of a program interms of space and time complexity.
- Design algorithms to generate machine code.

UNIT - I

Introduction: The structure of a compiler, the science of building a compiler, programming language basics

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of aLexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT - II

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, Using Ambiguous Grammars and Parser Generators.

UNIT - III

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

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT - IV

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in



the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

UNIT - V

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TEXT BOOKS:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman.
2. "Modern Compiler Implementation in C/Java" by Andrew W Appel

REFERENCE BOOKS:

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
Compiler Construction, Loudon, Thomson.



19AM3111: DESIGN AND ANALYSIS OF ALGORITHMS

B.Tech. III Year I Sem.

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3 - - 3

Prerequisites:

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

Course Objectives:

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure of disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic Programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate
4. Describes how to evaluate and compare different algorithms using worst-, average-, and bestcase analysis.
5. Explains the difference between tractable and intractable problems, and introduces the Problems that are P, NP and NP complete.

Course Outcomes:

1. Ability to analyze the performance of algorithms and describe the Divide and Conquer Method .
2. Ability to describe about disjoint sets and describe the Backtracking Technique.
3. Describe the dynamic programming paradigm and explain when an algorithmic design situation calls for it. Synthesize dynamic programming algorithms and analyze them.
4. Describes the greedy paradigm and explain when an algorithmic design situation calls for it. Synthesize greedy algorithms and analyze them.
5. Describe the Brand and Bound and Differentiate between tractable and intractable problems and to introduce P and NP classes.

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, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT - II

Disjoint Sets: Disjoint set operations, union and find algorithms

Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person 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.

**UNIT - V**

Branch and Bound: General method, applications - Travelling sales person 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.

TEXT BOOK:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.
2. "Introduction to Algorithms", by Aho, Hopcroft, Ulman, Pearson Education, 2000.

REFERENCE BOOKS:

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.



19AM3112: MACHINE LEARNING

B.Tech. III Year I Sem.

L T P C

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Prerequisites:

1. Statistics
2. Linear Algebra
3. Calculus
4. Probability
5. Programming Languages and data structures.

Course Objectives: The course will explain

- The basic theory underlying machine learning.
- Machine learning problems corresponding to different applications.
- A range of machine learning algorithms along with their strengths and weaknesses.
- Machine learning algorithms to solve problems of moderate complexity.
- The algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models..

Course Outcomes: At the end of the course, the student will be able to

1. Appreciate the importance of visualization in the data analytics solution.
2. Apply structured thinking to unstructured problems.
3. Understand a very broad collection of machine learning algorithms and problems.
4. Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory.
5. Develop an appreciation for what is involved in learning from data.

UNIT - I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias, Gradient Descent Algorithm and its variants.

UNIT – II

Supervised Learning- Regression: Linear-Simple, Multiple , Logistic Regression.

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

UNIT – III

Ensemble Techniques II- C4.5, CHAID (Chi-Square Automatic Interaction Detection),Random Forest Algorithm.

Unsupervised Learning-Clustering: Measures of distance, k-means, Gaussian Mixture Model Clustering, Hierarchical Learning- Divisive, Agglomerative Clustering

UNIT- IV

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

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example:



face recognition, advanced topics in artificial neural networks.

UNIT - V

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Reinforcement Learning – Introduction, the learning task, Q-learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

TEXT BOOKS:

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

REFERENCE BOOKS:

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



VIGNANA BHARATHI
Institute of Technology



(A UGC Autonomous Institution, Approved by AICTE, Accredited by NBA & NAAC-A Grade, Affiliated to JNTUH)

R19-AI & ML



19AM3171: GRAPH THEORY (Professional Elective – I)

B.Tech. III Year I Sem.

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Pre-requisites: An understanding of Mathematics in general is sufficient.

Course Objectives: The objective of this course is to:

- Understand and apply the fundamental concepts in graph theory
- Apply graph theory based tools in solving practical problems
- Have an idea of matching in graphs and study some applications of matching in day to day life problems.
- Understand the concept of digraphs, Euler digraphs and Hamiltonian digraphs
- Develop the under-standing of Geometric duals in Planar Graphs.

Course Outcomes: At the end of course, students will be able to

- Know some important classes of graph theoretic problems;
- Formulate and prove central theorems about trees, matching, connectivity, coloring and planar graphs;
- Describe and apply some basic algorithms for graphs;
- Use graph theory as a modeling tool.
- Define the basic concepts of graphs, directed graphs, and weighted graphs.

UNIT - I

Introduction-Discovery of graphs, Definitions, Subgraphs, Isomorphic graphs, Matrix representations of graphs, Degree of a vertex, Directed walks, paths and cycles, Connectivity in digraphs, Eulerian and Hamilton digraphs, Eulerian digraphs, Hamilton digraphs, Special graphs, Complements, Larger graphs from smaller graphs, Union, Sum, Cartesian Product, Composition, Graphic sequences, Graph theoretic model of the LAN problem, Havel-Hakimi criterion, Realization of a graphic sequence.

UNIT - II

Connected graphs and shortest paths - Walks, trails, paths, cycles, Connected graphs, Distance, Cut-vertices and cut-edges, Blocks, Connectivity, Weighted graphs and shortest paths, Weighted graphs, Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm.

UNIT - III

Trees- Definitions and characterizations, Number of trees, Cayley's formula, Kirchoff's matrix-tree theorem, Minimum spanning trees, Kruskal's algorithm, Prim's algorithm, Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs, Eulerian Graphs, Fleury's algorithm, Chinese Postman problem, Hamilton Graphs, Introduction, Necessary conditions and sufficient conditions.

UNIT - IV

Independent sets coverings and matchings – Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall's Theorem, Konig's Theorem, Perfect matchings in graphs, Greedy and approximation algorithms.

UNIT - V

Vertex Colorings- Basic definitions, Cliques and chromatic number, Mycielski's theorem, Greedy coloring algorithm, Coloring of chordal graphs, Brooks theorem, Edge Colorings, Introduction and Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs, Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs, A scheduling problem and equitable edge-coloring.

**TEXT BOOKS:**

1. J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics. Springer, 1st edition, 2008.
2. J. A. Bondy and U. S. R. Murty. Graph Theory with Applications.

REFERENCE BOOKS:

1. Lecture Videos: <http://nptel.ac.in/courses/111106050/13>.
2. Introduction to Graph Theory, Douglas B. West, Pearson.
3. Schaum's Outlines Graph Theory, Balakrishnan, TMH.
4. Introduction to Graph Theory, Wilson Robin j, PHI.
5. Graph Theory with Applications to Engineering and Computer Science, Narsing Deo, PHI.
6. Graphs - An Introductory Approach, Wilson and Watkins.



19AM3172: INTRODUCTION TO DATA SCIENCE (Professional Elective – I)

B.Tech. III Year I Sem.

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Prerequisites:

1. Knowledge on Probability and Statistics.
2. Knowledge on Programming languages such as C, Python.

Course Objectives: The objective of this course is to:

1. Learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration.
2. Apply various data science techniques relating to pre-processing, exploring and visualizing data.
3. Understand the basic types of data and basics of R programming.
4. Identify the importance of data reduction and data visualization techniques.
5. Apply statistical and predictive analytical methods to deal with the real time data.

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

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

UNIT - I

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

UNIT - II

Data Types & Statistical Description

Types of Data: Attributes and Measurement, What is an Attribute? The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes. Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Inter-quartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

UNIT - III

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting, **Matrices:** Creating and Naming Matrices, Matrix Sub setting, Arrays, 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

Data Reduction: Overview of Data Reduction Strategies, Wavelet Transforms, Principal Components Analysis, Attribute Subset Selection, Regression and Log-Linear Models: Parametric Data Reduction, Histograms, Clustering, Sampling, Data Cube Aggregation.

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

TEXT BOOKS:

1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014
2. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed. The Morgan Kaufmann Series in Data Management Systems.
3. K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

REFERENCE BOOKS:

1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
2. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
3. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
4. Paul Teetor, "R Cookbook", O'Reilly, 2011.



19AM3173: WEB PROGRAMMING (Professional Elective – I)

B.Tech. III Year I Sem

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Course Objectives: The objective of this course is to:

- Learn HTML tags and JavaScript language programming concepts and techniques.
- Know the importance of object-oriented aspects of Scripting.
- Understand creating database connectivity using JDBC.
- Learn the concepts of web-based application using sockets.
- Learn to write, test and debug web pages using HTML and JavaScript.

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

- Design web pages.
- Use technologies of Web Programming.
- Apply object-oriented aspects to Scripting.
- Create databases with connectivity using JDBC.
- Build web-based application using sockets.

UNIT - I

SCRIPTING: Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java Script-Object, names, literals, operators and expressions- statements and features- events - windows -documents - frames - data types - built-in functions- Browser object model - Verifying forms.- HTML 5-CSS3- HTML 5 canvas - Web site creation using tools.

UNIT – II

JAVA: Introduction to object-oriented programming-Features of Java – Data types, variables and arrays –Operators – Control statements – Classes and Methods – Inheritance. Packages and Interfaces – Exception Handling – Multithreaded Programming – Input/ Output – Files – Utility Classes – String Handling.

UNIT – III

JDBC: JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking– Inet Address class – URL class- TCP sockets – UDP sockets, Java Beans –RMI.

UNIT – IV

APPLETS: Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

UNIT – V

XML AND WEB SERVICES: Xml – Introduction-Form Navigation-XML Documents- XSL – XSLT- Web services-UDDI-WSDL-Java web services – Web resources.



TEXT BOOKS:

1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5th Edition.
2. Herbert Schildt, Java - The Complete Reference, 7th Edition. Tata McGraw- Hill Edition.
3. Michael Morrison XML Unleashed Tech media SAMS.

REFERENCE BOOKS:

1. John Pollock, Javascript - A Beginners Guide, 3rd Edition — Tata McGraw-Hill Edition.
2. Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.

R19-AI&ML



19DS3173: IMAGE PROCESSING (Professional Elective – I)

B.Tech. III Year I Sem.

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Prerequisites

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: The objective of this course is to:

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

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

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

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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



TEXT BOOKS:

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

REFERENCE BOOKS:

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



19AM3174: COMPUTER GRAPHICS (Professional Elective – I)

B.Tech. III Year I Sem.

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Prerequisites:

1. Familiarity with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.
2. A course on “Computer Programming and Data Structures”

COURSE OBJECTIVES: The objective of this course is to:

1. The computer graphics will give you hands-on experience at developing interactive, realtime rendering applications using OpenGL.
2. A major use of computer graphics is in design processes, particularly for engineering and architectural systems, but almost products are now computer designed.
3. To study the fundamental concepts of graphics like line drawings to advanced concepts like rendering , ray tracing to computer animation
4. To Changes in orientation, size and shape are accomplished with geometric transformations that alter the coordinate descriptions objects.
5. To study the visible surface detection methods for identifying visible surfaces and eliminating hidden surfaces.

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

1. Demonstrate an understanding of contemporary graphics hardware and software.
2. Create interactive graphics applications in C++ using one or more graphics application programming interfaces.
3. Write program functions to implement graphics primitives and demonstrate geometrical transformations.
4. Demonstrate an understanding of the use of object hierarchy in graphics applications.
5. Write program functions to implement visibility detection Students will write programs that demonstrate computer graphics animation.

UNIT - I

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

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

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

UNIT - II

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

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

UNIT - III



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

UNIT - IV

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

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

UNIT - V

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

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

TEXT BOOKS:

1. Edward Angel, Interactive Computer Graphics. A Top-Down Approach Using OpenGL (fifth Edition), Pearson Education, 2008.
2. Donald Hearn and Pauline Baker, Computer Graphics with OpenGL (third edition), Prentice Hall, 2003.

REFERENCE BOOKS:

1. F. S. Hill Jr. and S. M. Kelley, Computer Graphics using OpenGL (third edition), Prentice Hall, 2006.
2. Peter Shirley and Steve Marschner, Computer Graphics (first edition), A. K. Peters, 2010 Web



19AM3175: SOFTWARE TESTING METHODOLOGIES (Professional Elective – II)

B.Tech. III Year I Sem.

L T P C

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Prerequisites: A course on “Software Engineering”.

COURSE OBJECTIVES: The objective of this course is to:

1. Learn and understand the tools and techniques of software testing and its practice in the industry.
2. Be aware of the differences between the various testing strategies.
3. Know the taxonomy and purpose of software testing tools.
4. Learn path testing, domain testing.
5. Learn the data flow testing.

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

1. Understand the basic concepts of testing, path testing and sensitization2. Generation of test cases from requirements.
2. Learn about the transaction flow testing.
3. Understand the concepts of domain based testing and logic based testing.
4. Describe about the path product and data flow anomaly detection.
5. Understand the concepts of transitions testing.

UNIT - I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II

Transaction Flow Testing: transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT - III

Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

UNIT - IV

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

UNIT - V

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

TEXT BOOKS:

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.



REFERENCE BOOKS:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

R19-AI&ML



19DS3175: INFORMATION RETRIEVAL SYSTEMS (Professional Elective – II)

B.Tech. III Year I Sem.

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Course Objectives: The course will explain:

1. Genesis and diversity of information retrieval situations for text and hyper media.
2. Hands-on experience store, and retrieve information from www using semantic approaches
3. The usage of different data/file structures in building computational search engines.
4. The performance of information retrieval using advanced techniques such as classification, clustering, and filtering over multimedia.
5. Information visualization technologies like Cognition and perception in the Internet or Web search engine.

Course Outcome: At the end of the course, students will be able to:

1. Understand various functionalities and capabilities of Information Retrieval System.
2. Gain knowledge on cataloguing and data structure methodology for IRS.
3. Differentiate various clustering algorithms and indexing.
4. Differentiate various user search techniques and system search techniques.
5. Understand the concepts of information visualization and text search.

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.



TEXT BOOK:

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer
2. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.

REFERENCE BOOKS:

1. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
2. Modern Information Retrieval By Yates and Neto Pearson Education.

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19AM3176: PATTERN RECOGNITION (Professional Elective – II)

B.Tech. III Year I Sem.

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Prerequisites

- Students are expected to have knowledge basic linear algebra, basic probability theory and basic programming techniques;
- A course on “Computational Mathematics”
- A course on “Computer Oriented Statistical Methods”

Course Objectives: The objective of this course is to:

1. Understand basic concepts in pattern recognition
2. Gain knowledge about state-of-the-art algorithms used in pattern recognition research
3. Understand pattern recognition theories, such as Bayes classifier, linear discriminant analysis.
4. Apply pattern recognition techniques in practical problems.
5. Understand the algorithms used in various phases of pattern recognition systems

Course Outcomes: At the end of this course, students will be able to:

- Explain and compare a variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.
- Summarize, analyze, and relate research in the pattern recognition area verbally and in writing.
- Apply performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature.
- Apply pattern recognition techniques to real-world problems such as document analysis and recognition.
- Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.

UNIT - I: Introduction: What is Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT - II: Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

UNIT - III: Hidden Markov Models: Markov Models for Classification, Hidden Markov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

UNIT - IV: Support Vector Machines: Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

UNIT - V: Clustering: Why is Clustering Important, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets. An Application-Hand Written Digit Recognition: Description of the Digit Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results.



TEXT BOOK:

1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Springer Pub, 1st Ed.
2. S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009

REFERENCE BOOKS:

1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. Prentice-Hall Pub.

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19AM3177: COMPUTER VISION AND ROBOTICS (Professional Elective – II)

B.Tech. III Year I Sem.

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Pre-Requisites:

1. Linear algebra, vector calculus, and probability
2. Data structures
3. Coding that represents images as feature and geometric constructions.
4. Programming knowledge.
5. Image Processing.

Course Objective:

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

Course Outcomes:

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

UNIT - I

CAMERAS: Pinhole Cameras.

Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases.

Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models.

Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT - II

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates.

Edge Detection: Noise, Estimating Derivatives, Detecting Edges.

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



UNIT - III

The Geometry of Multiple Views: Two Views

Stereopsis: Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras

Segmentation by Clustering: What Is Segmentation? Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,

UNIT - IV

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

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

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

UNIT - V

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations.

Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization.

Model-Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Application: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.

TEXTBOOKS:

1. David A. Forsyth and Jean Ponce: Computer Vision—A Modern Approach , PHI Learning (Indian Edition), 2009.
2. Computer Vision: Models, Learning, and Inference, **by Simon J. D. Prince**

REFERENCE BOOKS:

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



19AM3178: DATA WAREHOUSING AND BUSINESS INTELLIGENCE
(Professional Elective – II)

B.Tech. III Year I Sem.

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Course Objectives: The objective of this course is to:

- Introduce the concepts and components of Business Intelligence (BI)
- To introduce data warehousing, which consist on OLAP design concepts and multidimensional modeling.
- Extract, cleanse, consolidated, and transform heterogeneous data into a single enterprise data warehouse.
- Analyze data to generate information and knowledge that lead to informed decisions for businesses.
- Use Hadoop and related big data technologies such as Map Reduce, Pig, Hive, and Impala in the context of big data management and problem solving.

Course Outcomes: At the end of the course, students will be able to:

- Students will learn how the steps of the process of data warehousing to automate analytical processes that companies need for their business strategies
- The learner will be able to design and create a data warehouse from OLAP requirements.
- Use OLAP tools to import data into multi-dimensional data cubes.
- Discuss the impact of Business Intelligence (BI) theories, architectures, and methodologies on the organizational decision making process.
- Comprehension of business analytics and it facilitates in solving business problems in real world environment.

UNIT - I

DATA WAREHOUSE: Data Warehouse-Data Warehouse Architecture- Multidimensional Data Model- Data cube and OLAP Technology-Data Warehouse Implementation -DBMS schemas for Decision support - Efficient methods for Data cube computation.

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-vent-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 implementation-Business Intelligence and integration implementation-connecting



in BI systems- Issues of legality- Privacy and ethics- Social networking and BI.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE 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.
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.



19AM3152: MACHINE LEARNING LAB

B.Tech. III Year I Sem.

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Course Objective: The objective of this lab is to

1. Formulate machine learning problems corresponding to different applications.
2. Apply machine learning algorithms to solve problems of moderate complexity.
3. Apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.
4. Discover patterns in the user data and then make predictions based on these and intricate patterns for answering business questions and solving business problems.
5. Develop skills of using recent machine learning packages for solving practical problems.

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

- Understand complexity of Machine Learning algorithms and their limitations;
- **Understand** the mathematical and statistical prospective of machine learning algorithms through python programming.
- **Design** and evaluate the unsupervised models through python in built functions.
- **Evaluate** the machine learning models pre-processed through various feature engineering algorithms by python programming.
- **Design** and **apply** various reinforcement algorithms to solve real time complex problems.

List of Experiments

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.
medium skiing design single twenties no -> highRisk
high golf trading married forties yes -> lowRisk
low speedway transport married thirties yes -> medRisk
medium football banking single thirties yes -> lowRisk
high flying media married fifties yes -> highRisk
low football security single twenties no -> medRisk



medium golf media single thirties yes -> medRisk
medium golf transport married forties yes -> lowRisk
high skiing banking single thirties yes -> highRisk
low golf unemployed married forties yes -> highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of 'golf' and the conditional probability of 'single' given 'medRisk' in the dataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

Text Books:

1. "Machine Learning: Step-by-Step Guide To Implement Machine Learning Algorithms with Python" by Rudolph Russel.
2. "Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems" by Aurelien Geron.



19DS3153: COMPUTER NETWORKS LAB

B.Tech. III Year I Sem.

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Course Objectives:

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology and observe its performance
3. To analyze the traffic flow and the contents of protocol frames
4. Implement a simple LAN with hubs, bridges and switches.
5. Design and implement a network protocol.

Course Outcomes:

1. Implement data link layer framing methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. 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. Take 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 Wire shark
 - ii. Starting Wire shark
 - iii. Viewing Captured Traffic
 - iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. 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
2. Computer Networking With Internet Protocols And Technology Author: **William Stallings**

REFERENCEBOOKS:

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

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19HS3151: ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B.Tech. III Year I Sem.

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Introduction

A course on Advanced English Communication Skills (AECS) Lab is considered essential at the third year level of B.Tech and Pharmacy courses. At this stage, the students need to prepare themselves for their career which requires them to listen to, read, speak and write in English both for their professional and interpersonal communication. The main purpose of this course is to prepare the students of Engineering for their placements.

Course Objectives

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

- To improve students' fluency in spoken English
- To enable them to listen to English spoken at normal conversational speed
- To help students develop their vocabulary
- To read and comprehend texts in different contexts
- To communicate their ideas relevantly and coherently in writing
- To make students industry-ready
- To help students acquire behavioural skills for their personal and professional life
- To respond appropriately in different socio-cultural and professional contexts

Course Outcomes

Students will be able to:

- Acquire vocabulary and use it contextually
- Listen and speak effectively
- Develop proficiency in academic reading and writing
- Increase possibilities of job prospects
- Communicate confidently in formal and informal contexts

Unit-I

Inter-personal Communication and Building Vocabulary –Starting a Conversation–Responding Appropriately and Relevantly –Using Appropriate Body Language –Role Play in Different Situations –Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.

Unit-II

Reading Comprehension –General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, , Skimming, Scanning, Inferring Meaning.

Unit-III

Writing Skills –Structure and Presentation of Different Types of Writing –Letter Writing/Resume Writing/ e-correspondence/ Technical Report Writing.

Unit-IV

Presentation Skills –Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/ emails/Assignments...etc.

Unit-V

Group Discussion and Interview Skills –Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation-Concept and Process, Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

REFERENCES:

1. Kumar, Sanjay and Pushp Lata. English for Effective Communication, Oxford University Press, 2015.
2. Konar, Nira. English Language Laboratories –A Comprehensive Manual, PHI Learning Pvt. Ltd., 2011



19MC0005: PROFESSIONAL ETHICS

B.Tech. III Year I Sem.

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Course Objectives

- To enable the students to imbibe and internalize the Values and Ethical Behaviour in the personal and Professional lives.

Course Outcomes

- The students will understand the importance of Values and Ethics in their personal lives and professional careers.
- The students will learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT - I

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT - II

Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT - III

Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT - IV

Work Place Rights & Responsibilities, Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research - The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.

UNIT - V

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCES:

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e , Cengage learning, 2015.
2. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.



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B.Tech. III Year I Sem.

19AM3181: SUMMER INTERNSHIP

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III YEAR – SEM-II



19AM3211: ARTIFICIAL INTELLIGENCE

B.Tech. III Year II Sem.

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Prerequisites:

1. A course on "Computer Programming and Data Structures"
2. A course on "Design and Analysis of Algorithms"
3. A course on "Mathematical Foundations of Computer Science"
4. Some background in linear algebra, and probability.

Course Objectives: The objective of this course is to:

1. Learn the distinction between optimal reasoning Vs. human like reasoning
2. Understand the concepts of state space representation, exhaustive search, and heuristic search together with the time and space complexities.
3. Learn different knowledge representation techniques.
4. Understand the applications of AI, namely game playing, theorem proving, and machine learning.
5. Know about the various applications of AI.

Course Outcomes: At the end of the course, student will be able to:

1. Ability to formulate an efficient problem space for a problem expressed in natural language.
2. Select a search algorithm for a problem and estimate its time and space complexities.
3. Possess the skill for representing knowledge using the appropriate technique for a given problem.
4. Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.
5. Apply AI techniques to real-world problems to develop intelligent systems.

UNIT - I

Problem Solving by Search-I: Introduction to AI, Intelligent Agents

Problem Solving by Search –II: 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, Searching with Non-Deterministic Actions, Searching with Partial Observations, Online Search Agents and Unknown Environment .

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



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Logic, Knowledge Engineering in First-Order Logic.

Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT - IV

Planning

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

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

UNIT - V

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.

Learning: Forms of Learning, Supervised Learning, Learning Decision Trees. Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming.

TEXT BOOK:

1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.
2. The Logic of Mind (Synthese Library Book 155) 2nd Edition by R.J. Nelson.
3. Artificial Intelligence and Expert systems – Patterson, Pearson Education

REFERENCE BOOKS:

1. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.



19AM3212: DEVOPS

B.Tech. III Year II Sem.

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Course Objectives: The objective of this course is to:

1. To describe the agile relationship between development and IT operations.
2. To understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
3. To implement automated system update and DevOps lifecycle.
4. To illustrate the types of version control systems, continuous integration tools, continuous monitoring tools.
5. To analyze the concepts of test automation and deployment automation.

Course Outcomes: At the end of the course, student will be able to:

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

UNIT - I

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

UNIT - II

Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. **DevOps influence on Architecture:** Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, 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 automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development

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



TEXT BOOKS:

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

REFERENCE BOOK:

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. AddisonWesley; ISBN-10
2. The Devops Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations; by Gene Kim (Author), Patrick Debois (Author), Professor John Willis (Author), Jez Humble (Author), John Allspaw



19AM3213: NATURAL LANGUAGE PROCESSING

B.Tech. III Year II Sem.

L T P C

3 - - 3

Prerequisites:

1. Data structures, finite automata and probability theory.
2. Knowledge on basics of Machine Learning.

Course Objectives:

1. Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.
2. Introduce to NLP problems and solutions relation to linguistics and statistics.
3. Introduce to Regular expression and probabilistic model with n-grams.
4. Introduce to Recognizing Speech and parsing with grammar.
5. To learn basis of semantic analysis and discourse analysis.

Course Outcomes:

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
3. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Able to design, implement, and analyze NLP algorithms
5. Able to design different language modeling Techniques.

UNIT - I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT - II

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT - III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT - IV

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT - V

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling



TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice –Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications
2. Foundations of Statistical Natural Language Processing by Christopher D.Manning and Hinrich Schuetze, MIT press, 1999

R19-AI&ML



19BU3272: INTERNET OF THINGS (Professional Elective – III)

B.Tech. III Year II Sem.

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Course Objectives:

- To introduce the terminology, technology and its applications.
- To introduce the concept of M2M (machine to machine) with necessary protocols.
- To introduce the Python Scripting Language which is used in many IoT devices.
- To introduce the Raspberry PI platform, that is widely used in IoT applications.
- To introduce the implementation of web-based services on IoT devices.

Course Outcomes:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT - I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT - II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT - III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:



1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.

REFERENCE BOOKS:

1. The Internet of Things: Enabling Technologies, Platforms, and Use Cases Hardcover – 2 March 2017
2. Make Sensors: A Hands-On Primer for Monitoring the Real World with Arduino and Raspberry Pi 1st Edition

R19-AI&ML

**19AM3271: DATA MINING (Professional Elective – III)****B.Tech. III Year II Sem.****L T P C****3 - - 3****Pre-Requisites:**

- A course on “Database Management Systems”
- Knowledge of probability and statistics

Course Objectives: The aim of the course is:

- To introduce students to the basic concepts and techniques of Data Mining.
- To develop skills of using recent data mining software for solving practical problems.
- To introduce students to learn methods for mining frequent patterns, associations, and correlations.
- To describe methods for data classification and prediction, and data-clustering approaches.
- To gain experience of doing independent study and research.

Course Outcomes: At the end of the course, student will be able to:

- Perform the preprocessing of data and apply mining techniques on it.
- Identify the association rules and extract interesting patterns from large amounts of data.
- Able to apply density-based approach to cluster analysis, which can group dense regions of arbitrary shape, such as DBScan.
- Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.
- Ability to understand, define and characterize the unique aspects of spatial data mining.

UNIT - I

Data Mining: Data–Types of Data–, Data Mining Functionalities– Interestingness Patterns– Classification of Data Mining systems– Data mining Task primitives –Integration of Data mining system with a Data warehouse–Major issues in Data Mining–Data Preprocessing.

UNIT - II

Association Rule Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining. Graph Pattern Mining, SPM.

UNIT - III

Classification: Classification and Prediction – Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Lazy learner.

UNIT - IV

Clustering and Applications: Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

UNIT - V

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data–Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.



TEXT BOOKS:

1. Data Mining – Concepts and Techniques – Jiawei Han & Micheline Kamber, 3rd Edition Elsevier.
2. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

REFERENCE BOOK:

1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.
2. Alex Berson and Stephen J. Smith, —Data Warehousing, Data Mining & OLAP II, Tata McGraw – Hill Edition, 35th Reprint 2016.

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19AM3272: SCRIPTING LANGUAGES (Professional Elective – III)

B.Tech. III Year II Sem.

L T P C

3 - - 3

Prerequisites:

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

Course Objectives: The objective of this course is to:

- Introduce the script programming paradigm.
- Introduce scripting languages such as Perl, Ruby and TCL.
- Learn TCL.
- Assist Perl programmer or database administrator to compile large programming set. Other tasks include implementing complex data structure, compiling object-oriented programming
- Impart knowledge to students regarding the skills required to write Taylor Control Language (TCL) sequences using fundamental and advanced language features.

Course Outcomes: At the end of this course, students will be able to:

- 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.
- Develop, maintain, and scale the performance of web sites using Smarty templates.
- Develop a platform-independent GUI framework for Tcl named Tk and from a Tcl shell (tclsh), Tk may be invoked using this command: package requires Tk.

UNIT - I

Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Web servers, SOAP and webservice

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

UNIT - II

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

UNIT - III

Introduction to PERL and Scripting

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

UNIT - IV

Advanced perl

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

UNIT - V

**TCL**

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

Tk

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

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby 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 Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.



B.Tech. III Year II Sem.

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3 - - 3

Prerequisites

1. Acquaintance with JAVA programming.
2. A Course on Database and management system.

Course Objectives: The Objective of this course is to:

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

Course Outcomes: At the end of the course, the students will be able to:

- Student understands the working of Android OS Practically.
- Student will be able to develop Android user interfaces
- Understand the use of various Layouts and Widgets in Android Applications.
- Student will be able to develop, deploy and maintain the Android Applications.
- Able to develop embedded software for Mobile phones with SQLite.

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 - s
Layouts – Linear, Relative, Grid and Table Layouts
User Interface (UI) Components – Editable and non-editable TextViews, 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 new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS
Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity
Notifications – Creating and Displaying notifications, 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 shared preferences, saving and retrieving data using Shared Preference

**UNIT - V**

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOKS:

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

REFERENCE BOOK:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.
2. Paul Deitel "Android for Programmers: An App-Driven Approach" 1st Edition, Pearson India.
3. Wei-Meng Lee, "Beginning Android 4 Application Development", Wiley India Pvt Ltd


19AM3273: CRYPTOGRAPHY AND NETWORK SECURITY
(Professional Elective - III)
B.Tech. III Year II Sem.**L T P C****3 - - 3****Course Objectives:**

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
- Discuss Web security and Firewalls

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.
- Discuss the fundamental ideas of public-key cryptography
- Discuss Web security and Firewalls

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, Cross site Scripting Vulnerability.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw 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.



OPEN ELECTIVE I

B.Tech. III Year II Sem.

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19AM3251: ARTIFICIAL INTELLIGENCE AND NATURAL LANGUAGE PROCESSING LAB

B.Tech. III Year II Sem.

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Prerequisites:

1. Knowledge on Programming languages, Data structures.
2. Knowledge on finite automata and probability theory .

Course Objectives:

1. Become familiar with basic principles of AI toward problem solving.
2. Become familiar knowledge representation, and learning.
3. Knowledge on basic Language processing features
4. Knowledge on design an innovative application using NLP components.

Course Outcomes:

1. Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.
2. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
3. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
4. Able to design, implement, and analyze NLP algorithms.

List of Experiments (AI)

- 1) Write a program in prolog to implement simple facts and Queries
- 2) Write a program in prolog to implement simple arithmetic
- 3) Write a program in prolog to solve Monkey banana problem
- 4) Write a program in prolog to solve Tower of Hanoi
- 5) Write a program in prolog to solve 8 Puzzle problems
- 6) Write a program in prolog to solve 4-Queens problem
- 7) Write a program in prolog to solve Traveling salesman problem
- 8) Write a program in prolog for Water jug problem

List of Experiments (NLP)

1. Word Analysis
2. Word Generation
3. Morphology
4. N-Grams
5. N-Grams Smoothing

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach Third Edition Stuart Russell and Peter Norvig, 2010. Pearson Education, Inc. ISBN: 978-0-13-604259-4
2. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
3. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, O'Reilly Media, 2009.

REFERENCE BOOK:

1. Breck Baldwin, —Language Processing with Java and Ling Pipe Cookbook, Atlantic Publisher, 2015.



19AM3252: DEVOPS LAB

B.Tech. III Year II Sem.

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Course Objectives:

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

Course Outcomes:

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

List of Experiments:

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

TEXT BOOKS:

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

REFERENCE BOOKS / LEARNING RESOURCES:

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

Counselling Code : **VBIT**



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