TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by NBA and NAAC with 'A+' Grade.
(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)
Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097
Phone: 9100377790, email: info@tkrcet.ac.in, web site: www.tkrcet.ac.in

DEPARTMENT OF INFORMATION TECHNOLOGY

R22 B.Tech. IT Syllabus

SEMESTER V

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	HS	D5HSFM	Fundamentals of Management	3	0	0	3	40	60	100
2	PC	D65PC13	Computer Networks	3	0	0	3	40	60	100
3	PC	D65PC14	Fundamentals of IOT	3	0	0	3	40	60	100
4	OE	D65OE1	Open Elective-I	3	0	0	3	40	60	100
5	PE	D65PE1	Professional Elective-I	3	0	0	3	40	60	100
6	PE	D65PE2	Professional Elective –II	3	0	0	3	40	60	100
7	PC	D65PC15	Computer Networks Laboratory	0	0	2	1	40	60	100
8	PC	D65PC16	Internet of Things Lab	0	0	2	1	40	60	100
9	MC	MC003	Intellectual Property Rights	3	0	0	0	0	0	S
TOTAL				**21**	**0**	**04**	**20**	**320**	**480**	**800**

L-Lecture hours per week; T-Tutorial hours per week; P-Practical hours per week; I-Internal Marks; E-External Marks; S-Satisfactory

SEMESTER VI

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
1	PC	D66PC17	Machine Learning	3	0	0	3	40	60	100
2	PC	D66PC18	Data Warehousing and Data Mining	3	0	0	3	40	60	100
3	PC	D66PC19	Automata Theory and Compiler Design	3	0	0	3	40	60	100
4	PE	D66PE3	Professional Elective – III	3	0	0	3	40	60	100
5	OE	D66OE2	Open Elective-II	3	0	0	3	40	60	100
6	PC	D66PC20	Machine Learning Lab	0	0	3	1.5	40	60	100
7	PC	D66PC21	Data Warehousing and Data Mining Lab	0	0	3	1.5	40	60	100
8	HS	D6HSE3	Advanced English Communication Skills Lab	0	1	2	2	40	60	100
9	MC	MCOO2	Constitution of India	3	0	0	0	0	0	S
TOTAL				**18**	**1**	**08**	**20**	**360**	**540**	**900**

L-Lecture hours per week; T-Tutorial hours per week; P-Practical hours per week; I-Internal Marks; E-External Marks; S-Satisfactory

D5HSFM - FUNDAMENTALS OF MANAGEMENT

B.Tech. III Year V Sem.

L	T	P	C
3	0	0	3

Course Objective:

To make the students to understand the management concepts, analyze the managerial skills and the applications of management concepts in practical aspects of business.

Course Outcomes: Upon completion of the course the student will be able:

1. To infer the basic knowledge of management functions, levels and evolution of Management.
2. To ensure the students in decision making problem solving for the issues in corporate in the organization.
3. To acquire the knowledge of entire organization design and structure.
4. To perceive the strategically decision in selection, requirement training and development.
5. To enact and impose the qualities of a leader, mentor and coach.

UNIT - I

Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management- Classical Approach- Scientific and Administrative Management; The Behavioral approach.

UNIT – II

Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans. Decision making and Problem solving - Programmed and Non Programmed Decisions, Steps in Problem Solving and Decision Making.

UNIT - III

Organization and HRM: Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization; **Human Resource Management & Business Strategy**: Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

UNIT - IV

Leading and Motivation: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership during adversity and Crisis. Motivation - Types of Motivation; Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT - V

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non- Budgetary Controls. Characteristics of Effective Controls

TEXT BOOKS:

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

REFERENCE BOOKS:

1. Essentials of Management, Koontz Kleihrich, Tata Mc - Graw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
3. Harold Koontz and Heinz Weihrich, 2010, Essentials of Management, TMH

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D65PC13 - COMPUTER NETWORKS

B.Tech. III Year V Sem.

L	T	P	C
3	0	0	3

Course Objective:

- Identify the components required to build different types of networks and choose the required functionality at each layer for a given application

Course Outcomes:

Upon completion of the course the student will be able:

1. Apply protocol layering and physical level communication concepts effectively. L3
2. Identify network performance using appropriate metrics and tools proficiently. L3
3. Apply components knowledge to construct diverse network architectures proficiently.L3
4. Implement network layer functions and routing protocols competently for optimal performance.L3
5. Apply Transport layer functions and protocols proficiently in network setups. L3

UNIT I

Introduction: OSI, TCP/IP, and other network models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN. **Physical Layer:** Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrowband, broadband ISDN and ATM.

UNIT II

Data link layer: Design issues, framing, error detection and correction, CRC, Elementary Protocol- stop and wait, Sliding Window, Slip, Data link layer in HDLC, Internet, ATM. **Medium Access sub layer:** ALOHA, MAC addresses, Carrier sense multiple access. IEEE 80.X Standard Ethernet, wireless LANs and Bridges.

UNIT III

Network Layer: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing. Dynamic routing – Broadcast routing. Rotary for mobility, The Network layer on the internet and in the ATM Networks.

UNIT IV

Transport Layer: Transport Services, Connection management, TCP and UDP protocols; Congestion Control Algorithms – General Principles – of Congestion prevention policies ATM AAL Layer Protocol.

UNIT V

Application Layer – Domain name system, SNMP, Electronic Mail (SMTP, POP3, IMAP,

MIME) the World WEB, HTTP.

TEXT BOOK:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.
3. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH

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R22 B.Tech. IT Syllabus

D65PC14 - FUNDAMENTALS OF IOT

B.Tech. III Year V Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To impact necessary and practical knowledge of components of IoT connectivity protocols and design issues of industry IoT through cloud infrastructure

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

1. Apply IoT principles for designing and implementing sensor networks. L3
2. Integrate sensors and actuators with Arduino for IoT applications. L3
3. Utilize Python and Raspberry Pi for IoT implementation.L3
4. Implement IoT solutions with Raspberry Pi and Software-defined Networks. L3
5. Apply cloud computing for IoT applications in smart environments. L3

UNIT – I

Introduction to Internet of Things, Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, Sensor Networks.

UNIT - II

Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

UNIT – III

Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi, Case studies.

UNIT - IV

Implementation of IoT with Raspberry Pi, Introduction to Software-defined Network (SDN), SDN for IoT, Data Handling and Analytics.

UNIT - V

Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT.

Case Study: Agriculture, Healthcare, Activity Monitoring

TEXT BOOKS:

1. Pethuru Raj and Anupama C. Raman "The Internet 'of Things: Enabling Technologies, Platforms, and Use Cases", (CRC Press)
2. Terokarvinen, kemo, karvinen and villey valtokari, "Make sensors": 1st edition, maker media,
   2014.

REFERENCE BOOKS:

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach"
2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"
3. Beginning Sensor networks with Arduino and Raspberry Pi – Charles Bell, Apress, 2013

D65PE1A - QUANTUM COMPUTING
PROFESSIONAL ELECTIVE - I

L	T	P	C
3	0	0	3

B.Tech. III Year V Sem.

Course Objectives

The problem-solving approach using finite dimensional mathematics

Course Outcomes

Upon completion of the course the student will be able to

1. Identify the significance of mathematics, physics, and biology in the development of quantum computing and compare Bits and Qubits, Classical Vs Quantum logical operations. L3
2. Apply the basics of linear algebra, quantum mechanics, and the principles of genomics and proteomics to analyze quantum computing concepts. L3
3. Design quantum circuits using Qubits, single and multiple qubit gates and Bell states.
4. Compare quantum and classical complexity classes and implement various quantum algorithms. L4
5. Utilize quantum cryptography protocols for secure communication and apply quantum error correction techniques to mitigate noise and errors in quantum systems.L3

UNIT - I

History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits, Classical Vs Quantum logical operations

UNIT - II

Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements. **Background Physics:** Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Background Biology: Basic concepts of Genomics and Proteomics (Central Dogma)

UNIT - III

Qubit: Physical implementations of Qubit. Qubit as a quantum unit of information. The Bloch sphere Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.

UNIT - IV

Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorization algorithm, Grover's search algorithm.

UNIT - V

Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. Quantum Information and Cryptography: Comparison between classical and quantum information theory. Quantum Cryptography, Quantum teleportation

TEXT BOOK:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge

REFERENCE BOOKS:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol.I: Basic Concepts, Vol II
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to Quantum Computing Algorithms

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R22 B.Tech. IT Syllabus

D65PE1B - IMAGE PROCESSING
PROFESSIONAL ELECTIVE - I

L	T	P	C
3	0	0	3

B.Tech. III Year V Sem.

Course Objectives

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

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

1. Demonstrate knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization. L3
2. Demonstrate knowledge of filtering techniques. L3
3. Demonstrate the knowledge of 2D transformation techniques. L3
4. Demonstrate knowledge of image enhancement and segmentation techniques. L3
5. Demonstrate knowledge of restoration and compression techniques. L3

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 BOOK:

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

REFERENCE BOOKS:

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

D65PE1C - PRINCIPLES OF PROGRAMMING LANGUAGES
PROFESSIONAL ELECTIVE - I

L	T	P	C
3	0	0	3

B.Tech. III Year V Sem.

Course Objectives

Topics include programming paradigms; syntax and semantics; data types, expressions and statements; subprograms and blocks; abstract data types; concurrency; functional and logic pogramming languages; and scripting languages

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

1. Apply language concepts to analyze and evaluate programming languages effectively.L3
2. Apply naming, binding, and scoping concepts through varied programming scenarios.L3
3. Construct subprograms, implement dynamic scoping, abstract data types, encapsulation, naming. L3
4. Develop ability to identify concurrency mechanisms and handle exceptions/events effectively. L3
5. Develop proficiency in Functional, Logic, and Scripting languages application. L3

UNIT - I

Preliminary Concepts: Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

UNIT - II

Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence Expressions and Statements, Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment Control Structures – Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT - III

Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations

UNIT - IV

Concurrency: Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency. Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java, Introduction to Event Handling, Event Handling with Java and C#.

UNIT - V

Functional Programming Languages: Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming. Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library.

TEXT BOOKS:

1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education.
2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.

REFERENCE BOOKS:

1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003.

D65PE2A - BIOMETRICS
PROFESSIONAL ELECTIVE -II

L	T	P	C
3	0	0	3

B.Tech. III Year V Sem.

Course Objectives:

Will learn the biometric technologies, computational methods involved in the biometric systems and methods for evaluation of the reliability and quality of the biometric systems.

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

1. Construct applications integrating biometric principles, evaluating efficacy against traditional authentication. L3
2. Develop ability to select and experiment with biometric recognition methods. L3
3. Experiment with iris segmentation methods for retina biometrics design. L3
4. Select, develop, and experiment with biometric technologies for diverse applications. L3
5. Select, develop, and compare privacy-enhanced biometric solutions with cryptography. L3

UNIT - I

Introduction, history, type of Biometrics, General Architecture of Biometric Systems, Basic Working of biometric Matching, Biometric System Error and performance Measures, Design of Biometric Systems, Applications of Biometrics, Benefits of Biometrics Versus Traditional Authentication Methods

UNIT - II

Face Biometrics & Retina And Iris Biometrics Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages, Performance of Biometrics.

UNIT -III

Design of Retina Biometrics, Iris Segmentation Method, Determination of Iris Region, Experimental Results of Iris Localization, Applications of Iris Biometrics, Advantages and Disadvantages.

UNIT - IV

Vein and Fingerprint Biometrics & Biometric Hand Gesture Recognition For Indian Sign Language. Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages, Basics of Hand Geometry, Sign Language, Indian Sign Language, SIFT Algorithms- Practical Approach Advantages and Disadvantages.

UNIT - V

Privacy Enhancement Using Biometrics & Biometric Cryptography And Multimodal Biometrics: Introduction, Privacy Concerns Associated with Biometric Developments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics - Introduction to Biometric Cryptography.

TEXT BOOKS:

1. G r Sinha and Sandeep B. Patil, Biometrics: concepts and applications, Wiley, 2013.
2. Paul Reid, Biometrics for Network Security, Pearson Education.

REFERENCE BOOKS:

1. Samir Nanavathi, Micheal Thieme and Raj Nanavathi, Biometrics, Identity verification in a networked world, Wiley, dream Tech.
2. John D. Woodward and Jr. Wiley Dreamtech, Biometrics, The Ultimate Reference.
3. Online websites / Materials:
    1. https://www.biometricsinstitute.org
    2. https://www.tutorialspoint.com/biometrics/biometrics_quick_guide.htm

D65PE2B - DISTRIBUTED DATABASES
PROFESSIONAL ELECTIVE -II

L	T	P	C
3	0	0	3

B.Tech. III Year V Sem.

Course Objectives:

The purpose of the course is to enrich the previous knowledge of database systems and expose the need for distributed database technology to confront the deficiencies of the centralized database systems.

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

1. Make use of distributed database design strategies in developing applications by understanding distributed database architectures .L3
2. Implement query processing and decomposition using optimization techniques..L3
3. Apply concurrency control mechanisms to implement transaction management..L3
4. Apply reliability concepts and measures on distributed databases and learn to develop parallel database systems..L3
5. Construct data model using object oriented approach..L3

UNIT – I

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas. **Distributed DBMS Architecture:** Architectural Models for Distributed DBMS, DDMBS Architecture. **Distributed Database Design:** Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT – II

Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data. Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

UNIT – III

Transaction Management: Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

UNIT – IV

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning. **Parallel Database Systems:** Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

UNIT – V

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing. **Object Oriented Data Model:** Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

TEXT BOOKS:

1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCE BOOK:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition.

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D65PE2C - ADVANCED OPERATING SYSTEMS
PROFESSIONAL ELECTIVE -II

L	T	P	C
3	0	0	3

B.Tech. III Year V Sem.

Course Objectives

To study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open-source operating systems), Hardware and software features that support these systems.

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

1. Develop design skills for advanced operating system architecture. L3
2. Construct analysis framework for distributed operating system design challenges. L3
3. Evaluate design strategies for multi-processor operating systems effectively. L3
4. Identify requirements for Distributed File System and Shared Memory. L3
5. Formulate real-time application scheduling solutions with precision. L3

UNIT - I

Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives. Theoretical Foundations: Inherent Limitations of a Distributed System, Lamport's Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

UNIT - II

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms, Non-Token – Based Algorithms: Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm, Token-Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal's Heurisric Algorithm, Raymond's Heuristic Algorithm.

UNIT - III

Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized- Deadlock – Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms.

UNIT - IV

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures Multi Processor Operating Systems: Introduction,

Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling. Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues.

UNIT - V

Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm,Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues.

TEXT BOOK

1. Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, Tata McGraw-Hill Edition 2001

REFERENCE BOOK

1. Distributed Systems: Andrew S. Tanenbaum, Maarten Van Steen, Pearson Prentice Hall, Edition – 2, 2007.

D65PC15 - COMPUTER NETWORKS LAB

B.Tech. III Year V Sem.

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to:

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

Course Outcomes: Upon completing this course, the student will be able to:

1. Apply advanced data link layer techniques for efficient networking. L3
2. Evaluate error detection and correction codes for network robustness. L4
3. Implement and assess routing strategies, addressing congestion in network design. L3

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 Dijsktra'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
    a. Packet Capture Using Wire shark
    b. Starting Wire shark
    c. Viewing Captured Traffic
    d. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    a. NS2 Simulator-Introduction
    b. Simulate to Find the Number of Packets Dropped

c. Simulate to Find the Number of Packets Dropped by TCP/UDP
d. Simulate to Find the Number of Packets Dropped due to Congestion
e. Simulate to Compare Data Rate & Throughput.
f. Simulate to Plot Congestion for Different Source/Destination
g. Simulate to Determine the Performance with respect to Transmission of Packets

TEXT BOOK:

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

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.

D65PC16 - INTERNET OF THINGS LAB

B.Tech. III Year V Sem.

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to:

Understand the Internet of Things through experiments

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

1. Configure Raspberry Pi for network connectivity proficiently using instructions. L3
2. Employ GPIO pins to control hardware proficiently with Python scripts. L3
3. Utilize sensors for precise environmental data collection and analysis. L3

List of Experiments:

1. Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron chown, chgrp, ping etc.
2. Perform necessary software installation on Raspberry Pi.
3. Interface LED/Buzzer with Raspberry Pi, write a program to turn ON LED for 1 sec after every 2 seconds.
4. Interface Push button/Digital sensor (IR/LDR) with Raspberry Pi, write a program to turn ON LED when push button is pressed or at sensor detection.
5. Interface DHT11 sensor with Raspberry Pi, write a program to print temperature and humidity readings.
6. Interface motor using relay with Raspberry Pi, write a program to turn ON motor when push button is pressed.
7. Interface soil moisturizer sensor using relay with Raspberry Pi, write a program to find the amount of moist in soil.
8. Interface LCD with Raspberry Pi, write a program to print temperature and humidity readings on it.
9. Write a program on Raspberry Pi to upload temperature and humidity data to cloud.
10. Write a program on Raspberry Pi to retrieve temperature and humidity data from cloud

TEXT BOOKS:

1. ArshdeepBahga and Vijay Madisetti, Internet of Things - A Hands-on Approach, Universities Press,2015.
2. Internet of things, Jeeva Jose, First edition, Khanna publications, 2018. 3. Matt Richardson & Shawn Wallace, Getting Started with Raspberry Pi, O'Reilly (SPD), 2014.

MC003 - INTELLECTUAL PROPERTY RIGHTS

B.Tech. III Year V Sem.

L	T	P	C
3	0	0	0

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

UNIT – II : Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes

UNIT – III Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

Suggested Reading:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

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R22 B.Tech. IT Syllabus

D66PC17 - MACHINE LEARNING

B.Tech. III Year VI Sem.

L	T	P	C
3	0	0	3

Course Objectives:

1. Understanding of the Supervised and Unsupervised learning techniques and various probability-based learning techniques

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

1. Apply supervised learning techniques and utilize the principles of concept learning and linear discriminants to design effective machine learning systems. L3
2. Implement multi-layer perceptrons and SVM, and apply backpropagation and radial basis function techniques to develop solutions for machine learning problems. L3
3. Construct decision trees and apply ensemble learning techniques, including boosting and bagging, to analyze data using both supervised and unsupervised learning methods. L3
4. Implement dimensionality reduction techniques and apply genetic algorithms, including various genetic operators, to optimize machine learning models and solutions. L3
5. Utilize reinforcement learning principles, Markov Chain Monte Carlo methods, and construct graphical models, including Bayesian networks and Hidden Markov Models, to solve complex tracking and decision-making problems. L3

UNIT - I

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression.

UNIT - II

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT - III

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

UNIT - IV

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization. Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms

UNIT - V

Reinforcement Learning – Overview – Getting Lost Example. Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TEXT BOOK:

1. Stephen Marsland, ―Machine Learning ― An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

REFERENCE BOOKS:

1. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
3. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
4. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

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R22 B.Tech. IT Syllabus

D66PC18 - DATA WAREHOUSING AND DATA MINING

B.Tech. III Year VI Sem.

L	T	P	C
3	0	0	3

Course Objectives:

Learn data warehouse principles and data mining concepts.

Course Outcomes:

Upon completion of the course the student will be able to:

1. Experiment formally with data warehouse and summarizes the architecture and components used for constructing a data warehouse. -L3
2. Implement the data preprocessing techniques to incorporate the data mining tasks on various kinds of data. –L3
3. Identify the significance of association rule by understanding the item-set representations. –L3
4. Classify the data to gain learning experiences using various classification techniques –L4
5. Categorize the data based on the similarity measures through different clustering algorithms to estimate the outliers –L4

UNIT – I

Data warehouse: Introduction to Data warehouse, Difference between operational database systems and data warehouses. Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction – Transformation – Loading, Logical (Multi – Dimensional), Data Modeling, Schema Design, Star and Snow – Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi – Addictive, Non Addictive Measures; Fact – Less – Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture – ROLAP, MOLAP and HOLAP.

UNIT – II

Introduction to Data Mining: Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binarization, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

UNIT – III

Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT – IV

Classification: Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision Trees-Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction; Naïve – Bayes Classifier, Bayesian Belief Networks; K-Nearest neighbor classification-Algorithm and Characteristics.

UNIT – V

Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

TEXT BOOKS:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan
2. Kaufmann Publishers, Elsevier, 2 Edition,2006.
3. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Stein banch,
4. Pearson Education.

REFERENCE BOOKS:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Warehousing Fundamentals, Paulraj Ponnaiah, Wiley Student Edition.
3. The Data Ware housinG Life Cycle Toolkit – Ralph Kimbal. Wiley Student Edition.
4. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press.

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R22 B.Tech. IT Syllabus

D66PC19 - AUTOMATA THEORY AND COMPILER DESIGN

B.Tech. III Year VI Sem.

L	T	P	C
3	0	0	3

Course Objectives

- To understand deterministic and non-deterministic machines and the differences between decidability and undecidability.

Course Outcomes

1. Utilize finite state machines in computing problems for solutions. L3
2. Construct context-free grammars for formal language design. L3
3. Differentiate decidability from undecidability in computational contexts. L3
4. Apply patterns, tokens, and regular expressions for lexical analysis. L3
5. Utilize lex tool and design LR parsers proficiently. L3

UNIT I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.
Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.
Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA

UNIT II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions. **Pumping Lemma for Regular Languages**: Statement of the pumping lemma, Applications of the Pumping Lemma. **Context-Free Grammars:** Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.

UNIT III

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA and CFG's, Acceptance by final state **Turing Machines**: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine **Undecidability:** Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines

UNIT - IV

Introduction: The structure of a compiler, **Lexical Analysis:** The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex, **Syntax Analysis:** Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers

UNIT - V

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax- Directed Translation Schemes, Implementing L-Attributed SDD's. **Intermediate-Code Generation:** Variants of Syntax Trees, Three-Address Code **Run-Time Environments:** Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.
3. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.

REFERENCE BOOKS:

1. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
2. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
3. lex&yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

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R22 B.Tech. IT Syllabus

D66PE3A - RECOMMENDER SYSTEMS
PROFESSIONAL ELECTIVE-III

L	T	P	C
3	0	0	3

B.Tech. III Year VI Sem.

Course Objectives:

To learn the significance of machine learning and data mining algorithms for Recommender systems

Course Outcomes: Upon on completion of course the student will be to

1. Apply the knowledge of dimensionality reduction techniques and understand how it helps in designing a recommender system. L3.
2. Develop content based recommendation system using a given domain knowledge. L3
3. Implement the Collaborative Filtering technique to study the performance evaluation of recommender systems based on various metrics. L3
4. Develop security features for effective use of recommender systems and study the potential impact of attacks on user experience and trust. L3
5. Experiment formally with different paradigms used for evaluating recommender systems. L3

UNIT I INTRODUCTION

Introduction and basic taxonomy of recommender systems - Traditional and non-personalized Recommender Systems - Overview of data mining methods for recommender systems- similarity measures- Dimensionality reduction – Singular Value Decomposition (SVD)

UNIT II CONTENT-BASED RECOMMENDATION SYSTEMS

High-level architecture of content-based systems - Item profiles, Representing item profiles, Methods for learning user profiles, Similarity-based retrieval, and Classification algorithms.

UNIT III COLLABORATIVE FILTERING

A systematic approach, Nearest-neighbor collaborative filtering (CF), user-based and item-based CF, components of neighborhood methods (rating normalization, similarity weight computation, and neighborhood selection

UNIT IV ATTACK-RESISTANT RECOMMENDER SYSTEMS

Introduction – Types of Attacks – Detecting attacks on recommender systems – Individual attack – Group attack – Strategies for robust recommender design - Robust recommendation algorithms.

UNIT V EVALUATING RECOMMENDER SYSTEMS

Evaluating Paradigms – User Studies – Online and Offline evaluation – Goals of evaluation design – Design Issues – Accuracy metrics – Limitations of Evaluation measures

TEXTBOOKS:

1. Charu C. Aggarwal, Recommender Systems: The Textbook, Springer, 2016.
2. Dietmar Jannach , Markus Zanker , Alexander Felfernig and Gerhard Friedrich , Recommender Systems: An Introduction, Cambridge University Press (2011), 1st ed.

REFERENCE BOOKS:

1. Francesco Ricci , Lior Rokach , Bracha Shapira , Recommender Sytems Handbook, 1st ed, Springer (2011),
2. Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, Mining of massive datasets, 3rd edition, Cambridge University Press, 2020.

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R22 B.Tech. IT Syllabus

D66PE3B - DEVOPS
PROFESSIONAL ELECTIVE-III

L	T	P	C
3	0	0	3

B.Tech. III Year VI Sem.

Course Objectives:

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

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

1. Apply DevOps principles and methodologies to identify, analyze, and address challenges in software development and delivery processes.L3
2. Apply DevOps principles, implement continuous testing practices, and shape resilient software architecture to enhance business agility in software development models..L3
3. Apply source code control practices, understand the history and roles associated with source code management, and effectively utilize Git-based tools and platforms in project development.L3
4. Analyse complex build systems, demonstrate advanced proficiency in configuring and optimizing Jenkins servers, critically strategize build dependency management, and design sophisticated pipelines for effective system integration.L4
5. Analyze testing types, evaluate test automation, demonstrate proficiency in Selenium for frontend testing and JavaScript for backend integration, apply test-driven development principles, and assess deployment strategies using virtualization, configuration management, and container orchestration.L4

UNIT- I

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

UNIT- II:

Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Micro services and the data tier, DevOps, architecture, and resilience.

UNIT- III

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

UNIT- IV

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

UNIT- V

Testing Tools and Deployment: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development. Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, SaltStackand Docker.

TEXT BOOK:

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

REFERENCE BOOKS:

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

D66PE3C - SOFT COMPUTING
PROFESSIONAL ELECTIVE-III

L	T	P	C
3	0	0	3

B.Tech. III Year VI Sem.

Course Objectives:

Introduce and use the idea of fuzzy logic and use of heuristics based on human experience,Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques and Genetic algorithm and its applications

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

1. Identify differences in Conventional AI from Computational Intelligence through critical analysis. L3
2. Construct solutions using fuzzy logic for engineering challenges. L3
3. Develop classification strategies for diverse real-world applications. L3
4. Experiment with genetic algorithms and Rough Sets for problem-solving tasks. L3
5. Identify and apply operations of genetic algorithms and Rough Sets. L3

UNIT - I

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT- II

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT- III

Fuzzy Decision Making, Particle Swarm Optimization

UNIT- IV

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT- V

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

TEXT BOOK:

1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

REFERENCE BOOKS:

1. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.
4. G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.
5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.

Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill International editions, 1995

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R22 B.Tech. IT Syllabus

D66PC20 - MACHINE LEARNING LAB

B.Tech. III Year VI Sem.

L	T	P	C
0	0	3	1.5

Course Objective:

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

Course Outcomes:

Upon completion of course, the student will be able to

1. Build predictive models from data and analyze their performance L3
2. Implement multiple classification algorithms(logistic regression, decision tree, KNN). L3
3. Apply various functions and methods provided by the libraries Math, NumPy, and SciPy , Pandas for data manipulation , preprocessing and data analysis. L3

List of Experiments

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

TEXT BOOK:

1. Machine Learning – Tom M. Mitchell, - MGH.
2. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

D66PC21 - DATA WAREHOUSING AND DATA MINING LAB

B.Tech. III Year VI Sem.

L	T	P	C
0	0	3	1.5

Course Objective:

- Ability to understand the various kinds of tools demonstrate the classification clusters and in large data sets

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

1. Build a data warehouse and query it (using open source tools like Pentaho Data Integration and Pentaho Business Analytics). L3
2. Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering, and regression. L3
3. Practice the data mining techniques with varied input values for different parameters.L3

Task-1:

Build Data Warehouse and Explore WEKA

1.Build a Data Warehouse/Data Mart (using open source tools like Pentaho Data Integration tool, Pentoaho Business Analytics; or other data warehouse tools like Microsoft-SSIS, Informatica, Business Objects etc.).

i) Identify source tables and populate sample data
ii) Design multi-dimensional data models namely Star, snowflake and Fact constellation schemas for anyone enterprise (ex. Banking, Insurance, Finance, Healthcare, Manufacturing, Automobile,etc.).
iii) Write ETL scripts and implement using data warehouse tools
iv) Perform various OLAP operations such as slice, dice, roll up, drill up and pivot
v) Explore visualization features of the tool for analysis like identifying trends etc.

2.Explore WEKA Data Mining/Machine Learning Toolkit

i) Downloading and/or installation of WEKA data mining toolkit,
ii) Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface, Experimenter, command-line interface.
iii) Navigate the options available in the WEKA (ex. Select attributes panel, Preprocess panel, Classify panel, Cluster panel, Associate panel and Visualize panel) (iv). Study the arff file format
iv) Explore the available data sets in WEKA.
v) Load a data set (ex. Weather dataset, Iris dataset,etc.)
vi) Load each dataset and observe the following:

List the attribute names and their types

i) Number of records in each dataset
ii) Identify the class attribute (if any)
iii) Plot Histogram
iv) Determine the number of records for each class.
v) Visualize the data in various dimensions

Task-2:

Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets

i) Explore various options available in Weka for preprocessing data and apply (like Discretization Filters, Resample filter, etc.) on each dataset

ii) Load each dataset into Weka and run Apriori algorithm with different support and confidence values. Study the rules generated.
iii) Apply different discretization filters on numerical attributes and run the Apriori association rule algorithm. Study the rules generated. Derive interesting insights and observe the effect of discretization in the rule generation process.

Task3:

Demonstrate performing classification on data sets

i) Load each dataset into Weka and run Id3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kapp a statistic.
ii) Extract if-then rules from the decision tree generated by the classifier, Observe the confusion matrix and derive Accuracy, F-measure, TPrate, FPrate, Precision and Recall values. Apply a cross-validation strategy with various fold levels and compare the accuracy results.
iii) Load each dataset into Weka and perform Naïve-Bayes classification and k-Nearest Neighbour classification. Interpret the results obtained.
iv) Plot RoC Curves
v) Compare classification results of ID3, J48, Naïve-Bayes and k-NN classifiers for each dataset, and deduce which classifier is performing best and poor for each dataset and justify.

Task4:

Demonstrate performing clustering on data sets

i. Load each dataset into Weka and run a simple k-means clustering algorithm with different values of k (number of desired clusters). Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights.
ii. Explore other clustering techniques available in Weka.
iii. Explore visualization features of Weka to visualize the clusters. Derive interesting insights and explanations.

Task5:

Demonstrate performing Regression on datasets

i) Load each dataset into Weka and build a Linear Regression model. Study the clusters formed. Use the Training set option. Interpret the regression model and derive patterns and conclusions from the regression results.

ii) Use options cross-validation and percentage split and repeat running the Linear Regression Model. Observe the results and derive meaningful results.

iii) Explore a Simple linear regression technique that only looks at one variable.

TEXT BOOKS:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan
2. Kaufmann Publishers, Elsevier, 2 Edition,2006.
3. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Stein banch,
4. Pearson Education.

REFERENCE BOOKS:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Warehousing Fundamentals, Paulraj Ponnaiah, Wiley Student Edition.
3. The Data Ware housinG Life Cycle Toolkit – Ralph Kimbal. Wiley Student Edition.
4. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press.

D6HSE3 - ADVANCED ENGLISH COMMUNICATION SKILLS (AECS) LAB

B.Tech. III Year VI Sem.

L	T	P	C
0	1	2	2

1. Introduction

The introduction of the Advanced English Communication Skills Lab is considered essential at the B.Tech 3rd year level. At this stage, the students need to prepare themselves for their career which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use appropriate English and perform the following:

1. Gathering ideas and information to organise ideas relevantly and coherently.
2. Making oral presentations.
3. Writing formal letters.
4. Transferring information from non-verbal to verbal texts and vice-versa.
5. Writing project/research reports/technical reports.
6. Participating in group discussions.
7. Engaging in debates.
8. Facing interviews.
9. Taking part in social and professional communication.

2. Objectives:

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

- To improve the students' fluency in English, with a focus on vocabulary
- To enable them to listen to English spoken at normal conversational speed by educated English speakers
- To respond appropriately in different socio-cultural and professional contexts
- To communicate their ideas relevantly and coherently in writing
- To prepare the students for placements.

3. Syllabus:

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

1. **Activities on Listening and Reading Comprehension:** Active Listening – Development of Listening Skills Through Audio clips - Benefits of Reading – Methods and Techniques of Reading – Basic Steps to Effective Reading – Common Obstacles – Discourse Markers or Linkers - Sub-skills of reading - Reading for facts, negative facts and Specific Details- Guessing Meanings from Context, Inferring Meaning - Critical Reading — Reading Comprehension – Exercises for Practice.

2. **Activities on Writing Skills**: Vocabulary for Competitive Examinations - Planning for Writing – Improving Writing Skills - Structure and presentation of different types of writing – Free Writing and Structured Writing - Letter Writing –Writing a Letter of Application –Resume vs. Curriculum Vitae – Writing a Résumé **–** Styles of Résumé - e-Correspondence – Emails – Blog Writing - (N)etiquette – Report Writing – Importance of Reports – Types and Formats of Reports– Technical Report Writing– Exercises for Practice.

3. **Activities on Presentation Skills -** Starting a conversation – responding appropriately and relevantly – using the right language and body language – Role Play in different situations including Seeking Clarification, Making a Request, Asking for and Refusing Permission, Participating in a Small Talk – Oral presentations (individual and group) through JAM sessions- PPTs – Importance of Presentation Skills – Planning, Preparing, Rehearsing and Making a Presentation – Dealing with Glossophobia or Stage Fear – Understanding Nuances of Delivery - Presentations through Posters/Projects/Reports – Checklist for Making a Presentation and Rubrics of Evaluation

4. **Activities on Group Discussion (GD):** Types of GD and GD as a part of a Selection Procedure - Dynamics of Group Discussion- Myths of GD - Intervention, Summarizing - Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas **–** Do's and Don'ts - GD Strategies – Exercises for Practice.

5. **Interview Skills**: Concept and Process - Interview Preparation Techniques - Types of Interview Questions – Pre-interview Planning, Opening Strategies, Answering Strategies - Interview Through Tele-conference & Video-conference - Mock Interviews.

4. Minimum Requirement:
The Advanced English Communication Skills (AECS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- **Spacious room with appropriate acoustics**
- **Round Tables with movable chairs**
- **Audio-visual aids**
- **LCD Projector**
- **Public Address system**
- **One PC with latest configuration for the teacher**

- **T. V, a digital stereo & Camcorder**
- **Headphones of High quality**

5. Suggested Software:

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

- **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **Oxford Advanced Learner's Dictionary**, 10th Edition
- Cambridge Advanced Learner's Dictionary
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- **Lingua TOEFL CBT Insider**, by Dreamtech

6. Books Recommended:

1. Rizvi, M. Ashraf (2018). *Effective Technical Communication*. (2nd ed.). McGraw Hill Education (India) Pvt. Ltd.

2. Suresh Kumar, E. (2015). *Engineering English.* Orient BlackSwan Pvt. Ltd.

3. Bailey, Stephen. (2018). Academic *Writing: A Handbook for International Students.* (5th Edition). Routledge.

4. Koneru, Aruna. (2016). *Professional Communication*. McGraw Hill Education (India) Pvt. Ltd.

5. Raman, Meenakshi & Sharma, Sangeeta. (2022). *Technical Communication, Principles and Practice.* (4TH Edition) Oxford University Press.

6. Anderson,Paul V. (2007). *Technical Communication***.** Cengage Learning Pvt. Ltd. New Delhi.

7. McCarthy, Michael; O'Dell, Felicity & Redman, Stuart. (2017). *English Vocabulary in Use* Series. Cambridge University Press

8. Sen, Leela. (2009). *Communication Skills.* PHI Learning Pvt Ltd., New Delhi.

9. Elbow, Peter. (1998). *Writing with Power.* OxfordUniversity Press.

10. Goleman, Daniel. (2013). *EmotionalIntelligence*: *Why it can matter more than IQ.* Bloomsbury Publishing.

MCOO2 - CONSTITUTION OF INDIA

B.Tech. III Year VI Sem.

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Course Objectives:

- Understand the premises informing the twin themes of liberty and freedom from a civil rightsperspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutionalrole and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolutionin 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before thearrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
- Discuss the passage of the Hindu Code Bill of 1956.

Unit - 1 History of Making of the Indian Constitution- History of Drafting Committee. Philosophy of the Indian Constitution- Preamble Salient Features

Unit - 2 Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit - 3 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 4 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit - 5 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested Reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.