TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

B.TECH – COMPUTER SCIENCE & ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Course Structure R-20

SEMESTER V

S.No.	Class	Course Code	Name of the Subject	L	T	P	C
1	PC	C75PC1	Introduction to AI & Neural Networks	3	0	0	3
2	PC	C75PC2	Python Programming	3	0	0	3
3	PC	C75PC3	Natural Language Processing	3	0	0	3
4	PC	C75PC4	Introduction to Machine Learning	3	0	0	3
5	PE	C75PE5	Professional Elective I: A. Distributed Databases B. Distributed Computing C. Information Theory & Coding	3	0	0	3
6	OE	C75OE6	Open Elective-I	3	0	0	3
7	PC	C75PC7	ML Lab Using Python	0	0	2	1
8	PC	C75PC8	Natural Language Processing Lab	0	0	2	1
9	PW	C75PW9	Project I	0	0	2	1
10	MC	MC005	MOOCs/Online Course	0	0	0	Satisfactory
			Total credits				**21**

Project I: Student should develop back end database tables for any chosen database application. It can be extension of project work carried out in VI semester with back end connections. The table developed should be more than a six-table database. Students can form a minimum of two and maximum of 4 in a group. The allocated teachers should guide in framing the problem, teach the back end technologies like Oracle during the lab hours allotted to them. The departmental academic committee based on the rubrics framed will do the evaluation of the project.

Mandatory Course: MOOCs/Online Course
The student should register for any one of the MOOCs course offered by NPTEL, COURSERA, UDEMY, student should submit the completion certificate to clear this course.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

B.TECH – COMPUTER SCIENCE & ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)
Course Structure R-20

SEMESTER VI

S.No.	Class	Course Code	Name of the Subject	L	T	P	C
1	HS	CHSM2	Fundamentals of Management	3	0	0	3
2	PC	C76PC1	Data Warehousing and Data Mining	3	0	0	3
3	PC	C76PC2	Advanced Computer Vision	3	0	0	3
4	PE	C76PE3	Professional Elective II: A. Advanced Databases B. Wireless Networks C. Cryptography	3	0	0	3
5	PE	C76PE4	Professional Elective III: A. Introduction to Analytics B. Mobile Ad hoc Networks C. Network Security	3	0	0	3
6	HS	CHSE3	Advanced English Communication Skills Lab	0	0	4	2
7	PC	C76PC5	Data Warehousing and Data Mining Lab	0	0	2	1
8	PC	C76PC6	Advanced Computer Vision Lab	0	0	2	1
9	PW	C76PW7	Project II	0	0	4	2
10	MC	MC006	1. Personality Development/Skill Development 2. Technical Events 3. Internships				Satisfactory
Total credits							**21**

Project II: This project is extension of project work carried out in V semester with back end connections. Front end should be developed with .NET or Python or Java framework. The departmental academic committee based on the rubrics framed will do the evaluation of the project.

Mandatory Course: The satisfactory report should be submitted either for 1 or 2 or 3 given below.
Personality Development/Skill Development: Student should participate in personality development/communication skills programme, student should submit the completion certificate for clearing this course.
Technical Events: The student should participate in any technical event organized by any College/Organization/Industry and submit the participation certificate for clearing this course.
Internships: The Student should submit the completion certificate from the respective organization. Where he/she performs their internship.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**
3/0/0/3

INTRODUCTION TO AI & NEURAL NETWORKS (C75PC1)

Course Objective:
Acquire knowledge on intelligent systems and agents, formalization of knowledge, reasoning with and without uncertainty, machine learning and applications at a basic level and to know the Biological Neural Network and to model equivalent neuron models

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

1. To gain basic knowledge on understanding the AI phenomenon, use state space representations and apply heuristic techniques
2. To apply knowledge representation issues to build predicate logic and knowledge rules.
3. To understand the uncertainty measures for symbolic reasoning, learn how neural networks are modelled.
4. To develop a learning process based on supervised and unsupervised mechanism.
5. To develop unconstrained optimization techniques, for single layer perceptron, derive output for multilayer perceptron, using decision rule, Feature detection, Back Propagation and differentiation, Hessian Matrix.

UNIT I
What is Artificial Intelligence: The AI Problems, The Underlying Assumption, What is an AI Technique.
Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics.
Heuristic Search Techniques: Generate and Test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Means ends Analysis.

UNIT II
Knowledge Representation Issues: Representation and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation.
Using Predicate Logic: Representing Simple Facts in Logic, Representing Instances and ISA Relationships, Computable Functions and Predicates, Resolution.
Representing Knowledge Using Rules:
Procedural Versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning. Matching.

UNIT III
Symbolic Reasoning under Uncertainty:
Part I Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation: Depth first Search, Implementation: Breadth first Search

Neural Networks Introduction:
Part II What is Neural Network, Human Brain, Models of a Neuron, Neural Networks Viewed as Directed Graphs, Feedback, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

UNIT IV
Learning Process:
Introduction, Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive Learning, Boltzmann Learning, Credit Assignment Problem, Learning with a Teacher, Learning without a Teacher, Learning Tasks, Memory, Adaption, Statistical nature of the Learning Process, Statistical nature of the Learning Process.

UNIT V
Single Layer Perceptrons:
Introduction, Adaptive Filtering Problem, Unconstrained Optimization Techniques, Linear Least Squares Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron, Perceptron Convergence Theorem
Multilayer Perceptrons:
Introduction, Output Representation and Decision Rule, Feature Detection, Back propagation and Differentiation, Hessian Matrix

Text Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shiva Shankar B Nair, McGraw Hill. Third Edition
2. Neural Networks a Comprehensive Foundations, Simon S Haykin, PHI 2 Ed.

Reference Books:

1. Stuart Russell and Peter Norvig. “Artificial Intelligence-A Modern Approach ", 2nd Edition, Pearson Education/ Prentice Hall of India, 2004
2. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
3. Neural Networks in Computer Intelligence, Li Min Fu TMH 2003
4. Neural Networks -James A Freeman David M S Kapura Pearson Ed., 2004.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**

3/0/0/3

PYTHON PROGRAMMING (C75PC2)

Course Objectives:

To understand and learn the concepts of basic python programming, as it is a current programming constructs used for real time applications.

Course Outcomes:

Upon completion, of course the student will be able to

1. Understand the usage of procedural statements assignments, conditional statements, loops, method calls and different data structures..
2. Design, code, and test small Python programs.
3. Understand the concepts of object-oriented programming as used in Python: classes, subclasses, properties, inheritance, and overriding.

UNIT I

Introduction

Introduction to Python, History, Need of Python Programming, features Applications, python environment setup, Basic syntax, Variables, Data Types, Keywords, Input-Output, Indentation, script structure, Running Python Scripts.

UNIT II

Operators

Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations, Conditional statements if, if-else Looping Control Structures for, while Control Statements: Break, Continue, Pass.

UNIT III

Functions

Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Data Structures

Lists, Tuples, dictionaries, sets, Sequences, Comprehensions.

UNIT IV

Files

File input/output, Text processing file functions.

Modules

Creating modules, import statement, from. Name spacing, Packages, using packages, implementing packages: numpy, pandas, Django framework, iterator tools, scipy, matplot lib.

UNIT V

Object Oriented Programming in Python

Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding.

Error and Exception Handling

Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.

Text Books:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Wesley J. Chun “Core Python Programming”, Second Edition, Prentice Hall

Reference Books:

1. Allen Downey, “Think Python”, Second Edition , Green Tea Press
2. Introduction to Computation & Programming Using Python, Spring 203 Edition, ByJohn V.Guttag.
3. Programming in Python 3: A Complete Introduction to the Python Language (Developer's Library), by Mark Summerfield, 2ndEdition.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**

3/0/0/3

NATURAL LANGUAGE PROCESSING (C75PC3)

Course Objective:

Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

Upon completion, of course the student will be able

1. To develop sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. To understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.
3. To design, implement and analyse Natural Language Processing Algorithms.
4. To design different language modelling 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, and Performances of the Approaches

UNIT II

Syntax Analysis: Parsing Natural Language, Tree banks: 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

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual 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: Taneer Siddiqui, U.S. Tiwary

Reference Books:

1. Speech and Natural Language Processing – Daniel Jurafsky & James H Martin, Pearson Publications

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**
3/0/0/3

INTRODUCTION TO MACHINE LEARNING (C75PC4)

Course Objective

To be able to formulate machine learning problems corresponding to different applications and range of machine learning algorithms along with their strengths and weaknesses.

Course Outcomes:

Upon completion of the Course, the student will

1. Know how to, design a learning system based on well-posed problems, study perspectives issues in machine learning. Understand how to imply concept learning in general to specific ordering.
2. Implement learning mechanism using decision trees. Understand the basic phenomenon of artificial neural networks and infer the evaluation hypothesis mechanism for learning mechanism.
3. Gain insights how to apply bayes theory, computational theory, and instance base on learning mechanism. Classify the learnt information based on hypothesis for predicting probabilities.
4. Learn to apply set of rules and analyse the learning mechanism with perfect domain theories like PROLOG-EGB
5. Know in brief how to combine inductive and Analytical learning approaches.

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.

UNIT II

Decision Tree Learning – Introduction, Decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, Hypothesis space search indecision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.

Artificial Neural Networks – Introduction, Neural network representation, appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm.

Evaluation Hypothesis – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses

UNIT III

Bayesian Learning – Overview of -Bayes theorem principle, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities , Minimum Description Principle, Bayes optimal Classifier, Gibs algorithm, Navie Bayesian Classifier.

Computational Learning Theory – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space,

Instance-Based Learning- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case Based Reasoning, Remark son Lazy and Eager Learning

UNIT IV

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, and Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL.

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG, Remarks on Explanation- Based Learning-Discovering new features,

UNIT V

Combining Inductive and Analytical Learning – Motivation, Inductive- Analytical approaches to Learning, Reinforce learning task and Q Learning.

Text Books:

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

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge University Press.
2. Richard o.Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 20
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**

3/0/0/3

DISTRIBUTED DATABASES (C75PE5A)

Course Objective:

Be able to apply methods and techniques for distributed query processing and optimization and understand the broad concepts of distributed transaction Process

Course Outcomes:

Upon completion of the Course, the student will be able to

1. Know the necessity of distributed Database concepts, through architecture and design.
2. Learn to process queries, decompose, and to optimize them.
3. Understand the control mechanisms and algorithms that are implied through transaction management.
4. Identify issues like reliability, parallelism, associated in developing distributed database system.
5. Understand and relate the concepts of Object Oriented design paradigm to Distributed Databases.

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 Patrick Valduriez: Principles of Distributed Database Systems, Pearson Edition. Asia, 20.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

Reference Books:

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

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**

3/0/0/3

DISTRIBUTED COMPUTING (C75PE5B)

Course Objective:
Introduce the fundamental problems, concepts, and approaches in the design and analysis of distributed computing systems and applications.

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

1. Gain knowledge on distributed system and computing paradigms
2. Understand and apply the interprocess communication concepts to develop socket APIs
3. Develop client server paradigms and imply to build group communication
4. Understand the phenomenon of distributed objects, internet applications, and basics of grid computing.

UNIT I
Distributed Computing an Introduction:
The different forms of computing, The strengths and weaknesses of Distributed computing, Basics of Operating Systems, Network basics, Software Engineering Basics.
Distributed Computing Paradigms:
Paradigms and Abstractions, Paradigms for Distributed Applications. Trade-offs

UNIT II
Inter Process Communication:
Event Synchronization, Timeouts and Threading, Text based Protocols, Request-Response Protocols, Connection-Oriented versus Connection less IPC
The Socket API:
The Socket Metaphor on IPC, The datagram Socket API, The Stream-Mode Socket API, Sockets with Nonblocking I/O Operations, Secure Socket API.

UNIT III
The Client-Server Paradigm:
Client-Server Paradigm Issues, Connection-Oriented and Connectionless Servers, Iterative Server and Concurrent Server, Stateful Servers.
Group Communication:
Unicasting versus Multicasting, an Archetypal Multicast API, Connectionless versus Connection-Oriented Multicast, Reliable Multicasting versus Unreliable Multicasting, The Java Basic Multicast API

UNIT IV
Distributed Objects:
Message Passing versus Distributed Objects, An Archetypal Distributed Object Architecture, Distributed Object Systems, Remote Procedure Calls, Remote Method Invocation.

Internet Applications:
Applets, Servlets, Web Services, The Simple Object Access Protocol (SOAP)

UNIT V
The Grid: Past, Present, Future:
The Grid, Beginnings of the Grid, A community Grid model, Building blocks of the Grid, Grid applications and application middleware
The Grid: A New Infrastructure for 21st Century Science:
Technology trends, Infrastructure and tools, Grid architecture, Authentication, authorization, and policy.
The Evolution of the Grid:
The evolution of the Grid: the first generation, The evolution of the Grid: the second generation, The evolution of the Grid: the third generation

Text Books:

1. Distributed Computing, Principles and Applications, M.L.Liu, Pearson Education, 2004
2. Grid Computing Making the Global Infrastructure a Reality, Fran Berman, Anthony J.G. Hey, Geoffrey C. Fox, Wiley Series

Reference Books:

1. Grid Computing – Making the global infrastructure a reality, Fran Berman, Geoffrey C Fox, Anthony J G Hey, Wiley India, 2010.
2. A Networking Approach to Grid Computing, D.Minoli, Wiley & sons, 2006.
3. Grid Computing: A Practical Guide to Technology and Applications, A.Abbas, Firewall Media, 2008

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**

3/0/0/3

INFORMATION THEORY & CODING (C75PE5C)

Course Objective:

Explain entropy, mutual information and characteristics of various types of noisy communication channels, discuss various source coding schemes and channel coding techniques for error-free transmission of message over a noisy communication channel.

Course Outcomes:

Upon completion of the course, the student will

1. Understand the concept of information and entropy
2. Learn the properties of codes and understand Shannon's theorem for coding
3. Calculate channel capacity and learn to apply mechanism for sharing mutual information.
4. Learn the finite geometric codes and apply convolutional codes.

UNIT I

Information And Sources: The Definition of Information, The Zero-memory Information Source, Properties of Entropy, Extensions of a Zero-memory Source, The Markov Information Source

UNIT II

Properties of Codes: Uniquely Decodable Codes, Instantaneous Codes, Construction of an Instantaneous code, Kraft Inequality—Statement

Coding Information Sources: The Average Length of a Code, Method of Encoding for Special Sources, Shannon's Theorem for Markov Sources, Coding without Extensions, Finding Binary Compact Codes—Huffman Code.

UNIT III

Channels And Mutual Information: Information Channels, Probability Relations in a Channel, A Priori and A Posteriori Entropies, A Generalization of Shannon's Theorem, Mutual Information, Properties of Mutual Information, Noiseless Channels and Deterministic Channels, Cascaded Channels, Reduced Channels and Sufficient Reductions, Additivity of Mutual Information, Mutual Information of Several Alphabets, Channel Capacity, Conditional Mutual Information

UNIT IV

Finite Geometry Codes: Euclidean geometry, Majority Logic Decodable Cyclic codes based on Euclidean geometry, Projective geometry and projective geometry codes, Modifications of Majority-Logic Decoding, Single-Burst-Error-Correcting odes, Interleaved codes, Phased-Burst-Error-Correcting-Codes

UNIT V

Application Of Convolutional Codes: Applications of viterbi Decoding, Sequential Decoding, Majority-Logic-Decoding, Burst-Error-Correction, Convolutional Codes in ARQ Systems

Text Books:

1. N. Abramson, Information and Coding, McGraw Hill, 1963.
2. Shu Lin and D.J. Costello Jr., Error Control Coding, Prentice Hall, 1983.

Reference Books:

1. Principles of Communication Systems-Herbert Taub, Donald L schilling, Goutam Saha, 3rd Edition, McGraw Hill, 2008.
2. Digital and analog communication systems-Sam Shanmugam, John Wiley, 2005.
3. Digital communication—Simon Haykin, John Wiley, 2005.
4. Communication Systems-B.P.Lathi, BS Publications 2006

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**
0/0/2/1

ML LAB USING PYTHON (C75PC7)

Course Objective:
To disseminate the practical demonstration the concepts of Machine learning and Internet of Things.

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

1. Make use of Data sets in implementing the machine learning algorithms
2. Implement the machine learning concepts and algorithms in any suitable language of choice.

Note to students for implementation.

1. The programs are implemented in Python.
2. For Problems 3 to 6 and 10, programs are to be developed without using the built-in classes or APIs in Python.

Note: Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students

1. Demonstrate conditional and control structures in Python.

2. Demonstrate Data Structures (Lists, Tuples, Dictionaries, etc.,) in Python.

3. Implement and demonstrate the **FIND-S algorithm** for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the **Candidate-Elimination algorithm** to output a description of the set of all hypotheses consistent with the training examples.

5. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

6. Build an Artificial Neural Network by implementing the **Back propagation algorithm** and test the same using appropriate data sets.

7. Write a program to implement the **naïve Bayesian classifier** for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

8. Assuming a set of documents that need to be classified, use the **naïve Bayesian Classifier** model to perform this task. Built-in Java classes/API can be used to write

the program. Calculate the accuracy, precision, and recall for your data set.

9. Write a program to construct a **Bayesian network** considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

10. Apply **EM algorithm** to cluster a set of data stored in a .CSV file. Use the same data set for clustering using **k-Means algorithm**. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

11. Write a program to implement **k-Nearest Neighbor algorithm** to classify the iris dataset. Print both correct and wrong predictions. Java/Python ML library classes can be usedfor this problem.

12. Implement the non-parametric **Locally Weighted Regression algorithm** in order to fitdata points. Select appropriate data set for your experiment and draw graphs.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**

0/0/2/1

NATURAL LANGUAGE PROCESSING LAB (C75PC8)

Course Objective:

To introduce the students with the basics of NLP which will empower them for developing advanced NLP tools and solving practical problems in the field.

Course Outcomes:

Upon completion, of course the student will be able to

1. Implementing experimental methodology for training and evaluating empirical NLP systems.
2. Show Sensitivity to linguistic phenomena and an ability to model them with formal grammars.
3. Design, implement, and analyze NLP algorithms
4. Design different language modeling Techniques.

List of experiments:

1. Word Analysis: experiment is to learn about morphological features of a word by analyzing it

2. Word Generation : experiment is to generate word forms from root and suffix information

3. Morphology: experiment understands the morphology of a word by the use of Add-Delete table.

4. N-Grams: experiment is to learn how to apply add-one smoothing on sparse bigram table.

5. N-Grams smoothing: experiment is to learn how to apply add-one smoothing on sparse bigram table.

6. POS Tagging: Hidden Markov Model: experiment is to calculate emission and transition matrix which will be helpful for tagging Parts of Speech using Hidden Markov Model.

7. POS Tagging: Viterbi Decoding: experiment is to find POS tags of words in a sentence using Viterbi decoding.

8. Building POS Tagger: experiment is to know the importance of context and size of training corpus in learning Parts of Speech.

9. Chunking: experiment is to understand the concept of chunking and get familiar with the basic chunk tagset

10. Building Chunker: experiment is to know the importance of selecting proper features for training a model and size of training corpus in learning how to do chunking.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech V Semester **L/T/P/C**

3/0/0/3

FUNDAMENTALS OF MANAGEMENT (CHSM2)

COURSE OBJECTIVES

1. To make the students to understand the management concepts
2. To analyze the managerial skills.
3. To know the applications of management concepts in practical aspects of business.
4. To interpret, understand and develop the management principles in organizations.
5. To learn the basic concepts of organization its principles and functions.

COURSE OUT COMES

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.

REFERENCES:

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

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**

3/0/0/3

DATA WAREHOUSING AND DATA MINING (C76PC1)

Course Objectives:

1. Study data warehouse principles and its working learn data mining concepts
2. Understand association rules mining. Discuss classification algorithms
3. Learn how data is grouped using clustering techniques.

Course Outcome:

Upon completion of the Course, the student will be able to

1. Gain insights on the necessity of building a data Warehouse, and basic operations that can be performed on it.
2. Understand the importance and process of knowledge discovery from data through its functionalities.
3. Analyse the algorithms developed for understanding Association rule functionality.
4. Learn how to classify the knowledge based on the information, and study different proposed algorithms for classifying the knowledge.
5. Analyse how to group similar knowledge based on the information, and study different approaches proposed for grouping the information.

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, 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 Binaryzation, 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 Kaufmann Publishers, Elsevier, 2 Edition,2006.

Reference Books:

1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
2. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
3. Data Warehousing Fundamentals, Paulraj Ponnaiah, Wiley Student Edition.
4. The Data Ware housing Life Cycle Toolkit – Ralph Kimball. Wiley Student Edition.
5. Data Mining, Vikram Pudi, P Radha Krishna, Oxford University Press.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**

3/0/0/3

ADVANCED COMPUTER VISION (C76PC2)

Course Objective:
To introduce students the major ideas, methods, and techniques of computer vision and develop an appreciation for various issues in the design of computer vision.

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

1. To understand the significance of geometric transformations, coordinate parameters of objects that are viewed using 2D and 3D.
2. To implement feature detection and matching concepts, involving segmentation and feature based alignment.
3. To frame structure while the objects are in motion, estimate how dense is the object from the surface in motion.
4. To understand how, images are joined, and aligned; photographs are captured, using mathematical functions.
5. To construct images of objects in 3D representation.

UNIT I
Computer Vision Fundamentals: Point operators, linear filtering, more neighborhood operators, Fourier transforms, Pyramids and wavelets, Geometric transformations, Global optimization

UNIT II
Feature Detection and Matching: Points and patches, Edges, Lines.
Segmentation: Active contours, Split and merge, Mean shift and mode finding, Normalized cuts.
Feature-Based Alignment: 2D and 3D feature-based alignment, Pose estimation, Geometric intrinsic calibration

UNIT III
Structure From Motion: Triangulation, Two-frame structure from motion, Factorization, Bundle adjustment, constrained structure and motion.
Dense Motion Estimation: Translational alignment, parametric motion, Spline-based motion, Optical flow, Layered motion

UNIT IV
Image Stitching: Motion models, Global alignment, Compositing.
Computational Photography: Photometric calibration, High dynamic range imaging, Super-resolution and blur removal, Image matting and compositing, Texture analysis and synthesis

UNIT V

3D reconstruction: Shape from X, Active range finding, Surface representations, Point-based representations, Model-based reconstruction, Recovering texture maps and albedos. **Image-based rendering and Recognition:** Video-based rendering, Object detection, Face recognition, Instance recognition, Category recognition, Context and scene understanding

Text Books:

1. Computer Vision Algorithms and Applications Dr. Richard Szeliski ISSN 1868-0941 e-ISSN 1868-095X Springer

References:

1. Computer Vision A Modern Approach second edition David A. Forsyth University of Illinois at Urbana-Champaign Jean Ponce Ecole Normale Supérieure, Pearson
2. Advances in Computer Vision and Pattern Recognition Giovanni Maria Farinella _ Sebastiano Battiato Roberto Cipolla, Springer

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C 3/0/0/3**

ADVANCED DATABASES (C76PE3A)

Course Objective:

1. To provide a strong foundation in advanced database concepts from an industry perspective.
2. To covers advanced data modeling concepts like OOD Modeling
3. To learn query processing and transaction management concepts for object-relational database and distributed database

Course Outcomes:

Upon completion of the course, the student will

1. Understand the concepts of parallel databases, Object databases, and XML databases
2. Know the significance and concepts of Information retrieval; apply them in implementing transaction management features.
3. Learn the concepts of advance transaction processing, advance application development, spatial and temporal data Mobility.
4. Learn to address the prelims of security issues over advance database concepts.

UNIT I

Database system Architecture: computer-system architecture, and describes the influence of the underlying computer system on the database system.

Parallel databases: explores a variety of parallelization techniques, including I/O parallelism, inter query and intra query parallelism, and interoperation and intra operation parallelism. Query optimization, Design of parallel Systems, Parallelism on Multi Core Processors.

UNIT II

Object Based Databases: Complex data types, Structured types and Inheritance in SQL, Table Inheritance, Array and Multi set types in SQL, Object-Identity and Reference types in SQL, Implementing O-R features, Persistent Programming Languages, Object-Oriented versus Object- Relational.

XML Databases: Structure of XML data, XML document schema, Querying and Transformation, API to XML, Storage of XML data, XML applications.

UNIT III

Information Retrieval: Relevance ranking using Terms, Relevance using Hyperlinks, Synonyms, Homonyms and Ontologies, Indexing of Documents, Measuring Retrieval Effectiveness, Crawling and Indexing the web, Beyond ranking of pages, Directories and Categories.

UNIT IV

Advance application Development: Performance Tuning, Performance Benchmarks, Other Issues in Application Development, Standardization.

Spatial and Temporal data Mobility: Motivation, Time in Databases, Spatial and Geographical Data Geographic Data, Multimedia Databases, Mobility and Personal databases.
Advance Transaction Processing: Transaction-Processing Monitors, Transactional Workflows, E-commerce, Main-memory databases, Real-Time Transaction Systems, Long-Duration Transactions.

UNIT V
Introduction to database security issues, Discretionary access control based on granting and revoking privileges; Mandatory access control and role based access control for multilevel security. SQL Injection, Introduction to statistical Database Security, Introduction to flow control, Encryption and Public Key Infrastructures, Privacy issues and preservation, challenges to maintaining database security.

Text Books:

1. Database Systems concepts 6th edition silberschatz-korth-surdarshan Tata McGraw Hill Publications (Indian Edition)
2. Fundamentals of Database systems seventh edition Pearson Publications by Ramez Elmasri, Shamakanth.B. Navathe

Reference Book:

1. Distributed Databases Stefeno Ceri & Guiseppe Pelagatti TataMCgrewHill Edition

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**
3/0/0/3

WIRELESS NETWORKS (C76PE3B)

Course Objectives:

1. To learn about the issues and challenges in the design of wireless ad hoc networks.
2. To understand the working of MAC and Routing Protocols for ad hoc and sensor networks
3. To learn about the Transport Layer protocols and their QoS for ad hoc and sensor networks.
4. To understand various security issues in ad hoc and sensor networks and the corresponding solutions.

Course Outcomes:

Upon completion, of course the student will be able to

1. List and explain the various issues and applications of Ad hoc wireless networks.
2. Classify and Explain the working of MAC protocols for Ad-hoc wireless networks
3. Discuss the issues in designing routing protocols and working of Table-Driven Routing protocols.
4. Compare and contrast the working of various On-Demand Routing protocols.
5. Analyze the challenges in designing Transport layer Protocols for Ad-hoc networks, Compare and contrast the working of Transport protocols.
6. Identify the issues in designing Security Protocols for Ad-hoc networks focusing on the working performance of various security protocols.

UNIT I

Introduction:

Fundamentals Of Wireless Communication Technology, The Electromagnetic Spectrum, Radio Propagation Mechanisms, Characteristics Of The Wireless Channel, Modulation Techniques, Multiple Access Techniques, Error Control,

Wireless LANs and PANs:

Fundamentals of Wlans, IEEE802.11 Standard, Hiper lan Standard, Bluetooth, Home rf

UNIT II

MAC Protocols for Ad hoc wireless Networks: Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad-hoc wireless Networks, Classification of MAC Protocols, Contention based protocols, Contention based protocols with reservation mechanisms, Contention-Based MAC protocols With Scheduling Mechanisms, MAC protocols That Use Directional Antennas, Other MAC protocols

UNIT III

Routing protocols for Ad-hoc Wireless Networks: Issues in Designing a Routing Protocol for Ad-hoc Wireless Networks, Classification of Routing Protocols. Table driven routing Protocols, On-Demand Routing Protocols. Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power-Aware Routing Protocols

UNIT IV

Transport Layer and Security Protocols for Ad Hoc Wireless Networks:

Issues in Designing a Transport Layer Protocol for Ad-hoc wireless Networks, Design Goals of a Transport Layer Protocol for Adhoc wireless Networks, Classification of Transport Layer Solutions, TCP over Ad-hoc wireless Networks, Other Transport Layer Protocols For Ad Hoc Wireless Networks, Security In Ad Hoc Wireless Networks, Network Security Requirements, Issues And Challenges In Security Provisioning, Network Security Attacks, Key Management, Secure Routing In Ad Hoc Wireless Networks

UNIT V

Quality of Service in Ad Hoc Wireless Networks:

Issues and Challenges in Providing Qos in Ad Hoc Wireless Networks, Classifications of Qos Solutions, Mac layer Solutions, Network Layer Solutions, Qos Frameworks for Ad Hoc Wireless Networks

Text Book:

1. Ad hoc Wireless Networks– C. Siva Ram Murthy & B.S. Manoj, 2nd Edition, Pearson Education, 2005.

Reference Books:

1. Ad hoc Wireless Networks – Ozan K. Tonguz and Gianguigi Ferrari, JohnWiley, 2006.
2. Ad hoc Wireless Networking – Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du,Kluwer Academic Publishers,2004.
3. Adhoc Mobile Wireless Networks - C.K. Toh, Protocols and Systems, Prentice-Hal PTR,200.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**
3/0/0/3

CRYPTOGRAPHY (C76PE3C)

Course Objective:

Describe goals and design principles for and common structures of secret key primitives such as block and stream ciphers and message authentication codes

Course Outcomes:

Upon completion of the Course, the student will be able to

1. Learn how to encrypt the information using classical techniques like, symmetry, substitution, and steganography.
2. Know how to apply techniques to generate pseudo random sequences, use stream ciphers to for encrypting and decrypting the data.
3. Gain knowledge about Number theory, a mathematical notation of representing information
4. Know the principles of public key crypto systems to encrypt and decrypt the information
5. Understand various algorithms developed for hassing functions; choose one way hashing functions like, Message Authentication codes, Digital Signal Algorithm, Discrete Logarithm Signature.

UNIT I

Basic Concepts of Number Theory and Finite Fields:

Divisibility and the divisibility algorithm, Euclidean algorithm, Modular arithmetic, Groups, Rings and Fields, Finite fields of the form GF(p), Polynomial arithmetic, Finite fields of the form GF(2n).

UNIT II

Classical Encryption Techniques:

Symmetric cipher model, Substitution techniques, Transposition techniques, Steganography

Symmetric Ciphers:

Traditional Block Cipher structure, Data Encryption Standard (DES) , AES Cipher.

UNIT III

Pseudo-Random-Sequence Generators and Stream Ciphers:

Linear Congruential Generators, Linear Feedback Shift Registers, Design and analysis of stream ciphers, Stream ciphers using LFSRs.

UNIT IV

Number theory:

Prime Numbers, Fermat‘s and Euler‘s theorem, Primality testing, Chinese Remainder theorem, discrete logarithm.

Principles of Public-Key Cryptosystems:

The RSA algorithm, Diffie - Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

UNIT V

One-Way Hash Functions:

Background, N-Hash, MD4, MD5, Secure Hash Algorithm [SHA],One way hash functions using symmetric block algorithms, Using public key algorithms, Choosing a one-way hash functions, Message Authentication Codes. Digital Signature Algorithm, Discrete Logarithm Signature Scheme.

Text Books:

1. William Stallings , ―Cryptography and Network Security Principles and Practice‖, Pearson Education Inc., 6th Edition, 2014, ISBN: 978-93-325-1877-3
2. Bruce Schneier, ―Applied Cryptography Protocols, Algorithms, and Source code in C‖, Wiley Publications, 2nd Edition, ISBN: 9971-51-348-X

Reference Books:

1. Cryptography and Network Security, Behrouz A. Forouzan, TMH, 2007.
2. Cryptography and Network Security, Atul Kahate, TMH, 2003.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH, Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**
3/0/0/3

INTRODUCTION TO ANALYTICS (C76PE4A)

Course Objective:

Understand the overview of analytics, descriptive statistical & multivariate Analysis, clustering & regression techniques.

Course Outcomes:

On completion of course the student will be able to

1. Use the concepts Big Data, Data Science and Descriptive Statistics. - L2
2. Analyze descriptive multivariate analysis and various preprocessing techniques. - L4
3. Compare and contrast different clustering and regression methods. - L4
4. Apply additional predictive methods and classifications techniques on different data sets. - L3
5. Demonstrate various text, web and social media applications. - L3

UNIT I

Introduction: Big Data and Data Science, Big Data Architectures, Small Data, What is Data?

What Can We Do With Data? A Project on Data Analytics - A Little History on Methodologies for Data Analytics, The KDD Process, The CRISP-DM Methodology

Descriptive Statistics: Scale Types, Descriptive Univariate Analysis - Univariate Frequencies, Univariate Data Visualization, Univariate Statistics, Common Univariate Probability Distributions, Descriptive Bivariate Analysis

UNIT II

Descriptive Multivariate Analysis: Multivariate Frequencies, Multivariate Data Visualization, Multivariate Statistics - Location Multivariate Statistics, Dispersion Multivariate Statistics, Infographics and Word Clouds

Data Quality and Preprocessing: Data Quality - Missing Values, Redundant Data, Inconsistent Data, Noisy Data, Outliers, Converting to a Different Scale Type - Converting Nominal to Relative, Converting Ordinal to Relative or Absolute, Converting Relative or Absolute to Ordinal or Nominal. Converting to a Different Scale, Data Transformation, Dimensionality Reduction - Attribute Aggregation, Principal Component Analysis, Independent Component Analysis, Attribute Selection, Filters, Wrappers, Embedded, Search Strategies

UNIT III

Clustering: Distance Measures - Differences between Values of Common Attribute Types, Distance Measures for Objects with Quantitative Attributes, Distance Measures for Non-conventional Attributes, Clustering Validation

Regression: Predictive Performance Estimation - Generalization, Model Validation, Predictive Performance Measures for Regression

Finding the Parameters of the Model - Linear Regression, Empirical Error, The Bias-variance Trade-off, Shrinkage Methods, Ridge Regression, Lasso Regression, Methods that use Linear Combinations of Attributes, Principal Components Regression, Partial Least Squares Regression, Technique and Model Selection

UNIT IV

Additional Predictive Methods: Search-based Algorithms - Decision Tree Induction Algorithms, Decision Trees for Regression, Model Trees, Multivariate Adaptive Regression Splines,

Optimization-based Algorithms - Artificial Neural Networks, Back propagation, Deep Networks and Deep Learning Algorithms, Support Vector Machines, SVM for Regression

Advanced Predictive Topics: Ensemble Learning - Bagging, Random Forests, AdaBoost, Algorithm Bias, Non-binary Classification Tasks - One-class Classification, Multi-class Classification, Ranking Classification, Multi-label Classification, Hierarchical Classification

UNIT V

Applications for Text, Web and Social Media: Working with Texts - Data Acquisition, Feature Extraction, Tokenization, Stemming, Conversion to Structured Data, Is the Bag of Words Enough? Remaining Phases, Trends, Sentiment Analysis, Web Mining, Recommender Systems - Feedback, Recommendation Tasks, Recommendation Techniques, Knowledge-based Techniques, Content-based Techniques, Collaborative Filtering Techniques, Final Remarks, Social Network Analysis - Representing Social Networks, Basic Properties of Nodes, Degree, Distance, Closeness, Betweenness, Clustering Coefficient, Basic and Structural Properties of Networks, Diameter, Centralization, Cliques, Clustering Coefficient, Modularity, Trends and Final Remarks

Text Book(s)

1. A General Introduction to Data Analytics João Mendes Moreira André C.P.L.F. deCarvalho , wiley publishers

Reference Books:

1. Introduction to Business Analytics using simulation, Jonathan P. Pinder, Academic Press (Elsevier).
2. Data Mining and Predictive Analytics, “Daniel T.Larose, Chantal D.Larose, Wiley.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**
3/0/0/3

MOBILE ADHOC NETWORKS (C76PE4B)

Course Objective:
Analyze the various design issues and challenges in the layered architecture of Ad hoc wireless networks

Course Outcomes:
Upon completion of the course, the student will

1. Understand and analyse the applications of Mobile Adhoc Networks
2. Learn addressing the design issues of MAC protocols
3. Gain insights on the challenges of transmission control protocols and its performance over other protocols.
4. Learn how to apply different protocols to develop energy management system
5. Know how to optimize and integrate cross layer design issues.

UNIT I
Introduction: Fundamentals of Wireless Networks, Wireless Internet, What Are Ad Hoc Networks?
MAC Layer Protocols: Important Issues and Need for Medium Access, Classification of MAC Protocols

UNIT II
Routing Protocols: Design Issues of Routing Protocols for Ad Hoc, Classification of Routing Protocols, Proactive Routing Protocols, Hybrid Routing Protocols
Multi cast Routing Protocols: Issues in Design of Multicast Routing Protocols, Classification of Multicast Routing Protocols, QoS Routing, Energy-Efficient Multicast Routing Protocols, Location-Based Multicast Routing Protocols

UNIT III
Transport Protocols: TCP's Challenges and Design Issues in Ad Hoc Networks, TCP Performance over MANETs, Ad Hoc Transport Protocols,
Quality of Service: Challenges, Classification of QoS Solutions, QoS-Enabled Ad Hoc On-Demand Distance Vector Routing Protocol, QoS Frameworks for Ad Hoc Wireless Networks, INSIGNIA, INORA

UNIT IV
Energy Management Systems: Introduction, Energy-Efficient Routing Protocol, Transmission Power-Management Schemes, Transmission Power Control, AODV Protocol, Local Energy-Aware Routing Based on AODV, Power-Aware Routing Based on AODV, Lifetime Prediction Routing Based on AODV

UNIT V
Cross-Layer Design Issues: A Definition of Cross-Layer Design, Cross-Layer Design Principle,

Proposals Involving Cross-Layer Design, Proposals for Implementing Cross-Layer Interactions, Cross-Layer Design: Is It Worth Applying It?, Pitfalls of the Cross-Layer Design Approach, Performance Objectives.
Applications and Recent Developments: Typical Applications, Applications and Opportunities, Challenges, Most Recent Developments in the Field

Text Books:

1. Ad hoc Mobile Wireless Networks principles, Protocols, and Applications 2ed, Subir Kumar, T.G. Basavaraj, C.Puttamaddappa CRC publications

References:

1 Siva Ram Murthy and B. S. Manoj, Ad hoc Wireless Networks Architecture and Protocols, 2nd edition, Pearson Edition, 2007.
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000.
3. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad-hocnetworking, Wiley-IEEE press, 2004.
4. Mohammad Ilyas, The handbook of ad-hoc wireless networks, CRC press, 2002.
5. T. Camp, J. Boleng, and V. Davies " A Survey of Mobility Models for Ad-hoc Network"
6. Research, "Wireless Commun, and Mobile Comp.. Special Issue on Mobile Ad-hocNetworking Research, Trends and Applications, Vol. 2, no. 5, 2002, pp. – 502.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**
3/0/0/3

NETWORK SECURITY (C76PE4C)

Course Objective:
Provide a practical survey of network security applications and standards; emphasis is on applications that are widely used on the Internet and for corporate networks, and on standards (especially Internet standards) that have been widely deployed.

Course Outcomes:
Upon completion of course the student will

1. Learn and understand how to apply security mechanisms across transport layer.
2. Understand and learn the security mechanism involved across a wireless network
3. Understand about types of intruders and respective detection mechanism, malicious software, and viruses.
4. Know the need and significance of firewall and its types.
5. Gain knowledge on basic concepts of Network Management System, legal and ethical aspects of establishing a network.

UNIT I
Transport-Level Security
Web Security Considerations, Secure Socket Layer and Transport Layer Security, Transport Layer Security, HTTPS, Secure Shell (SSH).

UNIT II
Wireless Network Security: IEEE 80.11 Wireless LAN Overview, IEEE 80.11i Wireless LAN Security, Wireless Application Protocol Overview, Wireless Transport Layer Security, WAP End-to-End Security.

UNIT III
Intruders: Introduction, Intrusion Detection, Password, the Base-Rate Fallacy Malicious Software
Types of Malicious Software, Viruses, Virus Countermeasures, Worms, Distributed Denial of Service Attacks

UNIT IV
Firewalls
The Need for Firewalls, Firewall Characteristics, Types of Firewalls, Firewall Basing, Firewall Location and Configurations.

UNIT V
Network Management Security
Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3 Legal and Ethical Aspects, Cybercrime and Computer Crime, Intellectual Property, Privacy, Ethical Issues.

Text Book:

1. Network Security Essentials by William Stallings, Fourth Edition-Pearson Education.

Reference Books:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley,206
2. Applied Cryptography by Bruce Schneir-John Willey &Sons.
3. Corporate Computer and Network Security by Raymond panko-Pearson Education.
4. Security in Computing by Charles P Pfleeger-O'Reilley Publications.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**

0/0/4/2

ADVANCED ENGLISH COMMUNICATION SKILLS LAB (CHSE3)

Course Objectives:

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 behavioral skills for their personal and professional life
To respond appropriately in different socio-cultural and professional contexts
To sensitize the importance of Soft Skills and people skills

Course Outcomes:

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
Develop interpersonal communication skills

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.

What are soft skills? Active listening –self motivation -effective communication- assertive communication-controlling emotions-team player attitude-ability to work under pressure – openness to feedback

UNIT-II

Reading Skills and Appropriate English usage–General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, Skimming, Scanning, Inferring Meaning and practice with different texts.

Grammatical Accuracy

Use of tense in scientific writing-active vs. Passive voice –number agreement (singular and plural)-agreement of subject with verb in person and number - using phrases and clauses to construct simple complex and compound sentences-verb patterns-Eliminating ambiguity

UNIT-III

Writing Skills –

Structure and Presentation of Different Types of Writing–Letter writing / Resume Writing/ e-correspondence/ Technical Report Writing/Styles-Types-Report in Manuscript format. Writing an SOP and Portfolio Assessment

How to write a project –what is a scientific project-how to prepare the title, abstract, introduction, how to review literature –body of the project –how to write the results and conclusion-correct form and grammar ethics to be followed –avoiding plagiarism.

UNIT-IV

Group Discussion and Presentation Skills

Group Discussions-Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation- Concept and Process

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

UNIT-V

Interview Skills – Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

References:

1. Rizvi, M Ashraf. Effective Technical Communication. Mc Graw – Hill
2. Kumar, Sanjay and Pushp Lata. English for Effective Communication, OUP,2015
3. Konar, Nira. English Language Laboratories – A Comprehensive Manual,PHI Learning Pvt Ltd,2011.
4. Shiv Khera, You can Win, Macmillan Books, New York, 2003.
5. Jeff Butterfield, Soft Skills for Everyone, Cengage Learning, 2015
6. Barbara Gastel and Robert "A Day How to write and publish a scientific paper, Greenwood, 2016.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**
0/0/2/1

DATA WAREHOUSING AND DATA MINING LAB
(C76PC5)

Course Objective:
Ability to understand the various kinds of tools, demonstrate the classification, clusters and etc. in large data sets

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

1. Learn how to build a data warehouse and query it (using open source tools like Pentaho Data Integration and Pentaho Business Analytics),
2. Learn to perform data mining tasks using a data mining toolkit (such as open-source WEKA),
3. Understand the data sets and data preprocessing,
4. Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering, and regression,
5. Exercise the data mining techniques with varied input values for different parameters.

TASK I:
Build Data Warehouse and Explore WEKA

A. 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.).

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

B. Explore WEKA Data Mining/Machine Learning Toolkit

1. Downloading and/or installation of WEKA data mining toolkit,
2. Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface, Experimenter, command-line interface.
3. Navigate the options available in the WEKA (ex. Select attributes panel, Preprocess panel, Classify panel, Cluster panel, Associate panel and Visualize panel) Study the arff file format
4. Explore the available data sets in WEKA.
5. Load a data set (ex. Weather dataset, Iris dataset,etc.)
6. Load each dataset and observe the following:
    i. List the attribute names and their types
    ii. Number of records in each dataset
    iii. Identify the class attribute (if any)

iv. Plot Histogram
v. Determine the number of records for each class.
vi. Visualize the data in various dimensions

TASK II:

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

1. Explore various options available in Weka for preprocessing data and apply (like Discretization Filters, Resample filter, etc.) on each dataset
2. Load each dataset into Weka and run Apriori algorithm with different support and confidence values. Study the rules generated.
3. 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.

TASK III:

Demonstrate performing classification on data sets

1. Load each dataset into Weka and run Id3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kapp a statistic.
2. 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.
3. Load each dataset into Weka and perform Naïve-Bayes classification and k-Nearest Neighbour classification. Interpret the results obtained.
4. Plot RoC Curves
5. 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.

TASK IV:

Demonstrate performing clustering on data sets

1. 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.
2. Explore other clustering techniques available in Weka.
3. Explore visualization features of Weka to visualize the clusters. Derive interesting insights and explanations.

TASK V:

Demonstrate performing Regression on datasets

1. 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.
2. Use options cross-validation and percentage split and repeat running the Linear Regression Model. Observe the results and derive meaningful results.
3. Explore a Simple linear regression technique that only looks at one variable.

Resource Sites:

1. http://www.pentaho.com/

2. http://www.cs.waikato.ac.nz/ml/weka/

TASK VI:

Credit Risk Assessment Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data:

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset (original) Excel spreadsheet version of the German credit data. In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer!)

A few notes on the German Dataset

1. DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
2. owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones.
3. foreign_worker. There are millions of these in Germany (many from Turrkey). It is very hard to get German citizenship if you were not born of German parents. • There are 20 attributes used in judging a loan applicant. The goal is the classify the applicant into one of two categories, good or bad.

Subtasks: (Turn in your answers to the following tasks)

1. List all the categorical (or nominal) attributes and the real-valued attributes separately.

2. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes.

3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after

training.

4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100% training accuracy?

5. Is testing on the training set as you did above a good idea? Why or Why not ?

6. One approach for solving the problem encountered in the previous question is using cross- validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross- validation and report your results. Does your accuracy increase/decrease? Why?

7. Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal- status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss.

8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)

9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)?

10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model?

11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase?

12. (Extra Credit): How can you convert a Decision Trees into "if-thenelse rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of

rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one Can you predict what attribute that might be in this dataset ? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and one R.

Task Resources:
Mentor lecture on Decision Trees
Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation) Decision Trees (Source: Tan, MSU)
Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)

Weka resources:
Introduction to Weka (html version) (download ppt version) Download Weka Weka Tutorial ARFF format
Using Weka from command line

TASK VII:
Hospital Management System
Data Warehouse consists Dimension Table and Fact Table. REMEMBER The following Dimension
The dimension object (Dimension):
_ Name
_Attributes (Levels), with one primary key
_Hierarchies
One time dimension is must. About Levels and Hierarchies
Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels. For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:
H1: YearL > QuarterL > MonthL > WeekL > DayL H2: YearL > WeekL > DayL
The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth. About Unique Key Constraints When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level) Design a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient, Medicine, Supplier, Time. Where measures are 'NO UNITS', UNIT PRICE. Assume the Relational database (SOURCE) table schemas as follows
TIME (day, month, year),
PATIENT (patient_name, Age, Address, etc.,)
MEDICINE (Medicine_Brand_name, Drug_name, Supplier, no_units, Uinit_Price, etc.,) SUPPLIER: (Supplier_name, Medicine_Brand_name, Address, etc.,) If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably. Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
(Sponsored by TKR Educational Society , Approved by AICTE, Affiliated by JNTUH,
Accredited by NBA & NAAC with 'A' Grade)

CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

B.Tech VI Semester **L/T/P/C**
0/0/2/1

ADVANCED COMPUTER VISION LAB (C76PC6)

Course Objectives:

The Objective of Computer Vision Lab is to perform basic and applied research in image manipulation, image analysis, computer vision and related areas.

Course Outcomes:

Upon completion, of course the student will be able

1. To develop novel and efficient techniques for the extraction of quantitative descriptions of viewed objects from a variety of images and image sequences.
2. To translate those techniques into high quality software tools that can be used to address real world problems.

List of Experiments:

1. Install and use different Computer Vision Modules (CV2, PIL etc…) in Python
2. Read an Image and Display using PIL and CV2 modules
3. Implement and understand image resizing, image type conversion.
4. Implement of image addition, image complement, logical operations (like NOT, OR, AND, XOR) on images, geometric operations.
5. Understand histogram operations, contrast stretching, gamma correction on images.
6. Observe various type of noise effect on images.
7. Implement different spatial filtering (smoothing & sharpening) techniques.
8. Understand and implement Fast Fourier Transformation (FFT) and frequency domain filtering on images.
9. Understand image restoration and implement the Weiner filter on images.
10. Understand image segmentation using different edge detection, thresholding techniques.
11. Understand and implement different morphological operation and their applications.
12. Understand color model s and manipulate color images.