TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

SEMESTER V

S.No	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
01	**PC**	D75PC12	Automata Theory and Compiler Design	3	0	0	3	40	60	100
02	**PC**	D75PC13	Operating Systems	3	0	0	3	40	60	100
03	**PC**	D75PC14	Artificial Intelligence	3	0	0	3	40	60	100
04	**PC**	D75PC15	Machine Learning	3	0	0	3	40	60	100
05	**PE**	D75PE1	Professional Elective I A. Data Wrangling & Visualization B. Image Processing C. DevOps	3	0	0	3	40	60	100
06	**PE**	D75PE2	Professional Elective II A. Object Oriented Analysis & Design B. Neural Networks C. Scripting Languages	3	0	0	3	40	60	100
07	**PC**	D75PC16	Machine Learning Lab	0	0	2	1	40	60	100
08	**PC**	D75PC17	Skill Development Course ((Node JS/ React JS/ Django)/ DevOps)	0	0	2	1	40	60	100
09	**MC**	MC002	Constitution of India*	3	0	0	0	0	0	S
TOTAL				**20**	**0**	**4**	**20**	**320**	**480**	**800**
Mandatory Course: Constitution of India										

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

AUTOMATA THEORY AND COMPILER DESIGN (D75PC12)

Course Objective:

Introduce the major concepts of formal languages translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.

Course Outcomes:

After completion of the course the student will be able to

1. Solve the finite state machines for modelling and computing problems. L3
2. Build context free grammars for formal languages. L3
3. Distinguish between decidability and undecidability. L4
4. Organize the knowledge of patterns, tokens & regular expressions for lexical analysis. L3
5. Apply the Acquire skills in using Lex tool and design LR parsers 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's 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, 3rd 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.

REFERENCE BOOKS:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, JeffryD. Ullman, 2nd Edition, Pearson.
2. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
3. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
4. lex &yacc− John R. Levine, Tony Mason, Doug Brown, Oreilly.
5. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

OPERATING SYSTEMS (D75PC13)

Course Objective:

To understand the basic components of a computer operating system, scheduling polices, process synchronization, deadlocks, memory management strategies and file system implementation.

Course Outcomes:

After completion of the course the student will be able to

1. Identify the components, structure, OS services and analyze the role of an Operating System in developing software applications. L3
2. Make use of the concepts of CPU scheduling, including scheduling criteria and inter process communication, and apply them to solve scheduling problems. L3
3. Apply synchronization techniques to coordinate access to shared resources among concurrent processes and various mechanisms to detect and recovery the deadlocks. L3
4. Analyze memory management and virtual memory management strategies and their significance in modern computing environments. L4
5. Make use of the structure of file system and principles of protection to develop secure, efficient and reliable computing environments. L3.

UNIT – I
Overview

Introduction: Operating system objectives, User view, System view, Operating system definition, Computer System Architecture, OS Structure, OS Operations, Process Management, Memory Management, Storage Management, Protection and Security, Computing Environments. Operating System services, User and OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, OS Structure.

UNIT – II

CPU Scheduling Process concepts: The Process, Process State, Process Control Block, Threads, Process Scheduling, Scheduling Queues, Schedulers, Context Switch, Operations on Processes, System calls fork(), exec(),wait(),exit(), Inter-process

communication-ordinary pipes and named pipes, message queues, shared memory in Unix.
Process Scheduling-Basic concepts, Scheduling Criteria, Scheduling algorithms, Multiple-Processor Scheduling, Real Time Scheduling, Thread scheduling, Linux scheduling and Windows scheduling.

UNIT – III

Process Synchronization: Background, The Critical Section Problem, Peterson's solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization in Linux and Windows.
Deadlocks-System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

UNIT – IV

Memory Management: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table.
Virtual Memory Management: Background, Demand Paging, Copy-on-Write, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing, Virtual memory in Windows.

UNIT – V

Storage Management: File System- Concept of a File, System calls for file operations - open (), read (), write (), close (), seek (), unlink (), Access methods, Directory and Disk Structure, File System Mounting, File Sharing.
File System Implementation- File System Structure, File System Implementation, Directory Implementation, Allocation methods, Free-space Management, Efficiency, and Performance. Overview of Mass Storage Structure.
Protection System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

TEXT BOOKS:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, 8th Edition, Wiley, 2016 India Edition.
2. Operating Systems – Internals and Design Principles, W. Stallings, 7th Edition, Pearson.

REFERENCE BOOKS:

1. Modern Operating Systems, Andrew S Tanenbaum, 3rd Edition, PHI
2. Operating Systems: A concept-based Approach, 2nd Edition, D.M. Dhamdhere, TMH.
3. Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
4. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
5. Principles of Operating systems, Naresh Chauhan, Oxford University Press.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

ARTIFICIAL INTELLIGENCE (D75PC14)

Course Objective:

Understand state space representation, search algorithms, knowledge representation techniques and applications of artificial intelligence in different domains.

Course Outcomes:

After completion of the course the student will be able to

1. Apply theoretical knowledge to practical problem-solving scenarios across various domains, fostering critical thinking and problem-solving skills. L3
2. Utilize propositional theorem proving techniques such as resolution, horn clauses, and definite clauses to derive logical conclusions and make inferences. L3
3. Apply the principles of logic and knowledge representation using First-Order Logic to model and solve problems in various domains. L3
4. Analyze the strengths and limitations of different planning approaches using the factors: problem complexity, resource constraints, and domain dynamics. L4
5. Utilize inference techniques using full joint distributions, independence, and Bayes' rule to perform probabilistic reasoning and make probabilistic predictions. L3

UNIT - I

Introduction to AI: Intelligent Agents, problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first, search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces

UNIT - II

Problem Solving by Search-II and Propositional Logic: Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions. Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT - III

Logic and Knowledge Representation: First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

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

UNIT – IV

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

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

UNIT - V

Uncertain knowledge and Learning Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.

TEXT BOOK:

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

REFERENCE BOOKS:

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

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

MACHINE LEARNING (D75PC15)

Course Objective:

Understand the fundamental principles, supervised, unsupervised, probability based machine learning techniques and practical applications of machine learning.

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

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

DATA WRANGLING & VISUALIZATION (D75PE1A)

Course Objective:

Learn concepts, techniques and tools, need to deal with various facets of data science practice, including data collection and integration. Identify the importance of data reduction and data visualization techniques

Course Outcomes:

After completion of the course, the student should be able to

1. Construct scraping of data from multiple data resources. L3
2. Apply data transformation techniques, handle missing values in the data. L3
3. Construct and analyze interactive plots for effective decision making from the given data. L4
4. Construct Heat map for finding the correlations among various feature vectors to identify data transformation. L4
5. Analyze visualizations for continuous data by generating different kinds of plotting techniques. L4

UNIT- I

Importing Data- Reading Data from Text Files, Reading Data from Excel Files. Scraping Data- Importing Tabular and Excel Files Stored Online, Scraping HTML Text, Scraping HTML Table Data. Exporting Data- Writing Data to Text Files, Writing Data to Excel Files, excel Package, Saving Data as an R Object File.

UNIT- II

Managing Data Structures in R using packages: Data Structure Basics, Managing Vectors, Managing Lists, Managing Matrices, Managing Data Frames, Dealing with Missing Values, Reshaping Data with tidier package, Transforming data with dplyr package.

UNIT- III

Basic and Interactive Plots-scatter Plot-Scatter plots with texts, labels, and lines, Connecting points in a scatter plot Generating an interactive scatter plot Bar plot- A simple bar plot, An interactive bar plot Line plot-A simple line plot Line plot to tell an effective story. Generating an interactive Gantt/timeline chart in R, merging histograms, Making an interactive bubble plot.

UNIT- IV

Heat Maps and Dendrograms: Introduction, constructing a simple dendrogram, Creating dendrograms with colors and labels, Creating a heat map, Generating a heat map with customized colors, Generating an integrated dendrogram and a heat map, Creating a three-dimensional heat map and a stereo map, Constructing a tree map in R

UNIT- V

Visualizing Continuous Data: Introduction- Generating a candlestick plot, Generating interactive candlestick plots, Generating a decomposed time series, Plotting a regression line , Constructing a box and whiskers plot , Generating a violin plot , Generating a quantile-quantile plot (QQ plot), Generating a density plot ,Generating a simple correlation plot.

TEXTBOOKS:

1. Data Wrangling with R- Bradley C. Boehmke, Springer publisher
2. R Data Visualization Cookbook- Atmajitsinh Gohi, Packt Publishing

REFERENCE BOOKS:

1. Brain S. Everitt, “A Handbook of Statistical Analysis Using R”, Second Edition, 4 LLC, 2014.
2. R for Datascience, Hadley Wickham, Garrett Grolemund , O'Reilly Media
3. Paul Teetor, “R Cookbook”, O’Reilly, 2011.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

IMAGE PROCESSING (D75PE1B)

Course Objective:

The objective is to offer a theoretical and mathematical groundwork for essential Digital Image Processing principles, covering topics such as image acquisition, sampling, quantization, preprocessing, enhancement, restoration, segmentation, and compression.

Course Outcomes:

After completion of the course, the student should be able to

1. Apply sampling and quantization techniques to digitize continuous image signals, considering sampling rates, quantization levels, and their effects on image quality and representation. L3
2. Analyze the performance and limitations of spatial filtering methods in image enhancement L4.
3. Apply the degradation model to analyze and restore degraded images L3.
4. Apply thresholding techniques to segment images into distinct regions L3
5. Analyze the impact of redundancies on image compression efficiency L4.

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 Wilely, 3rd Edition, 2004.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

DEVOPS (D75PE1C)

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:

After completion of the course, the student should 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. Analyze 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, Salt Stack and Docker.

TEXT BOOK:

1. JoakimVerona, Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1. Deepak Gaikwad, ViralThakkar, DevOps Tools from Practitioner’s Viewpoint. Wiley publications.
2. LenBass, IngoWeber, LimingZhu. DevOps: A Software Architect's Perspective. Addison Wesley

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

OBJECT ORIENTED ANALYSIS &DESIGN (D75PE2A)

Course Objective:

The objective is to define fundamental modeling concepts, highlight the benefits of object-oriented modeling over structured approaches, demonstrate modeling of a real-world application through a UML class diagram, and identify appropriate usage of generalization, aggregation, and composition relationships, as well as specify various types of business rules within the class diagram.

Course Outcomes:

After completion of the course, the student should be able to

1. Apply principles of modeling, such as abstraction, encapsulation, modularity, and hierarchy, to design and create UML diagrams that accurately represent system requirements and design specifications. L3
2. Apply basic and Advanced Structural Modeling Concepts for designing real time applications. L3
3. Analyze Dynamic Aspects of a Software System using Use Case, Interaction and Activity Diagrams. L4
4. Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems. L3
5. Develop the case studies and model it in different views with respect user requirement such as Use Case, Component and Deployment etc. and preparation of document of the project for the Library and ATM Applications. L3

UNIT -I

Introduction to UML: Importance of modelling, principles of modelling, object oriented modelling, conceptual model of the UML, Architecture, Software Development Life Cycle

UNIT- II

Basic Structural Modeling: Classes, Relationships, Common Mechanisms, and diagrams, Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages, Instances. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

.

UNIT- III

Basic Behavioral Modeling: Interactions, Use cases, Use case Diagrams, Interaction diagrams, Activity Diagrams.

UNIT -IV

Advanced Behavioral Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams

UNIT -V

Architectural Modeling: Component, Deployment, Collaboration, Component diagrams and Deployment diagrams.

Patterns and Frameworks, Case Studies: The Unified Library application, ATM application.

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education 2nd Edition
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY- Dreamtech India Pvt. Ltd.

REFERENCE BOOKS:

1. K. Venugopal Reddy, Sampath Korra: Object Oriented Analysis and Design Using UML, BS Publications.
2. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML Pearson Education.
3. Pascal Rogues:Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
4. AtulKahate: Object Oriented Analysis & Design, The McG raw Hills Companies.
5. Mark Priestley: Practical Object-Oriented Design with UML, TMH.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

NEURAL NETWORKS (D75PE2B)

Course Objective:

The objective is to comprehend biological neural networks, model equivalent neuron models, grasp the architecture and learning algorithms, address issues in feedforward and feedback neural networks, and explore neurodynamic models for diverse problem-solving applications.

Course Outcomes:

After completion of the course, the student should be able to

1. Apply different models of a neuron, such as the perceptron model or the integrate-and-fire model, to understand how individual neurons process and transmit information in neural networks. L3
2. Construct the training of neural networks using various learning rules. L3
3. Analyze the Hessian matrix in the context of backpropagation, understanding its role in computing second-order derivatives and optimizing the learning process for neural networks. L4
4. Construct the Hopfield models. L3
5. Make use of Neuro Dynamics and Dynamical Systems. L3

UNIT- I

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

UNIT- II

Single Layer Perceptron's: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment

Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection.

UNIT -III

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT- IV

Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification

UNIT- V

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models – Hopfield Models, restricted boltzmen machine.

TEXT BOOKS:

1. Simon S Haykin - Neural Networks a Comprehensive Foundations, PHI
2. Jacek M. Zurada - Introduction to Artificial Neural Systems, JAICO Publishing House, 2006.

REFERENCE BOOKS:

1. Li Min Fu - Neural Networks in Computer Intelligence, TMH 2003
2. James A Freeman David M S Kapura - Neural Networks, Pearson, 2004.
3. B. Vegnanarayana -Artificial Neural Networks, Prentice Hall of India P Ltd, 2005

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
3	0	0	3

SCRIPTING LANGUAGES (D75PE2C)

Course Objective:

The course presents the script programming paradigm and introduces scripting languages like Perl, Ruby, and TCL.

Course Outcomes:

After completion of the course, the student should be able to

1. Apply Ruby for web development tasks such as writing CGI scripts, handling cookies, choosing appropriate web servers, and integrating with SOAP and web services to create dynamic and interactive web applications. L3
2. Apply the knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem. L3
3. Develop programming skills in scripting language. L3
4. Analyze in Python by effectively employing finer points of looping, pack and unpack operations, file system manipulation. L4
5. Compare and contrast TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures. L4

UNIT -I

Introduction: Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services.

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

UNIT- II

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

UNIT- III

Introduction to PERL and Scripting

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

UNIT- IV

Advanced Perl

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

UNIT- V

TCL

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. **Tk**-Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
0	0	2	1

MACHINE LEARNING LAB (D75PC16)

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:

After completion of the course the student should 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 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 (Mini Project)

TEXT BOOK:

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

REFERENCE BOOK:

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

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
0	0	2	1

SKILL DEVELOPMENT COURSE
((NODE JS/REACT JS/DJANGO) /DEVOPS) (D75PC17)

NODE JS/ REACT JS/ DJANGO (D75PC17)

Course Objective:

Develop an end to end application using java full stack Identify the static web pages using HTML and do client side validation using JavaScript.

Course Outcomes:

After completion of the course, the student should be able to

1. Build a custom website with HTML, CSS, and Bootstrap and little JavaScript. L3
2. Develop Server – side implementation using Java technologies like L3
3. Develop the server – side implementation using Node JS L3
4. Design a Single Page Application using React L3

List of Programs:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java standalone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.

6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed inexperiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various sessiontracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS,path, event.
10. Develop an express web application that can interact with REST API to perform CRUDoperations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSON Web Token).
12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation usingchart.js
14. Create a TODO application in react with necessary components and deploy it into github.

REFERENCE BOOKS:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2ndEdition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo,Express, React, and Node, 2nd Edition, A Press.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. V Sem.

L	T	P	C
0	0	2	1

SKILL DEVELOPMENT COURSE ((NODE JS/REACT JS/DJANGO) /DEVOPS) (D75PC17)

DevOps LAB (D75PC17)

Course Objective:

Develop a sustainable infrastructure for applications and ensure high scalability. DevOps aims to shorten the software development lifecycle to provide continuous delivery with high-quality.

Course Outcomes:

After completion of the course, the student should be able to

1. Understand the DevOps tools and software application development L2
2. Apply different project management, integration and development tools L3
3. Develop Selenium tool for automated testing of application L3

List of Programs:

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code in exercise.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application for exercise 7 using Kubernetes.

10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

TEXT 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.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

SEMESTER VI

S.No	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
01	**HS**	D7HSFM	Fundamentals of Management	3	0	0	3	40	60	100
02	**PC**	D76PC18	Natural Language Processing	3	0	0	3	40	60	100
03	**PC**	D76PC19	Deep Learning	3	0	0	3	40	60	100
04	**PE**	D76PE3	Professional Elective III A. Speech and Video Processing B. Robotic Process Automation C. Internet of Things	3	0	0	3	40	60	100
05	**PE**	D76PE4	Professional Elective IV A. Conversational AI B. Expert Systems C. Augmented Reality & Virtual Reality	3	0	0	3	40	60	100
06	**OE**	D76OE1	Open Elective I	3	0	0	3	40	60	100
07	**PC**	D76PC20	Natural Language Processing Lab	0	0	2	1	40	60	100
08	**PC**	D76PC21	Deep Learning Lab	0	0	2	1	40	60	100
09	**MC**	MC003	Intellectual Property Rights*	3	0	0	0	0	0	S
TOTAL				**21**	**0**	**4**	**20**	**320**	**480**	**800**
Mandatory Course: Intellectual Property Rights										

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
3	0	0	3

NATURAL LANGUAGE PROCESSING (D76PC18)

Course Objectives:

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

Course Outcomes:

After completion of the course, the student should be able to

1. Identify sensitivity to linguistic phenomena and an ability to model them with formal grammars. L3
2. Choose proper experimental methodology for training and evaluating empirical NLP systems. L3
3. Compare Manipulate probabilities, construct statistical models over strings and trees. L4
4. Compare and contrast estimate parameters using supervised and unsupervised training methods. L4
5. Design, implement, and analyze NLP algorithms; and design different language modeling Techniques. L4

UNIT - I

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

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

UNIT - II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues

Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

TEXT BOOK:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.

REFERENCE BOOKS:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
3	0	0	3

DEEP LEARNING (D76PC19)

Course Objective:

To understand deep Learning algorithms and their applications in real-world data

Course Outcomes:

After completion of the course, the student should be able to

1. Analyze Machine Learning algorithms and apply the knowledge of deep feed forward networks for a given problem scenario. L4
2. Make use of regularization techniques and optimization strategies to train deep models for a given problem. L3
3. Compare and contrast different variants of the basic convolution function, and analyze their applicability in different contexts. L4
4. Analyze recurrent neural networks (RNNs) to model sequential data and implement LSTM and other gated RNN architectures to address the vanishing gradient problem and capture long-term dependencies. L4
5. Analyze the effectiveness of default baseline models in various applications, including multi-digit number recognition, utilizing practical methodology and performance metrics. L4

UNIT - I

Machine Learning Basics: Learning Algorithms, Capacity, Over fitting and Under fitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning, Deep Feed forward Networks Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT - II

Regularization for Deep Learning

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier, Optimization for Training Deep Models, Learning vs Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates

UNIT- III

Convolutional Networks

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features

UNIT - IV

Recurrent and Recursive Nets

Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long Term Dependencies, Explicit Memory

UNIT - V

Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyper parameters, Debugging Strategies, Example: Multi-Digit Number Recognition Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications

TEXT BOOK:

1. Deep Learning by Ian Good fellow, Yoshua Bengio and Aaron Courville, MIT Press.

REFERENCE BOOKS:

1. The Elements of Statistical Learning. Hastie, R. Tibshirani, and J. Friedman, Springer.
2. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.
3. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.
4. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
5. Golub, G., H., and Van Loan, C.,F., Matrix Computations, JHU Press, 2013.
6. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
3	0	0	3

SPEECH AND VIDEO PROCESSING (D76PE3A)

Course Objective:

The course aims to provide students with a comprehensive understanding of speech and video processing principles, techniques, and applications, encompassing speech signal representation, analysis, enhancement, and recognition, as well as video signal representation, analysis, compression, and content understanding.

Course Outcomes:

After completion of the course, the student should be able to

1. Build the mechanisms of human speech production systems and methods for speech feature extraction. L3
2. Make use of basic algorithms of speech analysis and speech recognition. L2
3. Build basic techniques in digital video processing, including imaging characteristics and sensors. L3
4. Apply motion estimation and object tracking algorithms on video. L3
5. Analyze the theoretical principles and practical applications of Video Segmentation and Tracking, Image Segmentation. L4

UNIT - I

Speech processing concepts

The speech production mechanism, Discrete time speech signals, Pole-Zero modeling of speech, relevant properties of the fast Fourier transform for speech recognition, convolution, linear and nonlinear filter banks, spectral estimation of speech using DFT, Linear Prediction analysis of speech.

UNIT - II

Speech recognition

Feature extraction for speech, static and dynamic feature for speech recognition, MFCC, LPCC,Distance measures, vector quantization models, Gaussian Mixture model, HMM.

UNIT - III

Multi-Dimensional Signals and Systems

Multi-Dimensional Signals, Multi-Dimensional Transforms, Multi-Dimensional Systems, Multi- Dimensional Sampling Theory, Sampling Structure Conversion

Digital Images and Video: Human Visual System and Color, Digital Video

UNIT - IV

Motion Estimation

Image Formation, Motion Models, 2D Apparent-Motion Estimation, Differential Methods, Matching Methods, Nonlinear Optimization Methods, Transform-Domain Methods, 3D Motion and Structure Estimation

UNIT - V

Video Segmentation and Tracking

Image Segmentation, Change Detection, Motion Segmentation, Motion Tracking, Image and Video Matting, Performance Evaluation

TEXT BOOKS:

1. Fundamentals of Speech recognition – L. Rabiner and B. Juang, Prentice Hall signal processing series
2. Digital Video processing, A Murat Tekalp, 2nd edition,Prentice Hall.

REFERENCE BOOKS:

1. Discrete-time speech signal processing: principles and practice, Thomas F. Quatieri, Coth.
2. Video Processing and Communications, Yao Wang, J. Osternann and Qin Zhang, PearsonEducation
3. “Speech and Audio Signal Processing”, B. Gold and N. Morgan, Wiley.
4. “Digital image sequence processing, Compression, and analysis”, Todd R. Reed, CRC Press
5. “Handbook of Image and Video processing”, Al Bovik, Academic press, second Edition.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
3	0	0	3

ROBOTIC PROCESS AUTOMATION (D76PE3B)

Course Objective:

Develop robotic process automation, techniques of automation using UIPath RPA tool.

Course Outcomes:

After completion of the course, the student should be able to

1. Apply the knowledge of UiPath software components, including UiPath Studio, UiPath Robot, and UiPath Orchestrator, to create, manage, and orchestrate RPA processes efficiently. L3
2. Apply sequencing, flowcharting, and control flow concepts to design and implement workflows, incorporating various activities, loops, and decision-making structures to control program execution.L3
3. Applying UIPath tool for debugging process. L3
4. Develop system managing techniques. L3
5. Analyze application for process automation using UIPath tool. L4

UNIT - I

Robotic Process Automation: Introduction**,** Scope and techniques of automation, Robotic processautomation, Components of RPA, RPA platforms, About UiPath

UIPath Stack Uipath Studio, Uipath Robot, Types of Robots, UiPath Orchestrator

UIPath Studio Projects, User interface

The User Interface: Task recorder, Advanced UI interactions: Input methods, Output methods

UNIT - II

Sequence, Flowchart, and Control Flow: Sequencing the workflow, Activities, Control Flow, varioustypes of loops and decision making

Data Manipulation: Variables and scope, Collections, Arguments – Purpose and use, Data table usage with examples, File operation with step-by-step example, CSV/Excel to data table and vice versa

UNIT - III

Taking Control of the Controls: Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls – mouse and keyboard activities, Handling events, revisit recorder, When to use OCR, Types of OCR available, How to use OCR

Plugins and Extensions: Terminal Plugin, SAP Automation, Citrix automation and Credential management

UNIT - IV

Handling User Events and Assistant Bots: Assistant bots, Monitoring system event triggers, Monitoring image and element triggers, launching an assistant bot on a keyboard event

Exception Handling, Debugging, and Logging: Exception handling, Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps, Error reporting

UNIT - V

Managing and Maintaining the Code: Project organization, nesting workflows, Reusability of workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines, or Sequences, Using config files

Deploying and Maintaining the Bot: Publishing using publish utility, using Orchestration Server to control bots, deploy bots, License Management, Publishing and managing updates

TEXT BOOK:

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

REFERENCE BOOK:

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
3	0	0	3

INTERNET OF THINGS (D76PE3C)

Course Objective:

Explore the interconnection and integration of the physical world and the cyber space and design & development steps of IoT Devices.

Course Outcomes:

After completion of the course, the student should be able to

1. Apply the concepts of IOT emphazing on physical & logical design, communication models and APIs and base line technologies, by using deployment templets and understanding the characteristics. L3
2. Implement the features of M2M and use of network protocols to communicate among IOT devices. L3
3. Apply connectivity using protocols and implement the concepts of wireless sensor networks to communicate among IOT devices. L3
4. Develop Applications using Arduino and Raspberry pi Devices L4
5. Implement the features of cloud in developing IOT applications. L3

UNIT - I

Introduction To Internet of Things: Introduction, physical design of IoT, logical design of IoT-functional blocks, communicational models, communication APIs, IoT enabling technologies, IOT levels & deployment templates, Characteristics of IoT, Applications of IoT, IoT Enablers and Connectivity Layers, Baseline Technologies,, Sensors, Actuators, IoT Components and Implementation, Challenges of IoT.

UNIT - II

IoT and M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, Origin of SDN, SDN Architecture, Rule Replacement, IoT System Management with NETCONF-YANG: Need for IOT systems management, simple network management protocol, network operator requirements, NETCONF, YANG, IoT system management with NETCONF-YANG,

UNIT - III

IoT networking: Connectivity Terminologies, Gateway Prefix Allotment, Impact of Mobility on Addressing, Multihoming, Deviations from regular Web, IoT Identification and Data Protocols. Connectivity technologies: IEEE 80.15.4, ZigBee, 6LoWPAN, RFID, HART and Wireless HART, NFC, Bluetooth, Z-Wave, ISA 10.11AWireless Sensor networks : Components of a Sensor Node, Modes of Detection, Challenges in WSN, Sensor Web.

UNIT - IV

ARDUINO: Features of Arduino, Components of Arduino Board, Arduino IDE, Program Elements, Function Libraries, Random Numbers, Interrupts.

RASPBERRY: Introduction, Architecture, PIN Configuration.

UNIT - V

IoT Platforms Design Methodology ,IoT Physical Servers & Cloud Offerings: Cloud Storage Models & Communication APIs,, WAMP-AutoBahn for IoT, Xively Cloud for IoT, Amazon Web Services for IoT.

TEXT BOOK:

1. Internet of Things by Arshadeep Bagha, Madisetty Vijay, University Press
2. Internet of Things by Jiva jose, Khanna Book Publishing Co. (P) Ltd.

REFERENCE BOOK:

1. Getting Started with Raspberry Pi, 2nd Edition, Matt Richardson and Shawn Wallance, SPD
2. Internet of Things Principles and Paradigms, Rajkumar Buyya and Amir Vahid Dastjerdi, ELSEVIER

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
3	0	0	3

CONVERSATIONAL AI (D76PE4A)

Course Objective:

The develop familiarity with foundational concepts of conversational systems, comprehend various natural language processing techniques, and examine the essential role of machine learning in constructing conversational systems.

Course Outcomes:

After completion of the course, the student should be able to

1. Apply systems by examining the history and evolution of dialogue systems, exploring present-day applications, and actively participating in the modeling, design, and development of dialogue systems. L3
2. Build the rule-based dialogue system. L3
3. Develop AI in building conversational system and build advanced systems that are cognitivelyinclined towards human behavior. L3
4. Develop a real time working conversational system for social domain that can intelligentlyprocess inputs and generate relevant replies. L3
5. Compare and contrast End-to-End Neural Dialogue Systems Neural Network Approaches to Dialogue Modeling. L4

UNIT - I

Introducing Dialogue Systems

Introduction of Dialogue System, History of Dialogue Systems, Present-Day Dialogue Systems, Modeling Conversation Dialogue Systems, Designing and Developing Dialogue Systems

UNIT - II

Rule-Based Dialogue Systems: Architecture, Methods, and Tools

Dialogue Systems Architecture, designing a Dialogue System, Tools for Developing Dialogue Systems, Rule-Based Techniques in Dialogue Systems Participating in the Alexa Prize

UNIT - III

Statistical Data-Driven Dialogue Systems

Motivating the Statistical Data-Driven Approach, Dialogue Components in the Statistical Data-Driven Approach, Reinforcement Learning (RL), Representing Dialogue as a Markov Decision Process, From MDPs to POMDPs, Dialogue State Tracking, Dialogue Policy, Problems and Issues with Reinforcement Learning in POMDPs

UNIT - IV

Evaluating Dialogue Systems

Process of Evaluation, Evaluating Task-Oriented Dialogue Systems, Evaluating Open-Domain Dialogue Systems, Evaluation Frameworks- PARADISE, Quality of Experience (QoE), Interaction Quality, Best Way to Evaluate Dialogue Systems.

UNIT - V

End-to-End Neural Dialogue Systems

Neural Network Approaches to Dialogue Modeling, A Neural Conversational Model, Introduction to the Technology of Neural Dialogue, Retrieval-Based Response Generation, Task-Oriented Neural Dialogue Systems, Open-Domain Neural Dialogue Systems, Some Issues and Current Solutions, Dialogue Systems: Datasets, Competitions, Tasks, and Challenges.

TEXT BOOK:

1. Michael McTear, “Conversational AI: Dialogue Systems, Conversational Agents, andChatbots”, Second Edition, Moran and Claypool Publishers, 2020.

REFERENCE BOOK:

1. Cathy Pearl, “Designing Voice User Interfaces: Principles of Conversational Experiences”,O’REILLY, 2016.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
3	0	0	3

EXPERT SYSTEMS (D76PE4B)

Course Objective:

Classify the fundamental techniques of artificial intelligence, Comprehend non- monotonic reasoning and statistical reasoning.

Course Outcomes:

After completion of the course, the student should be able to

1. AI programming languages and various search strategies, including blind search techniques like breadth-first and depth-first search, heuristic search methods, in solving complex AI problems and game-playing scenarios. L3
2. Analyze the architecture of an expert system and its tools. L4
3. Make use of the importance of building an expert system. L3
4. Analyze various problems with an expert system. L4
5. Build Expert system development, Selection of the tool, Acquiring Knowledge, Building process. L3

UNIT - I

Introduction to AI programming languages, Blind search strategies, Breadth-first – Depth-first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO* algorithm – game trees, Min- max algorithms, game playing – Alpha-beta pruning

UNIT - II

Knowledge representation issues predicate logic – logic programming Semantic nets-frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules-based deduction systems

UNIT - III

Introduction to Expert Systems, Architecture of expert systems, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems

UNIT - IV

Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, system-building aids, support facilities, stages in the development of expert systems

UNIT - V

Building an Expert System: Expert system development, Selection of the tool, Acquiring Knowledge, Building process

Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain experts, difficulties during development

TEXT BOOKS:

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, New Delhi.
2. Waterman D.A., "A Guide to Expert Systems", Addison Wesley Longman.

REFERENCE BOOKS:

1. Stuart Russel and other Peter Norvig, "Artificial Intelligence – A Modern Approach", Prentice-Hall,
2. Patrick Henry Winston, "Artificial Intelligence", Addison Wesley,
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat, and Waterman: Building Expert Systems, Addison Wesley,
5. Weiss S.M. and Kulikowski C.A., "A Practical Guide to Designing Expert Systems", Rowman&Allanheld, New Jersey.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
3	0	0	3

AUGMENTED REALITY & VIRTUAL REALITY (D76PE4C)

Course Objective:

Lay the groundwork for the rapidly advancing field of AR and familiarize with diverse AR concepts. Offer historical and contemporary insights into virtual reality, covering the basics of sensation, perception, and the technical and engineering components of VR systems.

Course Outcomes:

Upon completion of the course student will be able to

1. Identify how AR systems works and list the applications of AR. L3
2. Construct the software architectures of AR. L3
3. Develop the Visual perception and rendering in VR. L3
4. Compare the interaction, auditory perception and rendering in VR. L4
5. Distinguish motion in real and Virtual Worlds. L4

UNIT - I

Introduction to Augmented Reality: Augmented Reality - Defining augmented reality, history ofaugmented reality, Examples, Related fields

Displays: Multimodal Displays, Visual Perception, Requirements and Characteristics, Spatial DisplayModel, Visual Displays

Tracking: Tracking, Calibration, and Registration, Coordinate Systems, Characteristics of TrackingTechnology, Stationary Tracking Systems, Mobile Sensors

UNIT - II

Computer Vision for Augmented Reality: Marker Tracking, Multiple-Camera Infrared Tracking,Natural Feature Tracking by Detection, Outdoor Tracking.

Interaction: Output Modalities, Input Modalities, Tangible Interfaces, Virtual User Interfaces on RealSurfaces, Augmented Paper, Multi-view Interfaces, Haptic Interaction.

Software Architectures: AR Application Requirements, Software Engineering Requirements,Distributed Object Systems, Dataflow, Scene Graphs

UNIT - III

Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology and Perception

The Geometry of Virtual Worlds: Geometric Models, Axis-Angle Representations of Rotation, Viewing Transformations

Light and Optics: Basic Behavior of Light, Lenses, Optical Aberrations, the Human Eye, Cameras, Displays

UNIT - IV

The Physiology of Human Vision: From the Cornea to Photoreceptors, From Photoreceptors to the Visual Cortex, Eye Movements, Implications for VR

Visual Perception: Visual Perception - Perception of Depth, Perception of Motion, Perception of Color

Visual Rendering: Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates, Immersive Photos and Videos

UNIT - V

Motion in Real and Virtual Worlds: Velocities and Accelerations, the Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection

Interaction: Motor Programs and Remapping, Locomotion, Social Interaction

Audio: The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering

TEXT BOOKS:

1. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India; First edition (12 October 2016), ISBN-10: 9332578494.
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016

REFERENCE BOOKS:

1. Allan Fowler-AR Game Development‖, 1st Edition, A press Publications, 2018, ISBN 978- 1484236178
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009
4. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381
5. Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija — Utgivare Publisher. 2012. ISBN 978-951-38-7449-0
6. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
0	0	2	1

NATURAL LANGUAGE PROCESSING LAB (D76PC20)

Course Objective:

To Develop and explore the problems and solutions of NLP

Course Outcomes:

Upon completion of the course student will be able to

1. Develop sensitivity to linguistic phenomena and an ability to model them with formal grammars. L3
2. Apply Knowledge on NLTK Library implementation L3
3. Analyze Work on strings and trees, and estimate parameters using supervised and unsupervisedtraining methods. L4

List of Programs:

1. Write a Python Program to perform following tasks on text
   a) Tokenization b) Stop word Removal
2. Write a Python program to implement Porter stemmer algorithm for stemming
3. Write Python Program for a) Word Analysis b) Word Generation
4. Create a Sample list for at least 5 words with ambiguous sense and Write a Python programto implement WSD
5. Install NLTK tool kit and perform stemming
6. Create Sample list of at least 10 words POS tagging and find the POS for any given word
7. Write a Python program to
   a) Perform Morphological Analysis using NLTK library
   b) Generate n-grams using NLTK N-Grams library
   c) Implement N-Grams Smoothing
8. Using NLTK package to convert audio file to text and text file to audio files.

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.Bikel and Imed Zitouni, Pearson Publication.
2. Oreilly Practical natural Language Processing, A Comprehensive Guide to Building Real WorldNLP Systems.
3. Daniel Jurafsky, James H. Martin―Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

REFERENCE BOOK:

1. Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing with Python, First Edition, O'Reilly Media, 2009.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
AN AUTONOMOUS INSTITUTION
Accredited by 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

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B. Tech. VI Sem.

L	T	P	C
0	0	2	1

DEEP LEARNING LAB (D76PC21)

Course Objective:

Gain skills in evaluating model performance and improving model accuracy and efficiency.

Course Outcomes:

Upon completion of the course student will be able to

1. Develop programs to build DNN for text, speech, video and number classification. L3
2. Develop programs using CNN and its variants for the given tasks.L3
3. Build programs to develop auto encoders and generative adversarial networks for generating MNIST Handwritten Digits.L3

List of Programs:

1. Build a deep neural network model start with linear regression using a single variable.
2. Build a deep neural network model start with linear regression using multiple variables.
3. Write a program to convert speech into text.
4. Write a program to convert text into speech.
5. Write a program to convert video into frames.
6. Write a program for Time-Series Forecasting with the LSTM Model.
7. Build a feed forward neural network for prediction of logic gates.
8. Write a program to implement deep learning Techniques for image segmentation.
9. Write a program for object detection using image labeling tools.
10. Write a program to predict a caption for a sample image using LSTM.
11. Write a program for character recognition using CNN.
12. Write a program to predict a caption for a sample image using CNN.
13. Write a program for character recognition using RNN and compare it with CNN.
14. Write a program to detect Dog image using YOLO Algorithm.
15. Write a program to develop Autoencoders using MNIST Handwritten Digits.
16. Write a program to develop a GAN for Generating MNIST Handwritten Digits.

REFERENCE BOOKS:

1. Navin Kumar Manaswi, Deep Learning with Applications Using Python Chatbots and Face, Object, and Speech Recognition with Tenso Flow and Keras, A press, 2018.
2. Ian Good fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2016.
3. Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017.