BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE:ODALAREVU
(AUTONOMOUS)

B. Tech., CSE (AI & DS) (BR23) COURSE STRUCTURE & SYLLABUS
(Applicable from the academic year 2023-24 and onwards)

Course Structure – BR23

B. Tech. – III Year I Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1	23AD5T02	PCC	Artificial Intelligence	3	0	0	3
2	23AD5T03	PCC	Computer Networks	3	0	0	3
3	23AD5T04	PCC	Computer Organization and Architecture	3	0	0	3
4	23AD5D01 23CS5D01 23AD5D02 23AD5D03 23AD5D04	PE -I	1. Automata Theory & Compiler Design 2. Object Oriented Analysis and Design 3. Soft computing 4. Internet of Things 5. Exploratory Data Analysis with Python	3	0	0	3
5		OE- I		3	0	0	3
6	23AD5L02	PCC	Artificial Intelligence Lab	0	0	3	1.5
7	23CS5L07	PCC	Computer Networks Lab	0	0	3	1.5
8	23CS5S06	SEC	Full Stack Development -II SWAYAM Plus – Data Engineer / AI Engineer	0	1	2	2
9	23ES5L09	ES	Tinkering Lab *(User Interface Design using Flutter)* / SWAYAM Plus - Android Application Development (with Flutter)	0	0	2	1
10	23BS5P01	Evaluation of Community Service Project		-	-	-	2
		Total		15	01	10	23

Dr. N Ramakrishnaiah, Professor and HOD–CSE, UCEK, JNTUK Kakinada	Dr. U.S.N. Raju, Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. Jnaneswara Rao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A. Ramakrishna, Professor and HOD of CSE(AI&ML), AIML, CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson-BOS.

Scanned with CamScanner

BONAM VENKATA CHALAMAYYA ENGINERING COLLEGE
ODALAREVU – 533 210, Andhra Pradesh, India
Autonomous

III Year - I Semester	Code: 23AD5T02	L	T	P	C
		3	0	0	3

ARTIFICIAL INTELLIGENCE

Course Objectives:

- Gain a historical perspective of Artificial Intelligence (AI) and its foundations.
- Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool. Experiment with a machine learning model for simulation and analysis.
- Explore the current scope, potential, limitations, and implications of intelligent systems.

Course Outcomes: Students are able

CO Number	Course Outcome	Blooms Level
CO 1	Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.	BL 2
CO 2	Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game-based techniques to solve them.	BL 3
CO 3	Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing.	BL 2
CO 4	Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.	BL 4
CO 5	Solve problems with uncertain information using Bayesian approaches.	BL 2

UNIT I **15Hrs**

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI, Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening A*, constraint satisfaction

UNIT II **15Hrs**

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games, Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

logic, resolution refutation in proportional logic, predicate logic

UNIT III **12Hrs**

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames, advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cycle theory, case grammars, semantic web.

UNIT-IV **15Hrs**

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

UNIT V **12Hrs**

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Text Books:

1. Artificial intelligence, A modern Approach, 2nded, Stuart Russel, Peter Norvig, Prentice Hall
2. Artificial Intelligence, Saroj Kaushik, 1st Edition, CENGAGE Learning, 2011.

Reference Books:

1. Artificial intelligence, structures and Strategies for Complex problem solving, 5th Edition, George F Lugar, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer, 2017
3. Artificial Intelligence, A new Synthesis, 1st Edition, Nils J Nilsson, Elsevier, 1998
4. Artificial Intelligence- 3rd Edition, Rich, Kevin Knight, Shiv Shankar B Nair, TMH
5. Introduction To Artificial Intelligence And Expert Systems, 1st Edition, Patterson, Pearson India, 2015

Online Learning Resources:

1. https://archive.nptel.ac.in/courses/106/105/106105158/

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

III Year - I Semester	Code: 23AD5T03	L	T	P	C
		3	0	0	3

Computer Networks
(Common to CSE(AI&DS)/AIML/CSE(AI&ML))

Course Objectives:

The main objectives of the course is to

- To understand the different types of networks
- To develop an understanding, the principles of computer networks.
- To familiarize with Reference model OSI and TCP/IP
- To understand various layers of Reference models functions
- To explore network protocols

Course Outcomes: Students are able

CO Number	Course Outcome	Blooms Level
CO 1	Explain the fundamental types of computer networks, reference models (OSI and TCP/IP), and the historical evolution of the Internet.	BL2
CO 2	Explain Data Link Layer functions, protocols, error control, and Ethernet technologies.	BL2
CO 3	Explain network layer functions, routing, congestion control, and IP addressing (IPv4/IPv6).	BL4
CO 4	Compare transport layer protocols and their services (UDP, TCP, SCTP).	BL3
CO 5	Describe web services, HTTP, DNS, remote login,email,and file transfer protocols.	BL3

UNIT I **15Hrs**

Introduction: Types of Computer Networks, Reference Models- The OSI Reference Model, The TCP/IP Reference Model, A Critique of the OSI Model and Protocols, A Critique of the TCP/IP Reference Model. History of Internet.

UNIT II **15Hrs**

The Data Link Layer: Transmission Media, Guided and Un-guided media, Data Link Layer Design Issues, Services Provided To the Network Layer, Error detecting and Error Correcting codes, Elementary Data Link Protocols, Sliding Window Protocols, HDLC, PPP. Multiple Access Protocols Wired Lans: Ethernet, Fast Ethernet, Gigabit Ethernet

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao , Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson-BOS.

Scanned with CamScanner

UNIT III	**12Hrs**
The Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion, Congestion control algorithms. The Network Layer in the Internet, The IP Version 4 Protocol, IP Addresses- Classful, CIDR, NAT, IP Version 6 Protocol, Transition from IPV4 to IPV6	
UNIT IV	**15Hrs**
The Transport Layer: The Transport Layer Services, Transport Layer Protocols: UDP, TCP and SCTP	
UNIT V	**12Hrs**
The Application Layer: The World Wide Web, HTTP, Domain Name Space, Remote Loging, Electronic Mail and File Transfer	

Text Books:

1. "Computer Networks", Andrew S Tanenbaum, David J Wetherall, 5th Edition, Pearson
2. "Data Communications and Networking", Behrouz A Forouzan, 4th Edition, Tata McGraw Hill Education

Reference Books:

1. "Data and Computer Communication", William Stallings, Pearson
2. "TCP/IP Protocol Suite", Behrouz Forouzan, McGraw Hill.

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao , Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson-BOS.

Scanned with CamScanner

III Year - I Semester	Code: 23AD5T04	L	T	P	C
		3	0	0	3

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Objectives:

The purpose of the course is

- to introduce principles of computer organization and the basic architectural concepts.
- to provide an in depth understanding of basic organization, design, programming of a simple digital computer, computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems.
- Apply micro programmed control and CPU instruction concepts to execute program control operations.
- Explain memory hierarchy and input-output mechanisms including data transfer and interrupt handling

Course Outcomes: Students are able

CO Number	Course Outcome	Blooms Level
CO 1	Explain data representation and Boolean algebra concepts for digital computer systems.	BL2
CO 2	Design and implement combinational and sequential digital logic circuits using basic components.	BL3
CO 3	Analyze computer arithmetic and micro-operations in basic computer organization and design.	BL4
CO 4	Explain micro programmed control and CPU organization including instruction formats and program control.	BL2
CO 5	Explain memory hierarchy and input-output organization including transfer modes and interrupt handling.	BL2

UNIT I **15Hr**

Digital Computers and Data Representation: Introduction, Numbering Systems, Decimal to Binary Conversion, Binary Coded Decimal Numbers, Weighted Codes, Self-Complementing Codes, Cyclic Codes, Error Detecting Codes, Error Correcting Codes, Hamming Code for Error Correction, Alphanumeric Codes, ASCI Code **Data Representation:** Data types, Complements, Fixed Point Representation, Floating Point Representation.**Boolean Algebra and Logical gates**: Boolean Algebra : Theorems and properties, Boolean functions, canonical and standard forms , minimization of Boolean functions using algebraic identities; Karnaugh map representation and minimization using two and three variable Maps ;Logical gates ,universal gates and Two- level realizations using gates : AND-OR, OR-AND, NAND-NAND and NOR-NOR structures

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

UNIT II **15Hrs**

Digital logic circuits: Combinatorial Circuits: Introduction, Combinatorial Circuit Design Procedure, Implementation using universal gates, Multi-bit adder, Multiplexers, De- multiplexers, Decoders
Sequential Switching Circuits: Latches and Flip-Flops, Ripple counters using T flip-flops;
Synchronous counters: Shift Registers; Ring counters

UNIT III **12Hrs**

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Booth multiplication algorithm, Division Algorithms, Floating – point Arithmetic
operations.
Register Transfer language and microinstructions: Bus memory transfer, arithmetic and logical micro-operations, shift and rotate micro-operations
Basic Computer Organization and Design: Stored program concept, computer Registers, common bus system, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input–Output configuration and program Interrupt.

UNIT-IV **15Hrs**

Microprogrammed Control: Control memory, Address sequencing, microprogram example, design of control unit.
Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation
Program Control: conditional Flags and Branching

UNIT V **12Hrs**

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.
Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Text Books:

1.Digital Logic and Computer Design, Moriss Mano, 11th Edition, Pearson.
2.Computer System Architecture,3rd Edition, M.Morris Mano, PHI

Reference Books:

1.Digital Logic and Computer Organization, Rajaraman, Radha krishnan, PHI, 2006
2.Computer Organization, 5Th Edition, Hamacher, Vranesic, Zaky, TMH, 2002
3.Computer Organization & Architecture: Designing for Performance, 7th Edition, William Stallings, PHI, 2006

Online Learning Resources:

1.https://archive.nptel.ac.in/courses/106/105/106105158/

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

BONAM VENKATA CHALAMAYYA ENGINERING COLLEGE ODALAREVU – 533 210, Andhra Pradesh, India
Autonomous

III Year - I Semester	Code: 23AD5D01	L	T	P	C
		3	0	0	3

AUTOMATA THEORY AND COMPILER DESIGN
(Common to CSE(AI&DS)/AI&ML/CSE(AI&ML))

Course Objectives:
The main objectives of the course is to

- Understand and apply formal language theory.
- Design and implement parsers.
- Understand the phases of a compiler.
- Apply semantic analysis and error handling.
- Optimize intermediate and target code.

Course Outcomes: Students are able

CO Number	Course Outcome	Blooms Level
CO 1	Apply finite automata concepts for modeling and solving language and pattern recognition problems.	BL3
CO 2	Apply regular expressions and context-free grammars for language representation and pattern matching.	BL2
CO 3	Apply pushdown automata and Turing machines to analyze language classes and undecidable problems.	BL3
CO 4	Apply lexical and syntax analysis techniques using grammars and parsing methods in compiler design.	BL3
CO 5	Apply syntax-directed translation and intermediate code generation for implementing compiler phases.	BL4

UNIT I **15Hrs**

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 ϵ-transitions to NFA without ϵ-transitions. Conversion of NFA to DFA

UNIT II **15Hrs**

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

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 **12Hrs**

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 **15Hrs**

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 R18 B.Tech. CS&D Syllabus JNTU Hyderabad

UNIT V **12Hrs**

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

Text Books:

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

Reference Books:

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

Compiler Construction, Kenneth C. Loud en, Thomson. Course Technology

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

III Year - I Semester	Code: 23AD5D02	L	T	P	C
		3	0	0	3

SOFT COMPUTING

Course Objectives:

1.To introduce the concepts in Soft Computing such as Artificial Neural Networks, Fuzzy logic-based systems, genetic algorithm-based systems and their hybrids.
2.Design and train neural networks using perceptron, ADALINE, and back propagation algorithms.
3.Apply fuzzy logic concepts to model uncertainty using fuzzy sets and defuzzification techniques.
4. Develop fuzzy inference systems using fuzzy rules, propositions, and neuro-fuzzy hybrid models.
5. Apply genetic algorithms and hybrid systems for optimization and intelligent problem solving.

Course Outcomes: Students are able

CO Number	Course Outcome	Blooms Level
CO 1	Learn soft computing techniques and their applications	BL2
CO 2	Analyze various neural network architectures	BL4
CO 3	Define the fuzzy systems	BL1
CO 4	Understand the genetic algorithm concepts and their applications.	BL2
CO 5	Identify and select a suitable Soft Computing technology to solve the problem; construct a solution and implement a Soft Computing solution	BL4

UNIT I **15Hr**

Introduction to Soft Computing, Artificial neural networks, biological neurons, Basic models of artificial neural networks, Connections, Learning, Activation Functions, McCulloch and Pitts Neuron, Hebb network.

UNIT II **15Hrs**

Perceptron networks, learning rule, Training and testing algorithm, Adaptive Linear Neuron, Back propagation Network, Architecture, Training algorithm

UNIT III **12Hrs**

Fuzzy logic, fuzzy sets, properties, operations on fuzzy sets, fuzzy relations, operations on fuzzy relations, Fuzzy membership functions, fuzzification, Methods of membership, value assignments, intuition, inference, rank ordering, Lambda –Cuts for fuzzy sets , Defuzzification methods

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao , Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

UNIT IV	**15Hrs**
Truth values and Tables in Fuzzy Logic, Fuzzy propositions, Formation of fuzzy rules, Decomposition of rules, Aggregation of rules, Fuzzy Inference Systems, Mamdani and Sugeno types, Neuro-fuzzy hybrid systems, characteristics, classification	
UNIT V	**12Hrs**
Introduction to genetic algorithm, operators in genetic algorithm, coding, selection, crossover, mutation, stopping condition for genetic algorithm flow, Genetic-neuro hybrid systems, Genetic Fuzzy rule based system	
Text Books: 1. S. N. Sivanandam and S. N. Deepa, Principles of soft computing–John Wiley & Sons,2007. 2.Timothy J. Ross, Fuzzy Logic with engineering applications, John Wiley & Sons, 2016.	
Reference Books: 1.N.K. Sinhaand M.M. Gupta,Soft Computing & Intelligent Systems:Theory& Applications-Academic Press /Elsevier. 2009. 2.Simon Haykin, Neural Network-A Comprehensive Foundation-Prentice Hall International, Inc.1998 3.R. Eberhart and Y. Shi, Computational Intelligence: Concepts to Implementation, Morgan Kaufman/Elsevier, 2007. 4.BartKosko, Neural Network and Fuzzy Systems-Prentice Hall,Inc.,Englewood Cliffs, 1992 5.Goldberg D.E, Genetic Algorithms in Search ,Optimization , and Machine Learning Addison Wesley, 1989	
Online Learning Resources: 1.https://archive.nptel.ac.in/courses/106/105/106105158/	

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

BONAM VENKATA CHALAMAYYA ENGINERING COLLEGE
ODALAREVU – 533 210, Andhra Pradesh, India
Autonomous

III Year - I Semester	Code: 23AD5D03	L	T	P	C
		3	0	0	3

INTERNET OF THINGS
(Common to CSE(AI&DS)/AIML/CSE(AI&ML))

Course Objectives:
The main objectives of the course is to
- Vision and Introduction to Internet of Things(IoT).
- Understand IoT Market perspective.
- Data and Knowledge Management and use of Devices in IoT Technology.
- Understand State of the Art – IoT Architecture.
- Understand Real World IoT Design Constraints, Industrial Automation and Commercial

Course Outcomes: Students are able

CO Number	Course Outcome	Blooms Level
CO 1	Apply IoT concepts and connectivity principles using application layer protocols for smart device communication	BL3
CO 2	Analyze IoT/M2M architectures, business models, and standards to design efficient and affordable systems	BL4
CO 3	Design web and message communication protocols for connected devices ensuring efficient connectivity	BL5
CO 4	Analyze and organize IoT/M2M data for business process integration and informed decision-making	BL4
CO 5	Apply cloud platforms and sensor technologies for data collection, storage, and computing in IoT/M2M	BL3

UNIT I **15Hrs**

The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles For Connected Devices Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT II **15Hrs**

Business Models for Business Processes in the Internet of Things, IoT/M2M systems LAYERS AND designs standardizations, Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

UNIT III	**12Hrs**
Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.	
UNIT IV	**15Hrs**
Data Acquiring, Organizing and Analytics in IoT/M2M, Applications /Services /Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.	
UNIT V	**12Hrs**
Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.	
Text Books: 1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education 2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015	
Reference Books: 1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally,Wiley 2. Getting Started with the Internet of Things, Cuno Pfister , Oreilly	

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao , Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

BONAM VENKATA CHALAMAYYA ENGINERING COLLEGE ODALAREVU – 533 210, Andhra Pradesh, India
Autonomous

III Year - I Semester	Code: 23AD5D04	L	T	P	C
		3	0	0	3

EXPLORATORY DATA ANALYSIS WITH PYTHON
(Common to CSE(AI&DS)/AIML/CSE(AI&ML))

Course Objectives:
The main objectives of the course is to

- Introduce the fundamentals of Exploratory Data Analysis
- Cover essential exploratory techniques for understanding multivariate data by
- summarizing it through statistical methods and graphical methods.
- Evaluate the Models and select the best model
- Develop and evaluate machine learning models using complete workflow and real-world data analysis.

Course Outcomes: Students are able

CO Number	Course Outcome	Blooms Level
CO 1	Analyze datasets using EDA tools and techniques to interpret, preprocess, and extract insights.	BL2
CO 2	Datasets using appropriate visualizations and case-based EDA techniques to uncover patterns and insights.	BL4
CO 3	Analyze and apply data transformation techniques to preprocess, clean, and restructure datasets effectively	BL3
CO 4	datasets using descriptive statistical techniques to summarize distributions and reveal data patterns	BL3
CO 5	Analyze and evaluate machine learning models using appropriate preprocessing, training, and performance metrics	BL4

UNIT I **15Hrs**

Exploratory Data Analysis Fundamentals: Understanding data science, The significance of EDA, Steps in EDA, Making sense of data, Numerical data, Categorical data, Measurement scales, Comparing EDA with classical and Bayesian analysis, Software tools available for EDA, Getting started with EDA.

UNIT II **15Hrs**

Visual Aids for EDA: Technical requirements, Line chart, Bar charts, Scatter plot using seaborn, Polar

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

chart, Histogram, Choosing the best chart
Case Study: EDA with Personal Email, Technical requirements, Loading the dataset, Data transformation, Data cleansing, Applying descriptive statistics, Data refactoring, Data analysis.

UNIT III **12Hrs**

Data Transformation: Merging database-style dataframes, Concatenating along with an axis, Merging on index, Reshaping and pivoting, Transformation techniques, Handling missing data, Mathematical operations with NaN, Filling missing values, Discretization and binning, Outlier detection and filtering, Permutation and random sampling, Benefits of data transformation, Challenges.

UNIT IV **15Hrs**

Descriptive Statistics: Distribution function, Measures of central tendency, Measures of dispersion, Types of kurtosis, Calculating percentiles, Quartiles, Grouping Datasets, Correlation, Understanding univariate, bivariate, multivariate analysis, Time Series Analysis

UNIT V **12Hrs**

Model Development and Evaluation: Unified machine learning workflow, Data pre-processing, Data preparation, Training sets and corpus creation, Model creation and training, Model evaluation, Best model selection and evaluation, Model deployment
Case Study: EDA on Wine Quality Data Analysis

Text Books:

1. 1. Suresh Kumar Mukhiya, Usman Ahmed, Hands-On Exploratory Data Analysis with Python, Packt Publishing, 2020.

Reference Books:

1. 1. Ronald K. Pearson, Exploratory Data Analysis Using R, CRC Press, 2020
2. RadhikaDatar, Harish Garg, Hands-On Exploratory Data Analysis with R: Become an expert in exploratory data analysis using R packages, 1st Edition, Packt Publishing, 2019

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

BONAM VENKATA CHALAMAYYA ENGINERING COLLEGE
ODALAREVU – 533 210, Andhra Pradesh, India
Autonomous

III Year - I Semester	Code: 23AD5L02	L	T	P	C
		0	0	3	1.5

ARTIFICIAL INTELLIGENCE LAB

Course Objectives:

The aim of this course is to

1. Understand and apply fundamental concepts of Artificial Intelligence (AI) techniques.
2. Solve real-world problems using search, optimization, and reasoning algorithms.
3. Develop intelligent systems using rule-based inference, semantic networks, and constraint-solving.
4. Analyze and optimize decision-making in games and problem-solving scenarios.

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Understand the fundamental concepts of AI, including agent behavior, goal formulation, and state-space search.	BL2
CO2	Apply classical and uninformed search strategies for problem solving in AI	BL4
CO3	Analyze and implement heuristic and adversarial search algorithms to solve decision-making problems.	BL4
CO4	To implement semantic network-based knowledge representation systems and demonstrate the relationships among entities using nodes and edges	BL3
CO5	**To implement a** rule-based expert system **using** forward chaining, **allowing the system to** derive conclusions from known facts.	BL3

List of Experiments:

1. Implementation of DFS for water jug problem using PYTHON
2. Implementation of BFS for tic-tac-toe problem using PYTHON
3. Implementation of TSP using heuristic approach using PYTHON
4. Implementation of Simulated Annealing Algorithm using PYTHON
5. Implementation of Hill-climbing to solve 8-Puzzle Problem using PYTHON
6. Implementation of Monkey Banana Problem using PYTHON

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

7. Implementation of A* Algorithm using PYTHON
8. Implementation of AO* Algorithm using PYTHON
9. Implementation of Min-Max Game playing algorithm using PYTHON
10. Implementation Expert System with forward chaining using PYTHON
11. Implementation Expert System with backward chaining using PYTHON
12. Write a python program to implementation of an Expert System for COVID-19 Symptom Diagnosis Using a Knowledge-Based Approach.
13. Write the python program to implementation of Semantic Network Knowledge representation.
14. Write the python program to Implement and solve the cryptarithm problem "TWO + TWO = FOUR" as a Constraint Satisfaction Problem (CSP)
15. Develop the Python program to implementation of the Minimax Algorithm with Alpha-Beta Pruning to Optimize Decision-Making in Game Trees

Dr. N Ramakrishnaiah, Professor and HOD–CSE UCEK, JNTUK Kakinada	Dr. U.S.N. Raju,Associate Professor, Dept. of CSE, NIT, Warangal	Dr. V. Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr.B. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S. Rao Chintalapudi, Professor and HOD–CSE (AIML), CMR Technical Campus, Hyderabad	Dr.A.Ramakrishna, Professor and HOD of CSE(AI&ML), AIML CSE(AI&DS)
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson–BOS

Scanned with CamScanner

III Year - I Semester	Code: 23CS5L07	L	T	P	C
		0	0	3	1.5

COMPUTER NETWORKS LAB
(Common to CSE, CSE-(AI&DS), CSE(AI&ML), IT)

Course Objectives:

Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP. A lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Identify and set up various network devices and establish Local Area Networks (LANs).	BL3
CO2	Develop programs for error detection and correction using Hamming code and CRC algorithms.	BL4
CO3	Implement and evaluate congestion control mechanisms such as the Leaky Bucket algorithm.	BL5
CO4	Design and apply routing algorithms like Dijkstra's and Distance Vector to determine optimal network paths.	BL4

List of Experiments:

Experiment 1: Study of Network devices in detail and connect the computers in Local Area Network

Experiment 2: Write a Program to implement the data link layer farming methods such as i) Character stuffing ii) bit stuffing.

Experiment 3: Write a Program to implement data link layer farming method checksum.

Experiment 4: Write a program for Hamming Code generation for error detection and correction.

Experiment 5: Write a Program to implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.

Experiment 6: Write a Program to implement Sliding window protocol for Goback N.

Experiment 7: Write a Program to implement Sliding window protocol for Selective repeat.

Experiment 8: Write a Program to implement Stop and Wait Protocol.

Experiment 9: Write a program for congestion control using leaky bucket algorithm

Experiment 10: Write a Program to implement Dijkstra's algorithm to compute the Shortest path through a graph.

Experiment 11: Write a Program to implement Distance vector routing algorithm by obtaining routing table at each node
(Take an example subnet graph with weights indicating delay between nodes).

Dr. N Ramakrishnaiah, Professor and HOD-CSE UCEK, JNTUK Kakinada.	Dr. U.S.N. Raju, Assoc.Professor, Dept. of CSE, NIT, Warangal	Dr.V.Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr. B. Jnaneswara Rao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S.Rao Chintalapudi, Professor and HOD-CSE (AIML),CMR Technical campus, Hyderabad	Dr. Sheik Meera Sharif, Professor and Head of CSE
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairman-BOS.

Experiment 12: Write a Program to implement Broadcast tree by taking subnet of hosts.
Experiment 13: Wireshark i. Packet Capture Using Wire shark ii. Starting Wire shark iii. Viewing Captured Traffic iv. Analysis and Statistics & Filters
Experiment 14: How to run Nmap scan
Experiment 15: Operating System Detection using Nmap
Experiment 16: Do the following using NS2 Simulator i. NS2 Simulator-Introduction ii. Simulate to Find the Number of Packets Dropped iii. Simulate to Find the Number of Packets Dropped by TCP/UDP iv. Simulate to Find the Number of Packets Dropped due to Congestion v. Simulate to Compare Data Rate& Throughput.

Note: At the end of Lab course students have to complete a Mini Project/Case Study for evaluation of Internal Marks

Dr. N Ramakrishnaiah, Professor and HOD-CSE UCEK, JNTUK Kakinada.	Dr. U.S.N. Raju, Assoc.Professor, Dept. of CSE, NIT, Warangal	Dr.V.Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr. B. Jnaneswara Rao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S.Rao Chintalapudi, Professor and HOD-CSE (AIML),CMR Technical campus, Hyderabad	Dr. Sheik Meera Sharif, Professor and Head of CSE
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairman-BOS.

III Year - I Semester	Code: 23CS5S06	L	T	P	C
		0	1	2	2

FULL STACK DEVELOPMENT – II
(Common to CSE,CSE-(AI&DS),AIML,CSE(AI&ML))

Course Objectives:

The main objectives of the course are to

- Make use of router, template engine and authentication using sessions to develop application in ExpressJS.
- Build a single page application using RESTful APIs in ExpressJS
- Apply router and hooksin designing ReactJS application
- Make use of MongoDB queries to perform CRUD operations on document database

Experiments covering the Topics:

- ExpressJS – Routing, HTTP Methods, Middleware, Templating, Form Data
- ExpressJS – Cookies, Sessions, Authentication, Database, RESTful APIs
- ReactJS – Render HTML, JSX, Components – function & Class, Props and States, Styles, Respond to Events
- ReactJS – Conditional Rendering, Rendering Lists, React Forms, React Router, Updating the Screen
- ReactJS – Hooks, Sharing data between Components, Applications – To-do list and Quiz
- MongoDB – Installation, Configuration, CRUD operations, Databases, Collections and Records

Course Outcomes:

Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Develop server-side applications using ExpressJS with routing, middleware, and HTTP methods.	BL3
CO2	Implement user session management and authentication using cookies and sessions in ExpressJS.	BL4
CO3	Apply advanced ReactJS concepts such as conditional rendering, list rendering, forms, routing, hooks, and data sharing between components.	BL6
CO4	Design and implement real-world web applications by integrating front-end, back-end, and database technologies.	BL5

List of Experiments:

Experiment 1: ExpressJS – Routing, HTTP Methods, Middleware.

a. Write a program to define a route, Handling Routes, Route Parameters, Query Parameters and. URL building

b. Write a program to accept data, retrieve data and delete a specified resource using http methods.

Dr. N Ramakrishnaiah, Professor and HOD-CSE UCEK, JNTUK Kakinada.	Dr. U.S.N. Raju, Assoc.Professor, Dept. of CSE, NIT, Warangal	Dr.V.Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr. B. Jnaneswara Rao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S.Rao Chintalapudi, Professor and HOD-CSE (AIML),CMR Technical campus, Hyderabad	Dr. Sheik Meera Sharif, Professor and Head of CSE
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairman-BOS.

c. Write a program to show the working of middleware.
Experiment 2: ExpressJS – Templating, Form Data
a. Write a program using templating engine.
b. Write a program to work with form data.
Experiment 3: ExpressJS – Cookies, Sessions, Authentication
a. Write a program for session management using cookies and sessions.
b. Write a program for user authentication.
Experiment 4: ExpressJS – Database, RESTful APIs
a. Write a program to connect MongoDB database using Mangoose and perform CRUD operations.
b. Write a program to develop a single page application using RESTful APIs
Experiment 5: ReactJS – Render HTML, JSX, Components – function & Class
a. Write a program to render HTML to a web page.
b. Write a program for writing markup with JSX.
c. Write a program for creating and nesting components (function and class).
Experiment 6. ReactJS – Props and States, Styles, Respond to Events
a. Write a program to work with props and states.
b. Write a program to add styles (CSS & Sass Styling) and display data.
c. Write a program for responding to events.
Experiment 7. ReactJS – Conditional Rendering, Rendering Lists, React Forms
a. Write a program for conditional rendering.
b. Write a program for rendering lists.
c. Write a program for working with different form fields using react forms.
Experiment 8. ReactJS – React Router, Updating the Screen
a. Write a program for routing to different pages using react router.
b. Write a program for updating the screen.
Experiment 9. ReactJS – Hooks, Sharing data between Components
a. Write a program to understand the importance of using hooks.
b. Write a program for sharing data between components.
Experiment 10. MongoDB – Installation, Configuration, CRUD operations
a. Install MongoDB and configure ATLAS
b. Write MongoDB queries to perform CRUD operations on document using insert(), find(), update(), remove()
Experiment 11:MongoDB – Databases, Collections and Records
a. Write MongoDB queries to Create and drop databases and collections.
b. Write MongoDB queries to work with records using find(), limit(), sort(), createIndex(),

Dr. N Ramakrishnaiah, Professor and HOD-CSE UCEK, JNTUK Kakinada.	Dr. U.S.N. Raju, Assoc.Professor, Dept. of CSE, NIT, Warangal	Dr.V.Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr. B. Jnaneswara Rao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S.Rao Chintalapudi, Professor and HOD-CSE (AIML),CMR Technical campus, Hyderabad	Dr. Sheik Meera Sharif, Professor and Head of CSE
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairman-BOS.

aggregate().
Experiment 12. Augmented Programs: (Any 2 must be completed) 1. Design a to-do list application using NodeJS and ExpressJS. 2. Design a Quiz app using ReactJS. 3. Complete the MongoDB certification from MongoDB University website.
Text Books: 1. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly. 2. Node.Js in Action, Mike Cantelon, Mark Harter, T.J. Holowaychuk, Nathan Rajlich,Manning Publications. (Chapters 1-11) 3. React Quickly, AzatMardan,Manning Publications(Chapters 1-8,12-14)
Web Links: 1. ExpressJS - https://www.tutorialspoint.com/expressjs 2. ReactJS - https://www.w3schools.com/REACT (and) https://react.dev/learn# 3. MongoDB - https://learn.mongodb.com/learning-paths/introduction-to-mongodb

Dr. N Ramakrishnaiah, Professor and HOD-CSE UCEK, JNTUK Kakinada.	Dr. U.S.N. Raju, Assoc.Professor, Dept. of CSE, NIT, Warangal	Dr.V.Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr. B. Jnaneswara Rao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr. S.Rao Chintalapudi, Professor and HOD-CSE (AIML),CMR Technical campus, Hyderabad	Dr. Sheik Meera Sharif, Professor and Head of CSE
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairman-BOS.

III Year - I Semester	Code: 23ES5L09	L	T	P	C
		0	0	2	1

TINKERING LAB
USER INTERFACE DESIGN USING FLUTTER
(Common to CSE,CSE-(AI&DS),AIML,CSE(AI&ML),IT)

Course Objectives:

The main objectives of the course are to

- Learns to Implement Flutter Widgets and Layouts
- Understands Responsive UI Design and with Navigation in Flutter
- Knowledge on Widges and customize widgets for specific UI elements, Themes
- Understand to include animation apart from fetching data

Course Outcomes: Students are able

CO Number	Course Outcome	Blooms Level
CO 1	Install and configure the Flutter and Dart environment, and demonstrate Dart programming basics.	BL2
CO 2	Develop responsive user interfaces adaptable to various screen sizes using media queries and layout management.	BL3
CO 3	Create custom widgets and apply themes and styling to enhance UI consistency and aesthetics.	BL6
CO 4	Integrate animations into UI components to improve user experience using Flutter's animation features.	BL3

List of Experiments:

Students need to implement the following experiments

Experiment 1:

a) Install Flutter and Dart SDK.
b) Write a simple Dart program to understand the language basics

Experiment 2:

a) Explore various Flutter widgets (Text, Image, Container, etc.)
b) Implement different layout structures using Row, Column, and Stack widgets

Experiment 3:

a) Design a responsive UI that adapts to different screen sizes.
b) Implement media queries and breakpoints for responsiveness.

Experiment 4:

a) Set up navigation between different screens using Navigator.
b) Implement navigation with named routes.

Dr. N Ramakrishnaiah, Professor and HOD-CSE UCEK, JNTUK Kakinada.	Dr.U.S.N.Raju, Assoc. Professor, Dept. of CSE, NIT, Warangal	Dr.V.Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr.S.Rao Chintalapudi, Professor and HOD-CSE (AIML),CMR Technical campus,Hyderabad	Dr. MeeraSharif, Professor and Head of CSE
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson-BOS.

Experiment 5:
a) Learn about stateful and stateless widgets.
b) Implement state management using set State and Provider

Experiment 6:
a) Create custom widgets for specific UI elements.
b) Apply styling using themes and custom styles

Experiment 7:
a) Design a form with various input fields.
b) Implement form validation and error handling

Experiment 8:
a) Add animations to UI elements using Flutter's animation framework.
b) Experiment with different types of animations (fade, slide, etc.).

Experiment 9:
a) Fetch data from a REST API.
b) Display the fetched data in a meaningful way in the UI.

Experiment 10:
a) Write unit tests for UI components.
b) Use Flutter's debugging tools to identify and fix issues.

Text Books:

1. Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development.
2. Rap Payne, Beginning App Development with Flutter: Create Cross-Platform Mobile Apps 1st Edition, Apres
3. Richard Rose, Flutter & Dart Cookbook, Developing Full stack Applications for the Cloud, Oreilly..

Dr. N Ramakrishnaiah, Professor and HOD-CSE UCEK, JNTUK Kakinada.	Dr.U.S.N.Raju, Assoc. Professor, Dept. of CSE, NIT, Warangal	Dr.V.Venkata Krishna, Dean of Computer Science, JBIET, Hyderabad	Mr. JnaneswaraRao, Senior Machine Learning Expert HC Robotics Pvt. Ltd., Hyderabad	Dr.S.Rao Chintalapudi, Professor and HOD-CSE (AIML),CMR Technical campus,Hyderabad	Dr. MeeraSharif, Professor and Head of CSE
University Nominee	Subject Expert	Subject Expert	Industrial Expert	Alumni Expert	Chairperson-BOS.