ARTIFICIAL INTELLIGENCE R20 – Course Structure (W.E.F. A.Y. 2021-22)

B.Tech I Year I Semester

Category	Course Title	L	T	P	Credits
BS – 1	Mathematics-I	3	1	0	4.0
BS – 2	Chemistry	3	1	0	4.0
BS Lab – 1	Chemistry Lab	0	0	3	1.5
ES - 1	Basic Electrical Engineering	3	0	0	3.0
ES Lab - 1	Basic Electrical Engineering Lab	0	0	2	1.0
ES Lab – 2	Engineering Workshop	0	1	3	2.5
H&S Lab – 1	English Language Skills Lab (ELSL)	0	0	2	1.0
ES – 2	Programming for Problem Solving-I	2	0	0	2.0
ES Lab – 3	Programming for Problem Solving Lab-I	0	0	2	1.0
	Total	**11**	**3**	**12**	**20**

B.Tech I Year II Semester

Category	Course Title	L	T	P	Credits
BS – 3	Mathematics-II	3	1	0	4.0
BS – 4	Applied Physics	3	1	0	4.0
BS Lab – 2	Physics Lab	0	0	3	1.5
H&S – 1	English	2	0	0	2.0
H&S Lab – 2	English Communication Skills Lab (ECSL)	0	0	2	1.0
ES – 3	Programming for Problem Solving-II	2	0	0	2.0
ES Lab - 4	Programming for Problem Solving Lab-II	0	0	2	1.0
ES – 4	Engineering Graphics & Modeling	1	0	3	2.5
	Total	**11**	**2**	**10**	**18**

S. Ghosh.

Dr. B. VASANTH

B.TECH SECOND YEAR AI R20 COURSE STRUCTURE (W.E.F. A.Y. 2021-22)

B.Tech II Year I Semester

Category	Course Title	L	T	P	Credits
BS – 5	Probability and Statistics for Artificial Intelligence (PSAI)	3	0	0	3
ES – 5	Electronic Devices & Circuits (EDC)	3	0	0	3
ES – 6	Digital Logic Design(DLD)	3	0	0	3
PC – 1	Introduction to Artificial Intelligence (IAI)	3	0	0	3
PC – 2	Mathematical Foundations of Computer Science (MFCS)	3	0	0	3
PC – 3	Concepts of Data Structures (CDS)	3	0	0	3
PC Lab – 1	Data Structures using C++ Lab	0	0	2	1
ES Lab – 5	Digital Logic Design and Electronic Devices & Circuits Lab	0	0	2	1
MC – 1	Cyber Law (CL)	2	0	0	0
	Total	20	0	4	20

B.Tech II Year II Semester

Category	Course Title	L	T	P	Credits
PC – 4	Design & Analysis of Algorithms (DAA)	4	0	0	4
ES – 7	Computer Organization and Architecture (COA)	3	0	0	3
PC – 5	Database Management Systems (DBMS)	3	0	0	3
PC – 6	Machine Learning (ML)	3	0	0	3
PC – 7	Essentials of Python (EP)	3	0	0	3
H&S – 2	Professional Communication (PC)	1	0	2	2
PC Lab – 2	Database Management Systems Lab	0	0	2	1
PC Lab – 3	Machine Learning using Python Lab	0	0	2	1
MC – 2	Environmental Science (ES)	2	0	0	0
	Total	19	0	6	20

S. Ghosh.

Dr. G. VASANTH

B.TECH THIRD YEAR AI R20 COURSE STRUCTURE (W.E.F. A.Y. 2021-22)

B.Tech III Year I Semester (Non Fast Track Batch)

Category	Course Title	L	T	P	Credits
PC – 8	Java Programming (JP)	3	0	0	3
PC – 9	Operating Systems (OS)	3	0	0	3
H&S – 3	Managerial Economics & Financial Analysis (MEFA)	3	0	0	3
PC – 10	Formal Languages and Automata Theory (FLAT)	3	0	0	3
PE – 1	A) Introduction to Data Science (IDS) B) Software Engineering (SE) C) Information Retrieval Systems (IRS) D) Drone	3	0	0	3
OE – 1	Open Elective : The subject offered by other departments	3	0	0	3
PC Lab – 4	Java Programming Lab	0	0	2	1
H&S Lab – 3	Advanced Communication Skills (ACS) Lab	0	0	2	1
Value Added Course – 1	Personality Development & Behavioural Skills (PDBS) / Quantitative Methods & Logical Reasoning (QMLR)	2	0	0	1
	Total	**20**	**0**	**4**	**21**

B.Tech III Year II Semester (Non Fast Track Batch)

Category	Course Title	L	T	P	Credits
PC – 11	Computer Networks (CN)	3	0	0	3
PC – 12	Artificial Neural Network (ANN)	3	0	0	3
PC – 13	Natural Language Processing (NLP)	3	0	0	3
PC - 14	Robotics	3	0	0	3
PE - 2	A) Web Technologies (FSWT) B) Compiler Design (CD) C) Data Warehousing & Data Mining (DWDM) D) Cloud Computing (CC)	3	0	0	3
OE - 2	Open Elective : The subject offered by other departments	3	0	0	3
PC Lab - 5	Artificial Neural Network Lab	0	0	2	1
PC Lab – 6	Robotics Lab	0	0	2	1
Value Added Course - 2	Personality Development & Behavioural Skills (PDBS) / Quantitative Methods & Logical Reasoning (QMLR)	2	0	0	1
	Total	**20**	**0**	**4**	**21**

B.TECH THIRD YEAR AI R20 COURSE STRUCTURE (W.E.F. A.Y. 2021-22)

B.Tech III Year I Semester (Fast Track Batch)

Category	Course Title	L	T	P	Credits
PC – 8	Java Programming (JP)	3	0	0	3
PC – 9	Operating Systems (OS)	3	0	0	3
H&S – 3	Managerial Economics & Financial Analysis (MEFA)	3	0	0	3
PC – 11	Formal Languages and Automata Theory (FLAT)	3	0	0	3
PE – 1	A) Introduction to Data Science (IDS) B) Software Engineering (SE) C) Information Retrieval Systems (IRS) D) Drone	3	0	0	3
OE – 1	Open Elective : The subject offered by other departments	3	0	0	3
PC Lab – 4	Java Programming Lab	0	0	2	1
H&S Lab – 3	Advanced Communication Skills (ACS) Lab	0	0	2	1
Value Added Course – 1	Personality Development & Behavioural Skills (PDBS) / Quantitative Methods & Logical Reasoning (QMLR)	2	0	0	1
	Total	20	0	4	21

B.Tech III Year II Semester (Fast Track Batch)

Category	Course Title	L	T	P	Credits
PC – 11	Computer Networks (CN)	3	0	0	3.0
PC – 12	Artificial Neural Network (ANN)	3	0	0	3.0
PC – 13	Natural Language Processing (NLP)	3	0	0	3.0
PC - 14	Robotics	3	0	0	3.0
PE - 2	A) Web Technologies (FSWT) B) Compiler Design (CD) C)Data Warehousing & Data Mining (DWDM) D) Cloud Computing (CC)	3	0	0	3.0
OE - 2	Open Elective : The subject offered by other departments	3	0	0	3.0
PC Lab - 5	Artificial Neural Network Lab	0	0	2	1.0
PC Lab – 6	Robotics Lab	0	0	2	1.0
Value Added Course –2	Personality Development & Behavioural Skills (PDBS) / Quantitative Methods & Logical Reasoning (QMLR)	2	0	0	1.0
** PC 17	Industrial AI (IAI)	3	0	0	3.0
	Total	23	0	4	24

Dr. G. VASANTH

B.TECH FINAL YEAR AI COURSE STRUCTURE (W.E.F. A.Y. 2021-22)

B.Tech IV Year I Semester (Non Fast Track Batch)

Category	Course Title	L	T	P	Credits
PC – 15	Computer Vision (CV)	3	0	0	3
PC – 16	Deep Learning (DL)	3	0	0	3
OE – 3	**Open Elective :** The subject offered by other departments	3	0	0	3
PE – 3	A) R Programming (RP) B) Block chain Technologies C) Mobile Application Development (MAD) D) Programming with Julia (PWJ)	3	0	0	3
PE – 4	A) Big Data Analytics (BDA) B) Internet of Things (IoT) C) Advanced Databases (ADB) D) Human Computer Interaction (HCI)	3	0	0	3
PC Lab – 7	Computer Vision Lab	0	0	2	1
PE 3 Lab	A) R Programming Lab B) Block chain Technologies C) Mobile Application Development Lab D) Programming with Julia Lab	0	0	2	1
PW	Industry Oriented Mini Project	0	0	0	3
	Total	15	0	4	20

B.Tech IV Year II Semester (Non Fast Track Batch)

Category	Course Title	L	T	P	Credits
** PC 17	Industrial AI (IAI)	3	0	0	3
** PC 18	Software Project Management (SPM)	3	0	0	3
PW	Technical Seminar	0	0	4	2
PW	Comprehensive Viva Voce	0	0	0	2
PW	Major Project	0	0	20	10
	Total	6	0	24	20

** Marked subjects will be offered in 3 – II and 4 – I for Fast Track students.

S. Ghosh.

Dr. B. VASANTH

B.TECH FINAL YEAR AI COURSE STRUCTURE (W.E.F. A.Y. 2021-22)

B.Tech IV Year I Semester (Fast Track Batch)

Category	Course Title	L	T	P	Credits
PC – 15	Computer Vision (CV)	3	0	0	3
PC – 16	Deep Learning (DL)	3	0	0	3
OE – 3	**Open Elective :** The subject offered by other departments	3	0	0	3
PE – 3	A) R Programming (RP) B) Block chain Technologies C) Mobile Application Development (MAD) D) Programming with Julia (PWJ)	3	0	0	3
PE – 4	A) Big Data Analytics (BDA) B) Internet of Things (IoT) C) Advanced Databases (ADB) D) Human Computer Interaction (HCI)	3	0	0	3
PC Lab – 7	Computer Vision Lab	0	0	2	1
PE 3 Lab	A) R Programming Lab B) Block chain Lab C) Mobile Application Development Lab D) Programming with Julia Lab	0	0	2	1
** PC18	Software Project Management (SPM)	3	0	0	3
PW	Mini Project	0	0	0	3
	Total	15	0	4	23

B.Tech IV Year II Semester (Fast Track Batch)

Category	Course Title	L	T	P	Credits
PW	Technical Seminar	0	0	4	2
PW	Comprehensive Viva Voce	0	0	0	2
PW	Major Project	0	0	20	10
	Total	6	0	24	14

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
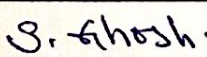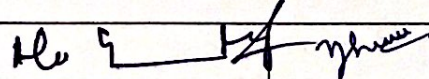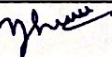(Aziz Nagar, C B Post, Hyderabad -500075)

R20

II YEAR B.Tech. AI – I Sem	L	T	P	C
	3	0	0	3

Introduction to Artificial Intelligence

Course Outcomes:
Student will be able to:

1. Understand the basic concepts and environment of Artificial intelligence.
2. Analyze various uniformed and informed search algorithm related to artificial intelligence.
3. Design various simple and complex network with real time applications.
4. Analyze the basic principles Markov Decision with real time applications.
5. Illustrate various types of Reinforcement Learning learning.

Unit – I
Concept of AI, History, Current Status, Scope, Intelligent Agents, Environments, Problem Formulations, Review of Tree and Graph Structures, State Space Representation, Search Graph and Search Tree.

Unit – II
Uninformed and Informed Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search : Generate & Test, Hill Climbing, Best first search, A* algorithm, Game Search, Alpha-Beta Pruning Genetic Algorithm

Unit – III
Probabilistic Reasoning : Probability, Conditional Probability, Bayes Rule, Bayesian Networks- Representation, Construction and Inference, Temporal Model, Hidden Markov Model, Dynamic Bayesian networks (DBN), Natural Language Processing using HMM

Unit – IV
Markov Decision Process, MDP Formulation, Utility Theory, Utility Functions, Value Iteration, Policy Iteration and Partially Observable MDPs.

Unit – V
Reinforcement Learning : Passive Reinforcement Learning, Direct Utility Estimation, Adaptive dynamic Programming, Temporal Difference Learning, Active Reinforcement Learning- Q Learning.
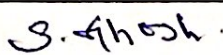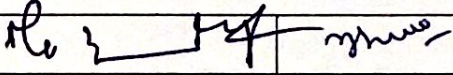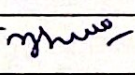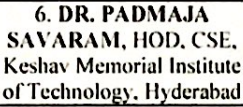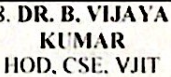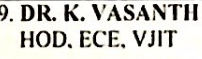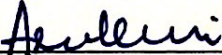
TEXT BOOKS:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill

REFERENCE BOOKS:

1. Trivedi, M.C., "A Classical Approach to Artificial Intelligence", Khanna Publishing House, Delhi.
2. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011

BOS Members' Signatures :-

1. Dr.SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)
R20

II YEAR B.Tech. AI – I Sem		L	T	P	C
		3	0	0	3

Mathematical Foundations of Computer Science

Course Outcomes:
At the end of the course student would be able to
1. Analyze elementary mathematical arguments.
2. Apply discrete mathematics problems that involve computing permutations and combinations of a set.
3. Analyze problems involving recurrence relations & generating functions.
4. Demonstrate various operations on discrete structures.
5. Apply graph theory models to solve the problems of networks.

UNIT - I:
Foundations: Basics, Sets, Statements, Connectives, Normal Forms, Fundamentals of Logic, Logical Inferences, First order logic and other methods of Proof, Rules of Inference for Quantified Propositions.

UNIT - II:
Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumerating Combinations and Permutations with & without repetitions, constrained repetitions, Pigeon hole principle, Inclusion-Exclusion principle.

UNIT - III:
Recurrence Relations: Generating Functions, Calculating coefficient of Generating Function, Solving Recurrence relations by substitution method and Generating Functions, The Method of Characteristic Roots, Solutions to inhomogeneous recurrence relations, Binomial Theorem.

UNIT - IV:
Relations and Digraphs: Relations and Directed Graphs, Special Properties of Binary Relations, Equivalence Relations, Ordering Relations, Lattice, Paths and Closures, Directed Graphs and adjacency matrices.

UNIT - V:
Graphs Basic Concepts, Isomorphism and Sub-graphs, Trees and Their Properties, Spanning Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.
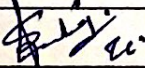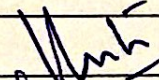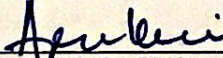
Text Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians by JoeL.Mott, Abraham Kandel, Theodare P.Baker, Second Edition, PHI,2009.
2. Discrete Mathematical Structures with Applications to Computer Science, Tremblay J P and Manohar R, Tata McGraw Hill Publishing Company Limited, New Delhi,2007.

Reference Books:

1. Discrete Mathematics R.K.Bisht, H.S.Dhami, OXFORD HigherEducation.
2. Discrete Mathematics and its ApplicationsI, Kenneth H Rosen, Tata McGraw Hill Publishing Company Limited, New Delhi, Sixth Edition,2007.

BOS Members' Signatures:

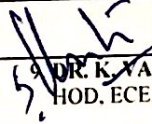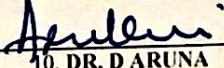|			
S. Ghosh.			
1. Dr.SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E, New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

II YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Concepts of Data Structures

Course Outcomes:

At the end of the course student would be able to

1. Analyze the representation of various static, dynamic and hierarchical data structures.
2. Design and implement the mechanism of stacks, general tree data structures with their applications.
3. Implementation of various advanced concepts of binary trees with real time applications.
4. Implement various algorithms on graph data structures, including finding the minimum spanning tree , shortest path with real time applications etc
5. Outline the concepts of hashing, collision and its resolution methods using hash function.

UNIT - I

C++ Programming Concepts: Review of C, input and output in C++, functions in C++- value parameters, reference parameters, Parameter passing, arrays, pointers, new and delete operators. **OOPs Concepts:** class and object, access specifiers, constructors and destructor, Inheritance and Polymorphism, Exception Handling .

Basic Concepts - Data objects and Structures, Algorithm Specification- Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations, Complexity Analysis Examples, Introduction to Linear and Non Linear data structures.

UNIT - II

Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

Linear list ADT-array representation and linked representation, Stack ADT, definition, array and linked implementations, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation, Queue ADT, definition, array and linked Implementations, Circular queues-Insertion and deletion operations. Singly Linked Lists-Operations-Insertion, Deletion, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations- Insertion, Deletion.

UNIT - III

Trees – definition, terminology, Binary trees-definition, Properties of Binary Trees, Binary Tree ADT, representation of Binary Trees-array and linked representations, Binary Tree traversals, Threaded binary trees, Priority Queues –Definition and applications, Max Priority Queue ADT-implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap.

UNIT - IV

Searching - Linear Search, Binary Search, Hashing-Introduction, hash tables, hash functions, Overflow Handling, Comparison of Searching methods.

Sorting-Insertion Sort, Selection Sort, Radix Sort, Quick sort, Heap Sort, Merge sort, Comparison of Sorting methods.

UNIT - V

Graphs–Definitions, Terminology, Applications and more definitions, Properties, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph Search methods - DFS and BFS, Complexity analysis,

Search Trees-Binary Search Tree ADT, Definition, Operations- Searching, Insertion and Deletion, Balanced search trees-AVL Trees-Definition and Examples only, B-Trees-Definition and Examples only, Red-Black Trees-Definitions and Examples only, Comparison of Search Trees.

TEXT BOOKS:

1. Data structures, Algorithms and Applications in C++, 2nd Edition, SartajSahni, Universities Press.
2. Data structures and Algorithms in C++, Adam Drozdek, 4th edition, Cengage learning.

REFERENCE BOOKS:

1. Data structures with C++, J. Hubbard, Schaum's outlines, TMH.
2. Data structures and Algorithms in C++, M.T. Goodrich, R. Tamassia and D. Mount, Wiley India.
3. Data structures and Algorithm Analysis in C++, 3rd edition, M. A. Weiss, Pearson.
4. Classic Data Structures, D. Samanta, 2nd edition, PHI.

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
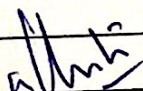(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad -500075)
R20

BOS Members' Signatures:-

S. Ghosh.			
1. Dr.SIDDARTHA GHOSH Chairman, BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM. HOD. CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD. CSE, VJIT
9. DR. K. VASANTH HOD, ECE. VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

II YEAR B.Tech. AI – I Sem   **L T P C**

                                                                          0 0 2 1

Data Structure using C++ Lab

1. Write a C++ program for displaying Student details using Classes and Objects
2. Write a C++ program that uses stack operations to convert a given infix expression into its postfix equivalent, Implement the stack using an array.
3. Write a C++ program to implement a double ended queue ADT using an array, using a doubly linked list.
4. Write a C++ program that uses functions to perform the following:
   a. Create a singly linked list of integers.
   b. Delete a given integer from the above linked list.
   c. Display the contents of the above list after deletion.
5. Write a template based C++ program that uses functions to perform the following:

   a. Create a doubly linked list of elements.
   b. Delete a given element from the above doubly linked list.
   c. Display the contents of the above list after deletion.
6. Write a C++ program that uses functions to perform the following:

   a. Create a binary search tree of characters.
   b. Traverse the above Binary search tree recursively in preorder, in order and post order,
7. Write a C++ program that uses function templates to perform the following:

   a. Search for a key element in a list of elements using linear search.
   b. Search for a key element in a list of sorted elements using binary search.
8. Write a C++ program that implements Insertion sort algorithm to arrange a list of integers in ascending order.
9. Write a template based C++ program that implements selection sort algorithm to arrange a list of elements in descending order.
10. Write a template based C++ program that implements Quick sort algorithm to arrange a list of elements in ascending order.
11. Write a C++ program that implements Heap sort algorithm for sorting a list of integers in ascending order.
12. Write a C++ program that implements Merge sort algorithm for sorting a list of integers in ascending order
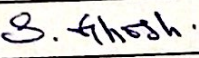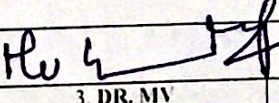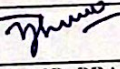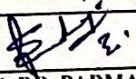
13. Write a C++ program to implement all the functions of a dictionary (ADT) using hashing.

14. Write a C++ program that implements Radix sort algorithm for sorting a list of integers in ascending order

   a. Write a C++ program that uses functions to perform the following: Create a binary search tree of integers.

   b. Traverse the above Binary search tree non recursively in inorder.\

BOS Members' Signatures:-

S. Ghosh.		He L	
1. Dr.SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
			DATE OF BOS MEETING
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	14-07-2021

II YEAR B.Tech. AI – II Sem.

L	T	P	C
4	0	0	4

Design and Analysis of Algorithm

Course Outcomes:

At the end of the course student would be able to

1. Analyse the efficiency of algorithms
2. Develop algorithms divide & conquer, greedy and related problems
3. Examine the performance of Dynamic programming
4. Explain performance of algorithm using Backtracking
5. Analyse NP-Hard and NP-Complete problems

UNIT I:

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Disjoint Sets- disjoint set operations, union and find operations.

Divide and conquer: General method, applications Binary search, Quick sort, Merge sort, Stassen's matrix multiplication.

UNIT II:

Graphs: Breadth First Search, Depth First Search, spanning trees, connected and bi-connected components

Greedy method: General method, Applications- Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT III:

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT IV:

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Branch and Bound: General method, applications Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT V:

Lower Bound Theory: Comparison Trees, **NP-Hard and NP-Complete problems:** Basic concepts, non-deterministic algorithms, NP Hard and NP Complete classes, Satisfiability problem, Clique Decision Problem (CDP), Node cover decision problem.
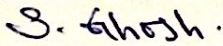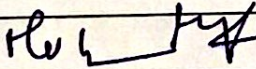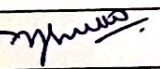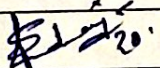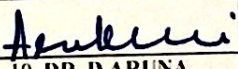
Text Books:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharan, Galgotia publications Pvt.Ltd.
2. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearsoneducation.

References:

1. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, McGrawHill.
2. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearsoneducation.

BOS Members' Signatures :-

S. Ghosh.			
1. Dr.SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD. UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

II YEAR B.Tech. AI – II Sem	L	T	P	C
	3	0	0	3

Database Management Systems

Course Outcomes:

At the end of the course student would be able to

1. Understand the concepts of Entity-Relationship Model for enterprise level databases.
2. Analyze the database and provide restricted access to different users of database.
3. Understand various Normal forms to carry out schema refinement.
4. Analyze various Concurrency control protocols.
5. Understand working principles of Recovery algorithms

UNIT-I:

Introduction to Database System Concepts: Database-System Applications, Purpose of Database Systems, View of data, Database Language, Database Architecture, Database Users and Administrators.

Introduction to the Relation Models and Database Design using ER Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Feature, Structure of relational databases , database schema.

UNIT-II:

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions Nested Sub queries, Modification of the Database.

Intermediate and Advanced SQL: Join Expressions, Views, Integrity Constraints, SQL Data Types, Authorization, Functions and Procedures, Triggers.

UNIT-III:

Formal Relational Query Languages: The Relational operations, The Tuple Relational Calculus, The Domain Relational Calculus.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Decomposition Using Multi valued Dependencies, BCNF.

UNIT-IV:

Transactions: Transaction Concept, a Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity.

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Timestamp- Based Protocols, Validation based protocols.

UNIT-V:

Recovery System: Failure Classification, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, ARIES, Remote Backup Systems.
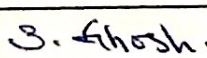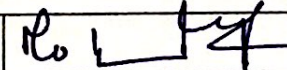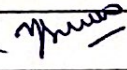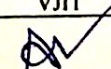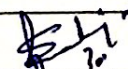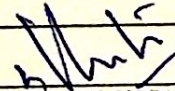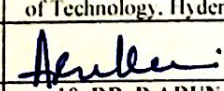
Text Books:

1. Abraham Silberschatz, Henry F. Korth, S.Sudarshan, Database System ConceptsI,6thEdition, Tata McGraw-Hill.
2. RaghuRamaKirshna,JohannesGehrk,DatabaseManagementSystemITataMcGrawHi ll 3rd Edition.

Reference Books:

1. PeterRob&CarlosCoronel DatabaseSystemConceptsCengageLearning.
2. RamezElmasri, ShamkanthB. Navrate–FundamentalsofDatabaseSystems7thEdition, Pearson Education.
3. C.J. Date Introduction to Database Systems PearsonEducation

BOS Members' Signatures:-

B. Ghosh.			
1. Dr.SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
			DATE OF BOS MEETING
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	14-07-2021

II YEAR B.Tech. AI – II Sem	L T P C
	3 0 0 3

Machine Learning

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

1. Understanding Machine Learning & it's applications
2. Understanding Supervised, Unsupervised and Reinforcement Machine Learning
3. Understanding important Machine Learning Algorithms
4. Learning different Machine Learning tools
5. Comprehension of clustering and classification problems

Unit – I
Introduction to Machine Learning, History, Current Status, Application of Machine Learning, Relation between Artificial Intelligence and Machine Learning, Data Driven Machine Learning, Types of Machine Learning : Supervised Learning, Unsupervised Learning, Learning Systems, Concept Learning, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm

Unit – II
Decision Tree learning : Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning
Artificial Neural Networks (ANN) : Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm. Applications of Decision Tree and ANN

Unit – III
Support Vector Machines : (Paper handouts) Maximum margin linear separators. Quadractic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.
Bayesian learning : Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier

Unit – IV

Instance-Based Learning : Constructing explicit generalizations versus comparing to past specific examples, k-Nearest-neighbor algorithm, Case-based learning.

Text Classification : Bag of words representation. Vector space model and cosine similarity. Relevance feedback and Rocchio algorithm, Versions of nearest neighbor and Naive Bayes for text

Unit – V

Clustering and Unsupervised Learning : Learning from unclassified dat,. Clustering. Hierarchical Aglomerative Clustering. k-means partitional clustering. Expectation maximization (EM) for soft clustering, Semi-supervised learning with EM using labeled and unlabled data.

Classification problems in language: word-sense disambiguation, sequence labelling, Hidden Markov models (HMM's), Veterbi algorithm for determining most-probable state sequences. Forward-backward EM algorithm for training the parameters of HMM's. Use of HMM's for speech recognition, part-of-speech tagging, and information extraction.
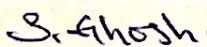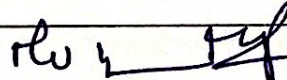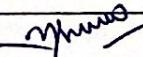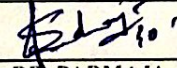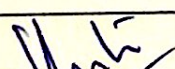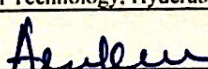
TEXT BOOKS :

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

REFERENCE BOOKS :

3) Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ. Press.
4) Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001.

BOS Members' Signatures :-

1. Dr.SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD. UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE. Keshav Memorial Institute of Technology, Hyderabad	7. DR. Y. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E, New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

II YEAR B.Tech. AI – II Sem

L	T	P	C
3	0	0	3

Essentials of Python

Course Outcome:

At the end of the course student would be able to

1. Understand the techniques to code in python and write the standard programs using python.
2. Understand to use different IDE's and package of python
3. Understand the python codes for machine learning
4. Having proper idea on different python packages and also the main packages used for machine learning.

Unit – I
Introduction to Python:
Features of Python Language, Data Types, Operators, Expressions, Control Statement, Standard I/O Operations, Functions, OOP using Python, Modules, Packages, Doc Strings, Built-in Functions, Exception, File management.

Unit – II
Strings and Regular Expressions:
String Operations, Built-in String Methods and Functions, Comparing Strings, function in Regular Expression.
Sequence: List, Tuples, Dictionaries.
Why Python for Machine Learning, Other platforms, languages and frameworks for ML

Unit – III
Understanding Python IDEs : Anaconda, Machine learning with scikit-learn, K-means clustering, Data Preprocessing or Data Munging, Dimensionality Reduction, Entropy, Decision tree as a classifier, Random Forest, Perceptron Learning Algorithm

Unit – IV
Other Python Packages : numpy for matrix computation, iPython for enhanced interactive console, sympy for symbolic calculations, pandas for data structures and analysis, pymc for stochastic calculation, libpgm for Bayesian networks.

Unit – V
Scientific Python using matplotlib, different types of plotting, Graphs, Pie-charts, vector

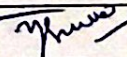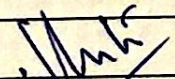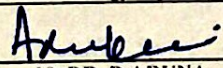Estimating occupancy using decision tree, Introduction to Theano and Kera.
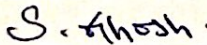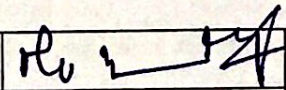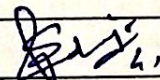
TEXT BOOKS

1. "Reema Thareja", Python Programming using Problem Solving Approach, First Edition, Oxford Higher Education.
2. Python Data Science Hand Book, Essential Tools for working with Data, Jake VanderPlas, O'REILLY.
3. "Sebastian Raschka", Python Machine Learning, PACKT Publishing, Open Source

REFERENCE BOOKS:

1. Kenneth A.Lambert, Fundamentals of Python
2. Machine Learning with Python/Scikit-Learn, - Application to the Estimation of Occupancy and Human Activities, GSCOP

BOS Members' Signatures :-

1. Dr.SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

II YEAR B.Tech. AI – II Sem	L	T	P	C
	0	0	2	1

Database Management Systems Lab

Course Outcomes:

1. Use the SQL commands such as DDL, DML, DCL, TCL to create, manipulate, access data from database objects and providing authorization to access database by different users.
2. To apply various integrity Constraints on the database tables for preserving the integrity of the database.
3. Design and implement Pl/SQL programs which includes procedures, functions, cursor and triggers.

1. Database Schema for a customer-sale scenario
Customer(Cust id : integer, cust_name: string)
Item(item_id: integer,item_name: string, price: integer)
Sale(bill_no: integer, bill_data: date, cust_id: integer, item_id: integer, qty sold: integer)

For the above schema, perform the following—
a. Create the tables with the appropriate integrity constraints
b. Insert around 10 records in each of the tables
c. List all the bills for the current date with the customer names and item numbers
d. List the total Bill details with the quantity sold, price of the item and the final amount
e. List the details of the customer who have bought a product which has a price>200
f. Give a count of how many products have been bought by each customer
g. Give a list of products bought by a customer having cust_id as 5
h. List the item details which are sold as of today
i. Create a view which lists out the bill_no, bill_date, cust_id, item_id, price, qty_sold, amount Create a view which lists the daily sales date wise for the last one week.

2. Database Schema for a Student Library scenario
Student (Stud_no : integer,Stud_name: string) Membership (Mem_no: integer,Stud_no: integer) Book (book_no: integer, book_name:string, author: string)Iss_rec(iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer)

For the above schema, perform the following
a. Create the tables with the appropriate integrity constraints
b. Insert around 10 records in each of the tables
c. List all the student names with their membership numbers

d. List all the issues for the current date with student and Book names
e. List the details of students who borrowed book whose author is CJDATE
f. Give a count of how many books have been bought by each student

g. Give a list of books taken by student with stud_no as 5
h. List the book details which are issued as of today
i. Create a view which lists out the iss_no, iss_date, stud_name, book name
j. Create a view which lists the daily issues-date wise for the last one week.

3. Database Schema for a Employee-pay scenario

Employee (emp_id:integer,emp_name:string)
Department (dept_id:integer,dept_name:string)
paydetails (emp_id : integer, dept_id: integer, basic: integer, deductions: integer, additions:
integer, DOJ: date)
Payroll (**emp_id: integer**, pay date: date)
For the above schema, perform the following
1. Create the tables with the appropriate integrity constraints
2. Insert around 10 records in each of the tables
3. List the employee details department wise
4. List all the employee names who joined after particular date
5. List the details of employees whose basic salary is between 10,000 and 20,000
6. Give a count of how many employees are working in each department
7. Give a names of the employees whose netsalary>10,000
8. List the details for an employee_id=5
9. Create a view which lists out the emp_name, department, basic, dedeuctions, netsalary
10. Create a view which lists the emp_name and his netsalary

4. Database Schema for a Video Library scenario

Customer(**cust_no: integer**, cust_name: string) Membership(**Mem_no: integer**, cust_no:
integer) Cassette(**cass_no:integer**, cass_name:string, Language: String) Iss_rec(**iss_no:
integer**, iss_date: date, **mem_no: integer**, **cass_no: integer**)
For the above schema, perform the following
    a. Create the tables with the appropriate integrity constraints
    b. Insert around 10 records in each of the tables
    c. List all the customer names with their membership numbers

    d. List all the issues for the current date with the customer names and cassette names
    e. List the details of the customer who has borrowed the cassette whose title is — The
Legendl
    f. Give a count of how many cassettes have been borrowed by each customer
    g. Give a list of book which has been taken by the student with mem_no as 5
    h. List the cassettes issues for today
    i. Create a view which lists outs the iss_no, iss_date, cust_name, cass_name
    j. Create a view which lists issues-date wise for the last one week.

5. Database Schema for a student-Lab scenario

Student(stud_no: integer, stud_name: string, class: string) Class (class: string,descrip: string)Lab (mach_no: integer, Lab no: integer, description: String) Allotment (Stud_no: Integer, mach_no: integer, day of week: string)

For the above schema, perform the following

    a. Create the tables with the appropriate integrity constraints

    b. Insert around 10 records in each of the tables

    c. List all the machine allotments with the student names, lab and machine numbers

    d. List the total number of lab allotments day wise

    e. Give a count of how many machines have been allocated to the 'IT' class

    f. Give a machine allotment details of the stud_no 5 with his personal and class details

    g. Count for how many machines have been allocated in **Lab_no 1** for the day of the week as ―Monday‖

    h. How many students class wise have allocated machines in the labs

    i. Create a view which lists out the stud_no, stud_name, mach_no, lab_no, dayofweek

    j. Create a view which lists the machine allotment details for ―Thursday‖.

    g salary > 50000.

6) Create a procedure to find reverse of a given number
7) Create a procedure to update the salaries of all employees as per the given data
8) Create a procedure to demonstrate IN, OUT and INOUT parameters
9) Create a function to check whether given string is palindrome or not.
10) Create a function to find sum of salaries of all employees working in depart number 10.
11) Create a trigger before/after update on employee table for each row/statement.
12) Create a trigger before/after delete on employee table for each row/statement.
13) Create a trigger before/after insert on employee table for each row/statement.

BOS Members' Signatures:

S. ᶠʰᵐ.	(signature)	(signature)	(signature)
1. Dr.SIDDARTHA GHOSH Chairman . BOS for AI. VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
(signature)	(signature)	(signature)	(signature)
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
(signature)	(signature)	(signature)	**DATE OF BOS MEETING**
9.DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	14-07-2021

II YEAR B.Tech. AI – II Sem   **L   T   P   C**

                                            0   0   2   1

Machine Learning using Python Lab

Exercise 1
a) Installation and Environment setup of python.
b) Write a program to demonstrate the use of basic Data Types
c) Write a program to demonstrate the Operators and Expressions
d) Write a program to demonstrate the Functions and parameter passing Techniques.

Exercise 2
a) Write a Program to implement
i. Packages   ii. Modules   iii. Built-in Functions
b) Write a Program to implement
i. List   ii. Tuple   iii. Dictionaries
c) Programs on Stings, String Operations and Regular Expressions

Exercise 3
a) Write a Program to implement Class and Object
b) Write a Program to implement Static and Instance methods, Abstract Classes and Interfaces.
c) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)

Exercise 4
a) Write a program to implement Inheritance and Polymorphism
b) Write a program to implement Files
c) Write a program to illustrate Handling.

Exercise 5
a) Write a program using scikit-learn to implement K-means Clustering
b) Program to calculate the entropy and the information gain
c) Program to implement perceptron

Exercise 6
a) Generate a decision tree. Find the Depth of decision trees and observe the results, then propose some changes in DecisionTreeClassifier function to limit.
b) Occupancy estimator using random forest

Exercise 7

a) Calculating with matrices using numpy : inv, pinv, matrix_rank, solve, lstsq, svd, transpose, eig, sort, linspace, meshgrid, mgrid, ogrid, concatenate, tile, squeeze, integrate

Exercise 8

a) Program using panda

b) Program using matplotlib – use minimum 5 plotting techniques
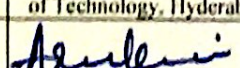
Exercise 9

a) Graph using matplotlib
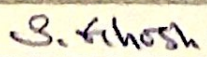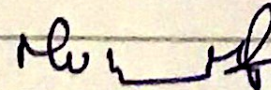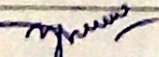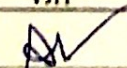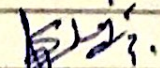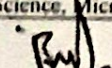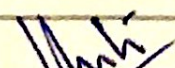
Exercise 10

a) Vector using matplotlib

Exercise 11

a) Program to estimating occupancy using decision tree

BOS Members' Signatures:-

1. Dr.SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. MR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

2nd Yr.

Vidya Jyothi Institute of Technology
(Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)

(Aziz Nagar, C.B. Post, Hyderabad -500075)

R20

Minutes of the Third Board of Studies (BoS) meeting dated 14th July 2021

The Third BoS meeting of the Department of Artificial Intelligence (AI) was held on 14th July 2021 at 03.00 PM. The meeting was conducted in virtual mode (Zoom) due to the ongoing pandemic of Covid-19.

The proposed agenda and the proposed course structure were sent in advance by e-mail to all the members of BoS.

The meeting was convened to discus and finalizes the Course Structure and syllabi of Artificial Intelligence (AI) Program of Vidya Jyothi Institute of Technology (VJIT) –Under R20 –Regulations as follows:

- Course structure of B.Tech II , III and IV year of AI Program for R20 Regulations with no change in total credits and overall structure from R19.

- Syllabi of B.Tech II , III and IV year of AI Program for R20 Regulations with no changes from R19 syllabi.

- Permission in adjusting 2 subjects and 2 labs among 1st and 2nd semesters of 3rd year and 4th year.

- And any other items as circulated in the proposed agenda

The Chairperson BOS welcomed all the members and given a brief introduction on the journey of Vidya Jyothi Institute of Technology. The Chairperson introduced all the internal and external BoS Members.

After the discussion the following resolutions are made:

- The R19 regulations of AI Program - B.Tech. II, III and IV year course structure and syllabi is approved, which was proposed in First and Second BoS Meetings held on 9th November 2019 and 23rd June 2020.

- The R20-Regulation of B.Tech. - AI Program - II, III and IV course structure and syllabi is same as R19 regulations except following modifications:

i. **Advanced Communication Skills (ACS) Lab is shifted from III Year- II Semester to III Year- I Sem.**

Vidya Jyothi Institute of Technology
(Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad -500075)
R20

ii.   Formal Languages and Automata Theory (FLAT) (PC) subject is shifted from III Year- II Semester to III Year- I Sem.

iii. Robotics (PC) subject and Robotics Lab are shifted from III Year- I Semester to III Year- II Sem.

iv.   Human Computer Interaction (HCI) (PE) is shifted from III year – II Semester to IV Year – I Semester

v.   Compiler Design (PE) is shifter from IV Year – I Semester to III Year – II Semester

vi.   Computer Networks (CN) is shifted from III Year – I Semester to III Year – II Semester

vii. Managerial Economics & Financial Analysis (MEFA) is shifted from III Year – II Semester to III Year – I Semester

viii. Drone is shifted from III – Year – II Semester to III – Year I Semester e.g. PE2 to PE1

ix.   Cloud Computing (CC) is shifted to III Year - I Semester to III Year – II Semester e.g. PE1 to PE2.

Zoom Meeting - BoS discussions clip: https://bit.ly/3hDzZFZ

The following subjects are offered by the Department of Artificial Intelligence to other departments.

S.No	Category	Year-Sem.	Open elective Subject Names
1	OE-1	III-I	Foundation of Artificial Intelligence (FAI)
2	OE-2	III-II	Introduction to Machine Learning (IML)
3	OE-3	IV-I	Foundation of Data Science (FDS)

The following members attended the meeting:

S.No	Name	Organization and Post Held	Designation in BOS
1	Dr. Siddhartha Ghosh	Professor & Head in the Dept of AI, VJIT	BOS Chairman
2	Dr. OBV Ramanaiah	Professor , CSE, JNTUH	JNTUH Nominee
3	Dr. Padmaja Savaram	HOD CSE, KMIT	Member

Vidya Jyothi Institute of Technology
(Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad -500075)
R20

4	Dr. MV Krishna Murthy	MD UOSD Pvt Ltd.	Member
5	Mr. Prasad Yerramsetti	Lead Program Manager in Data Science Microsoft	Member
6	Dr. Avuku Obulesu	Professor, Dept. of AI, VJIT	Member
7	Dr. V. Vijaya Kumar	Dean Dept. of CSE & IT, AU	Member
8	Dr. B. Vijaya Kumar	HOD , CSE, VJIT	Member
9	Dr. K. Vasanth Kishore	HOD, ECE, VJIT	Member
10	Dr. D. ArunaKumari	Professor, CSE, VJIT	Member
11	Prof. B. Srinivasulu	Professor in IT, VJIT	Member

3rd Yr.

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E . New Delhi. Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post. Hyderabad -500075)

R20

III YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Java Programming (JP)

Course Outcomes:

At the end of the course student would be able to

1. Understand OOP concepts to apply basic Java constructs.
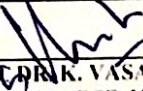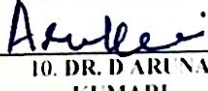2. Analyze different forms of inheritance and usage of Exception Handling
3. Understand the different kinds of file I/O Multithreading in complex Java programs, and usage of Container classes
4. Contrast different GUI layouts and design GUI applications
5. Construct a full-fledged Java GUI application and Applet with database connectivity.

UNIT I:

Java Basics History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program

Fundamentals of Object Oriented Programming: Object-Oriented Paradigm, Basic Concepts of Object Oriented Programming, Applications of OOP. Concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, static keyword, nested and inner classes, Strings, Object class.

UNIT II:

Inheritance & Polymorphism: Introduction, Forms of Inheritance specialization, specification, construction, extension, limitation, combination, Member access rules, super keyword, polymorphism- method overriding, abstract classes, final keyword.

Interfaces and Packages: Introduction to Interfaces, differences between abstract classes and interfaces, multiple inheritance through interfaces, Creating and accessing a package, Understanding CLASSPATH, importing packages.

Exception handling Concepts of exception handling, exception hierarchy, built in exceptions, usage of try, catch, finally, throw, and throws, creating own exception sub classes.

UNIT III:

Files: Introduction to I/O Streams: Byte Streams, Character Streams. File me /O. Multi-threading: Differences between multi-threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication.

Java.util package- Collection Interfaces: List, Map, Set. The Collection classes: Linked List, HashMap, TreeSet, StringTokenizer, Date, Random, Scanner.

UNIT IV:

AWT: Class hierarchy, Component, Container, Panel, Window, Frame, Graphics.
AWT controls: Labels, Button, Scrollbar, Text Components, Checkbox, Checkbox Group, Choice, List, Panes ScrollPane, Dialog and MenuBar.
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapterclasses.

UNIT V:

Layout Manager Border, Grid, Flow, Card and Gridbag.
Applets Concepts of Applets, life cycle of an applet, creating applets, passing parameters toapplets.
JDBC Connectivity: JDBC Type 1 to 4 Drivers, connection establishment, Query Execution.

Text Books:
1. Java- the complete reference, Seventh edition, Herbert Schildt, Tata McGraw Hill.
2. Database Programming with JDBC&JAVA, Second Edition, George Reese, O'Reilly Media.

Reference Books:
1. Thinking in Java Fourth Edition, Bruce Eckel
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

BOS Members' Signatures :-

S. Ghosh			
1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)
R20

III YEAR B.Tech. AI – I Sem

L   T   P   C

3   0   0   3

Operating Systems

Course Outcomes:
At the end of the course, student will be able to:
1. Understand the basic functions of Operating systems and system calls.
2. Analyze process scheduling and synchronization.
3. Understand the concepts of memory management.
4. Examine the concepts of MASS storage structure
5. Compare different protection methods of OS and understand the deadlock concepts.

UNIT - I:
Operating System Introduction: Operating Systems Objectives and functions, OS Structure, OS Operations, Evolution of Operating Systems Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special Purpose Systems, Operating System services, user OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, Virtual Machines.

UNIT - II:
Process and CPU Scheduling - Process concepts - The Process, Process State, Process Control Block, Threads, Process Scheduling Scheduling Queues, Schedulers, Context Switching, Preemptive Scheduling, Scheduling Criteria, Scheduling algorithms, thread scheduling, Case studies: Linux, Windows.
Process Coordination Process Synchronization, The Critical section Problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Windows.

UNIT - III:
Memory Management and Virtual Memory Logical & physical Address Space, Swapping, Contiguous Allocation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms, Thrashing.

UNIT - IV:

File System Interface - The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation File System Structure, File System Implementation, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance.

Mass Storage Structure - Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management.

UNIT - V:

Deadlocks - System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.

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 Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
2. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

REFERENCES 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.

BOS Members' Signatures:-

1. DR. SIDDHARTHA GHOSH Chairman . BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr. A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. Y. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

III YEAR B.Tech. AI – I Sem	L	T	P	C
	3	0	0	3

Formal Languages and Automata Theory

Course Outcomes:

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

1. Appreciate the role and structure of Language theory.
2. Design of regular expressions for language constructs and conversions of NFA and DFA.
3. Demonstrate the derivations and properties of various CFG and Regular grammars.
4. Design of PDA for the given CFG.
5. Appreciate the role of the Turing machine as computational and universal machine.

Unit -I:

Fundamental concepts: Strings, Alphabets, Language operations, Regular Expressions, Regular Languages: Finite automata, Types of finite automata (FA)-Non deterministic Finite Automata (NFA), Deterministic Finite Automata(DFA), NFA with ε-Moves, regular expression representation; Regular expressions to NFA; NFA with ε-Moves to NFA without ε-Moves; NFA to DFA Conversions; Minimization of DFA (Proofs Not Required)

Unit -II:

DFA with outputs: Moore and Melay machines, Pumping Lemma for Regular Sets: Closure properties of Regular Sets (Proofs Not Required): Context Free Grammars (CFG), Right most, Left most –derivations, Ambiguity, Parse Trees, Minimization of CFG: Elimination of useless symbols and unit productions, Chomsky Normal Forms (CNF).

Unit –III:

Left recursion and Elimination of left recursion in CFG, Greibach Normal Form, Push Down automata (PDA), Types of PDA, Design of a PDA for a given CFG. (Proofs Not Required)

Unit -IV:

Regular Grammars (RG), Design of DFA for a given RG: Right linear and left linear Grammars and conversions: Definition of Context Sensitive Grammar (CSG) and Linear bounded automata (LBA) (Proofs Not Required).

Unit -V:

Definition of unrestricted Grammar and Turing Machine (TM): Chomsky hierarchy on Languages, Grammars and recognizers; Design of TM as recognizer; Types of TM: Computational problems of TM with multiple tracks; Decidability Problem; Churches hypothesis (Proofs Not Required)
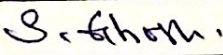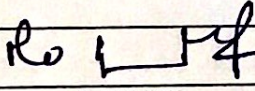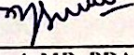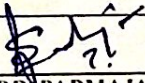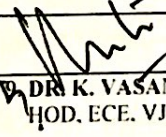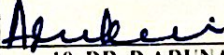
Text Books:
1. "Introduction to Automata Theory, Languages and Computation". Hopcroft H.E. and Ullman J.D., 3rd Edition, Pearson Education.
2. "Formal Languages and Automata Theory", Chander Kumar Nagpal , First edition, Oxford University press.

Reference Books:
1. Daniel I. A.Cohen, Introduction to Computer Theory, Second Edition, John Wiley.
2. John C Martin, Introduction to languages and the theory of Computation, Third Edition, TATA McGraw Hill, 2014.
3. Vivek Kulakarni, Theory of Computation, Oxford University press 2013, Second Edition, 2014.

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR.B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14 – 07 – 2021

III YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Introduction to Data Science (PE - 1)

Course Outcomes:

1. Understanding the fundamental concepts of Data Science
2. Understanding how data is collected, managed and stored for data science
3. Understand the real-world applications of data scientists
4. Visualize and present the inference using various tools
5. Implement data collection and management scripts using MongoDB

UNIT – I
Introduction to core concepts and technologies:
Introduction to Data Science, Terminology, Data Science Process, Data Science Toolkit, Types of Data, Example Applications, Data Science Tools, Applications of Data Science

UNIT – II
Data Collection and Management:
Sources of data, Data Collection and APIs, Exploring and Fixing Data, Data Storage and Management, Using Multiple Data Sources

UNIT-III
Data Analysis:
Terminology and Concepts, Applying statistics, Central Tendencies and Distributions, Variance, Distribution Properties and Arithmetic, Samples/CLT, Basic Machine Learning Algorithms, Linear Regression, SVM, Naive Bayes.

UNIT-IV
Data Visualization:
Types of data Visualization, Data for Visualization: Data Types, Data Encodings, Retinal Variables, Mapping Variables to Encodings, Visual Encodings

UNIT-V
Different Technologies for Visualization, Bokeh (Python), Recent Trends in Various Data Collection and Analysis Techniques, Various Visualization Techniques, Application Development methods of used in Data science

TEXT BOOKS :

1. Cathy O'Neil, Rachel Schutt, "Doing Data Science, Straight Talk from The Frontline", O'Reilly
2. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", Manning Publications Co., 1st Edition, 2016

REFERENCE BOOKS :

1. Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, "Mining of Massive Datasets", v2.1, Cambridge University Press, 2014.
2. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly, 1st Edition, 2015

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)
R20

III YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Software Engineering (PE-1)

Course Outcomes:

At the end of the course student would be able to

1. Outline the framework activities for a given project.
2. Examine Right process model for a given project.
3. Analyze various system models for a given Context.
4. Understand various testing techniques for a given project.
5. Identify various risks in project development.

UNIT I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), personal and team process models.

UNIT II:

Process Models: The waterfall model, Incremental process models, Evolutionary process model, Unified process model, agile process model.

Software Requirements: Functional and non-functional requirements, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

UNIT III:

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

Design Engineering: Design process and Design quality, Design concepts, the design model, Modeling component level design: design class based components, conducting component level design.

User interface design: Golden rules.

UNIT IV:

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing techniques, Validation testing, System testing.

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
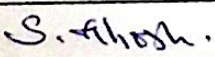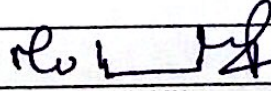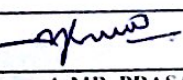(Aziz Nagar, C.B. Post, Hyderabad -500075)

R20

Product Metrics: Software Quality, Metrics for requirements Model- function based metrics, Metrics for Design Model-object oriented metrics, class oriented metrics, component design metrics, Metrics for source code, Metrics for Testing, Metrics for maintenance.

UNIT V:

Risk Management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software Reviews, Formal technical reviews, Software reliability, The ISO 9000 quality standards.
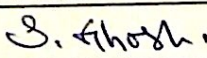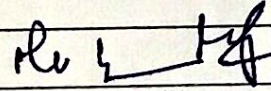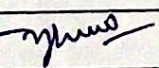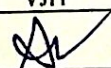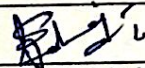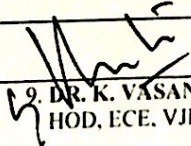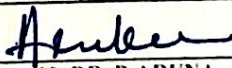
Text Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, Bruce R. Maxim, 8th edition, McGraw Hill International Edition.
2. Software Engineering- Ian Sommerville, 7th edition, Pearson education.

References:

1. Software Engineering- K.K. Agarwal& Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, WitoldPedrycz, JohnWiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman, BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr. A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

	L	T	P	C
III YEAR B.Tech. AI – I Sem	3	0	0	3

Information Retrieval System (PE - 1)

Course Outcomes
1. Understand the concepts of information system models
2. Ability to use various retrieval utilities for improving search
3. Analyze the crossing language barrier and learn about crossing language information retrieval.
4. Evaluate indexing and compressing documents to improve space and time efficiency.
5. Understand issues in web search, structured and unstructured data.

UNIT-I:
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.
Retrieval Strategies: Vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model, Language Models.

UNIT-II:
Retrieval Utilities: Relevance feedback, Clustering, N-grams, Regression analysis, Thesauri.

UNIT-III:
Retrieval Utilities: Semantic networks, Parsing Cross-Language Information Retrieval: Introduction, Crossing the language barrier.

UNIT-IV:
Efficiency: Inverted index, Query processing, Signature files, Duplicate document detection.

UNIT-V:
Integrating Structured Data and Text: A Historical progression, Information retrieval as a relational application, Semi-structured search using a relational schema
Distributed information Retrieval: A Theoretical model of distributed retrieval Web search.
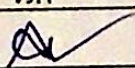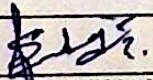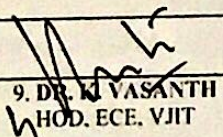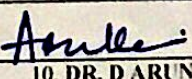
TEXT BOOK:

1. David A. Grossman, Ophir Frieder, information Retrieval —Algorithms and Heuristics, Springer, 2nd Edition (Distributed by Universities Press), 2004.
2. Gerald J Kowaiski, Mark T Maybury, Information Storage and Retrieval Systems, Springer, 2000

REFERENCE BOOKS:

1. Soumen Chakrabarti, Mining the Web : Discovering Knowledge from Hypertext Data, Morgan- Kaufrnann Publishers, 2002
2. Christopher D. Manning, Prabhakar Raghavan, Hinñch Schütze, An Introduction to Information Retrieval, Cambridge University Press, Cambridge, England, 2009

BOS Members' Signatures :-

S. Ghosh.			
1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. N VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)
R20

III YEAR B.Tech. AI – II Sem

L	T	P	C
3	0	0	3

Drone (PE 2)

Course Outcomes:

1. Recognize and describe the role of unmanned aerial vehicles (UAVs) in past, present, and future society
2. Comprehend and explain various components of UAVs
3. Comprehend and explain basics of flight and flight control systems
4. Understand and describe basic regulations applicable to UAV flight
5. Comprehend the knowledge of Emergency Identification and Handling

UNIT - I
Overview and Background :
Definitions, History of UAVs, Classifications of UAVs- Scale, Lift Generation Method, Contemporary Applications - Military, Government, Civil, Societal Impact and Future Outlook, Operational Considerations - Liability / Legal Issues, Insurance, Ethical Implications, Human Factors, LOS / BLOS (Line of Sight and Beyond LOS)

UNIT – II
Unmanned Aerial System (UAS) Components :
Platforms - Configurations, Characteristics, Applications, Propulsion - Internal Combustion Engines, Turbine Engines, Electric Systems, On-Board Flight Control, Payloads - Sensing / Surveillance, Weaponized, Delivery, Communications - Command/Control, Telemetry, Launch / Recovery Systems, Ground Control Stations

UNIT – III
Concepts of Flight :
Aerodynamics - Lift, Weight, Thrust, Drag Flight Performance - Climbing vs. Gliding Flight, Range / Endurance, Stability and Control - Flight Axes, Flight Controls, Autopilots

UNIT – IV
Drone Equipment Maintenance
Maintenance of Drone, Flight Control Box, Ground Station, Maintenance of Ground Equipment, Batteries and Payloads, Scheduled Servicing, Repair of Equipment Fault Finding and Rectification, Use of Flight Simulator

Emergency Identification and Handling:
In-Flight Emergencies, Loss of Link, Fly- Always (Straying), Loss of Power, Control Surface Failures.

UNIT – V
AI & ML in Drones :
Machine Perception, Computer Vision in Drone – Object Detection, Object Counting, Image Segmentation, Change Detection, Image Classification, Thermal Detection, Motion Planning
Application of Drones :
Farming, Medical and Pharmaceutical fields, Police and army, Smart Cities, Disaster Management
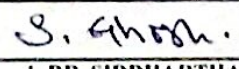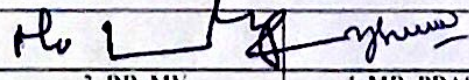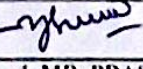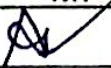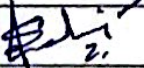
TEXT BOOKS :
1. A.R. Jha, "Theory, Design, and Applications of Unmanned Aerial Vehicles"
2. Terry Kilby, Belinda Kilby, "Getting Started with Drones"

REFERENCE BOOKS :
1. Adam Juiper, "The Complete Guide to Drones Extended",
2. David McGriffy, "Make: Drones: Teach an Arduino to Fly"
3. "Machine Learning Insider: Advanced Application of Artificial Intelligence", Onheaven Media

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

III YEAR B.Tech. AI – I Sem

L	T	P	C
0	0	2	1

Java Programming Lab

Course Outcomes:

1. Develop programs on various concepts like data abstraction & data hiding. encapsulation, inheritance, polymorphism.
2. Create and use I/O Streams, threads and handle exceptions.
3. Design GUI applications using applets and JDBC.

Week 1 & 2:

1. Write a program to find total, average of given two numbers by using function with command-line arguments, static data members.
2. Write a program to illustrate class and objects.
3. Write a program to illustrate method & constructor overloading.
4. Write a program to illustrate parameter passing using objects.
5. Write a program to illustrate Array Manipulation.

Week 3:

6. Write a program to illustrate different types of inheritances.
7. Write a java program to illustrate Method Overriding.
8. Write a java program to demonstrate the concept of polymorphism (Dynamic Method Dispatch).
9. Write a program to demonstrate final keyword.

Week 4 & 5:

10. Write a program to illustrate the use of creation of packages.
11. Write a java program to handle the situation of exception handling using multiple catch blocks.
12. Write a program to implement the concept of User defined Exceptions.

Week 6 & 7:

13. Write a program to illustrate Multithreading and Multitasking.
14. Write a program to illustrate thread priorities.
15. Write a program to illustrate Synchronization

Week 8 & 9:

16. Write a program to implement String Tokenizer.
17. Write a program to read one line at a time, and write it to another file.

S. Ghori.

Dr. S. VASANTH

Week 10 & 11:

18. Write a program to illustrate Event Handling (keyboard, Mouse events).

19. Write a program to illustrate applet life cycle and parameter passing.
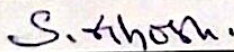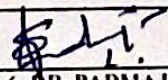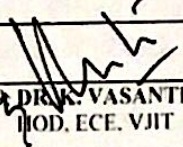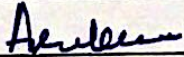
Week 12:

20. Write a program to develop a calculator application using AWT.

Week 13:

21. Write a program to illustrate JDBC

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

III YEAR B.Tech. AI – II Sem

L	T	P	C
3	0	0	3

Computer Networks

Course Outcomes:

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

1. Understand the overview of reference models.
2. Classify and illustrate various sub protocols in multi access protocols.
3. Understand various routing algorithms and their operations.
4. Recommend transport protocol for the given scenarios.
5. Identify the protocols and functionalities in application layer

UNIT - I:
Overview of the Internet: Definition of networks, Topology, Protocol, Layering Scenario. TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.
Physical Layer: Guided transmission media, wireless transmission media.

UNIT - II:
Data Link Layer Design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol.
Multi Access Protocols ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer CSMA/CD with Binary Exponential Back off, Ethernet Performance, Switched, Fast, Gigabit, 10-Gigabit Ethernets, Data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

UNIT - III:
Network Layer: Network Layer Design issues, routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, **Count to Infinity Problem**, Hierarchical Routing, Congestion control algorithms, admission control
Internetworking: Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses, CIDR, ICMP, ARP, RARP, DHCP

UNIT - IV:
Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Connection Release, Crash Recovery.
The Internet Transport Protocols: UDP-RPC, Real Time Transport Protocols, The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP

Connection Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The future of TCP.

UNIT - V:
Application Layer- Introduction, providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS.
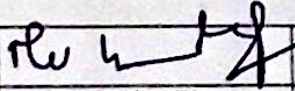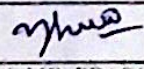
TEXT BOOKS:
1. Data Communications and Networking Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:
1. An Engineering Approach to Computer Networks-S.Keshav, 2ndEdition, Pearson Education.
2. Understanding Communications And Networks, 3rd Edition,W.A .Shay,Cengage Learning.
3. Introduction To Computer Networks And Cyber Security, Chwan-Hwa(John)Wu,J.David Irwin, CRC Press.

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAYARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

III YEAR B.Tech. AI – II Sem

L	T	P	C
3	0	0	3

Artificial Neural Networks

Course Outcomes:

1. Understanding the concept of Human Brain Neuron inspired ANN
2. Able to create different neural networks of various architectures both feed forward and feed backward.
3. Perform the training of neural networks using various learning rules.
4. Perform the testing of neural networks and do the perform analysis of these networks for various pattern recognition applications.

UNIT – I
Introduction:

Definition of a Neural Network, Human Brain and Inspiration, 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:

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

Support Vector Machines and Radial Basis Function:

Learning from Examples, Statistical Learning Theory, Support Vector Machines, SVM application to Image Classification, Radial Basis Function Regularization theory, Generalized RBF Networks, Learning in RBFNs, RBF application to face recognition

UNIT – V

Attractor Neural Networks :

Associative Learning Attractor Associative Memory, Linear Associative memory, Hopfield Network, application of Hopfield Network, Brain State in a Box neural Network, Bidirectional Associative Memory

Self-organization Feature Map: Maximal Eigenvector Filtering, Extracting Principal Components, Generalized Learning Laws, Vector Quantization, Self-organization Feature Maps
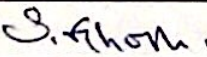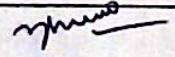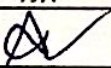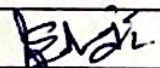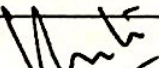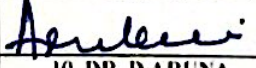
TEXT BOOKS :

1. Simon Haykin, "Neural Networks & Learning Machines", Pearson
2. B. Yegnanarayana, "Artificial Neural Networks", Prentice Hall India

REFERENCE BOOKS :

1. Li Min Fu, "Neural Networks in Computer Intelligence", TMH
2. Tariq Rashid, "Make your own Neural Network"

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad -500075)

R20

III YEAR B.Tech. AI – II Sem

L	T	P	C
3	0	0	3

Natural Language Processing

Course Outcomes:

1. Understanding Natural Language Processing and it's applications
2. Understanding the importance and framing-techniques of words and sentences
3. Understanding semantic analysis as a part of NLP
4. Understanding the concept of Language Translation in NLP
5. Analyse the sentiment analysis methods

UNIT – I
Introduction to Natural Language Processing (NLP):
Definition, History, Applications such as Information Extraction, Question Answering, and Machine Translation
Words, Morphology, Lexicons, Regular Expressions, Corpora, Text Normalization, Minimum Edit Distance, NLP Tasks in Syntax, Semantics & Pragmatics, Problem of Ambiguity, Role of Machine Learning in NLP

UNIT – II
Morphology & Part of Speech Tagging :
Linguistic Essentials , Lexical Syntax, Morphology & Finite State Transducers, Part of Speech Tagging, Rule-Based Part of Speech Tagging, Markov Models, Hidden Markov Models

N-gram Language Models :
The role of language models, N-gram, Simple N-gram models, Estimating parameters and Smoothing, Evaluating Language Models

UNIT – III
Syntax Analysis:
Parsing Natural Language, Treebanks- a Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues
Semantic Parsing:
Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems

UNIT – IV
Naive Bayes and Sentiment Classification :
Naive Bayes Classifiers, Training the Naive Bayes Classifiers, Optimizing for Sentiment Analysis, Naive Bayes for other Text Classification tasks, Naive Bayes as a Language Model, Evaluation - Precision, Recall, F-measure, Test sets and Cross-validation

Logistic Regression in NLP
Basic Concepts, Cross-Entropy Loss Function, Gradient Decent, Regularization
UNIT – V
Applications :
Named Entity Recognition, Information Extraction, Question Answering, Dialogue Systems and Chatbots, Rule Based and Statistical Machine Translation, Speech Processing, Natural Language Generation
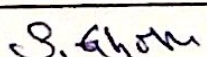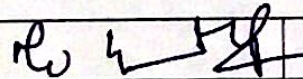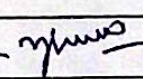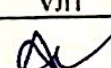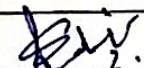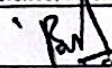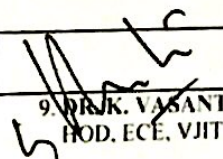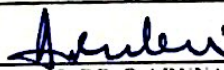
TEXT BOOKS :
1. Daniel Jurafsky, James H. Martin, "Speech and Language Processing", Pearson
2. James Allen, "Natural Language Understanding", Pearson

REFERENCE BOOKS :
1. Hobson Lane, Cole Howard, Hannes Hapke, "Natural Language Processing in Action: Understanding, Analyzing", Manning Books
2. Christopher D. Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", MIT Press

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr. A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. Y. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad -500075)

R20

III YEAR B.Tech. AI – II Sem

L	T	P	C
3	0	0	3

Robotics

Course outcomes:

1. Able to differentiate types of Robots and Robot Grippers
2. Understanding Model Forward and Inverse Kinematics of Robot Manipulators
3. Understanding how to programme a Robot
4. Able to design Intelligent Robots using Sensors.
5. Comprehension of Programming of Robots and Vision System

UNIT - I
Introduction to Robotics:
Definition, classification with respect to Geometrical Configuration (Anatomy), Controlled System & Chain Type : Serial Manipulator & Parallel Manipulator, Components of Industrial Robotics-Precession of Movement - Resolution, Accuracy & Repeatability - Dynamic Characteristics - Speed of Motion, Load Carrying Capacity & Speed of Response - Sensors-Internal Sensors : Position Sensors & Velocity Sensors, External Sensors: Proximity Sensors, Tactile Sensors, & Force or Torque Sensors.

UNIT - II
Grippers:
The Interface, Mechanical Gripper, Grasping Force, Engelberger-G-Factors-Mechanisms for Actuation, Magnetic Gripper , Vacuum cup Gripper, Gripper Selection & Design, Industrial Robots Specifications, Selection based on the Application

UNIT - III
Kinematics:
Manipulators Kinematics, Rotation Matrix, Homogenous Transformation Matrix, D-H Transformation Matrix, D-H method of Assignment of Frames, Direct and Inverse Kinematics for Industrial Robots, Differential Kinematics for Planar Serial Robots

UNIT - IV
Trajectory Planning:
Joint Space Scheme, Cubic Polynomial, Fit-Obstacle, Avoidance in Operation, Space-Cubic Polynomial Fit with Via Point, Bleding Scheme, Introduction Cartesian Space Scheme.

Control : Interaction Control, Rigid Body Mechanics, Control Architecture : Position, Path Velocity, Force Control Systems, Computed Torque Control, Adaptive Control, Servo system for Robot Control

UNIT - V

Programming of Robots and Vision System, Lead Through Programming Methods - Teach Pendent : Overview of Various Textual Programming Languages like VAL, Machine (robot) vision
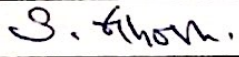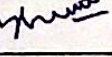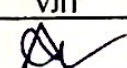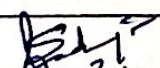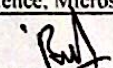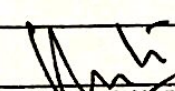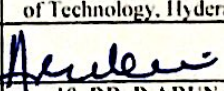
TEXT BOOKS :

1. Groover M P, "Industrial Robotics", Mc Graw Hill
2. John J. Craig, "Introduction to Robotics", Pearson

REFERENCE BOOKS :

1. Jazar, "Theory of Applied Robotics", Springer
2. Ghosal, "Robotics", Oxford

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

III YEAR B.Tech. AI – II Sem	L	T	P	C
	3	0	0	3

Web Technologies (PE - 2)

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

1. Develop static and dynamic web pages using HTML and javascript.
2. Understand the XML tags and to parse XML data with java.
3. Develop web applications using server side programming with PHP.
4. Implement web applications using JDBC and Servlets.
5. Apply web applications with JSP.

UNIT –I:
Introduction to HTML: HTML tags, Lists, Tables, Images, Forms, Frames, Cascading Style Sheets
Client Side Scripting: Java Script Language Declaring variables, Scope of variables, Functions, Objects in java scripts, Dynamic HTML with java scripts, Form Validation.

UNIT –II:
XML: Introduction to XML, Defining XML tags their attributes and values, Document Type Definition, XML Schema, Document Object Model, and XHTML.
Parsing XML Data: DOM and SAX Parsers in java.

UNIT –III:
Introduction to PHP:
Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc. Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.
File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. binary files listing directories.

UNIT –IV:
Introduction to Servlets: Common Gateway Interface (CGI), The Servlet API, Life cycle of a Servlet, Deploying a Servlet, Reading Servlet parameters, Reading Initialization parameters, Handling HTTP Request & Responses, Using Cookies and Sessions,
Introduction to JDBC: JDBC Drivers, JDBC Process, Connecting to a Database using JDBC

UNIT –V:

Introduction to JSP: The Anatomy of a JSP Page, Introduction to MVC Architecture, JSP Processing, Declarations, Directives, Expressions, Code Snippets, Implicit Objects, Using Beans in JSP Pages, Using Cookies and Session for Session Tracking, Connecting to Database using JSP.
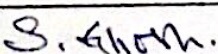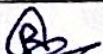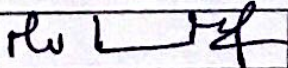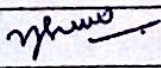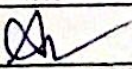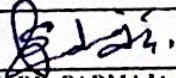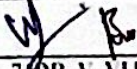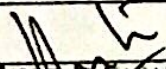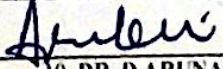
TEXT BOOKS
1. Programming the World Wide Web, 4th Edition by Robert W. Sebesta
2. Web Technologies, Uttam K Roy, Oxford University Press

REFERENCE BOOKS
1. Web Programming, Building Internet Applications , Chris Bates 2nd edition , Wiley Dreamtech
2. Java Script , D Flanagan, O'Reilly,SPD
   Java Server Pages- Hans Bergsten , SPD O'Reilly

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. R. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi. Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad -500075)

R20

III YEAR B.Tech. AI – II Sem

L	T	P	C
3	0	0	3

Compiler Design

Course Outcomes:

At the end of the course student would be able to

1. Formulate tokens for various programming languages.
2. Apply principles of parsing techniques to do syntax analysis.
3. Formulate semantic rules to do semantic analysis.
4. Apply optimization techniques on the intermediate code.
5. Generate the target code.

Unit I:

Introduction to Compilers: Structure of Compiler-Phases of Compiler, Symbol Table Management, Grouping of Phases into Passes, Compiler Vs Interpreter.

Lexical Analysis: Role and need of Lexical Analyzer, Input Buffering, Regular expressions for identifiers, Signed numbers etc.., A Language for specifying Lexical Analyzer, Lexical phase errors.

Unit II:

Syntactic Specification: Context Free Grammars, Derivations and Parse Trees, Capabilities of Context Free Grammars, Syntactic Phase errors, Semantic errors.

Basic Parsing Techniques: Parsers, Top-Down parsing, Predictive parsers and construction of predictive parsing and LL (1) parser table, LL (1) grammar.

Unit III:

Construction of efficient Parsers: Introduction to Bottom Up parsing, shift reduceparser,LR Parsers, Canonical collection of LR(0) items, construction of SLR parsing tables, Construction of canonical LR(0) parsing tables, Construction of LALR parsing tables, Comparison of SLR,LALR and CALR parsers, Comparison of Top down and Bottom up parsers.

Unit IV:

Syntax Directed Translation: Syntax Directed Translation schemes, Intermediate codes, Postfix notation, Three Address code, Quadruples and triples..

Run-Time Environments: Storage allocation strategies, Stack allocation of space, Access to non-local names.Symbol table: Contents of Symbol table, Data Structures for symbol tables, representing scope information

Unit V:

Code Optimization: Principal sources of optimization, Loop optimization, Copy Propagation, Dead code elimination, Redundant sub expression elimination.

Code Generation: Object programs, problems in Code generation, A Machine Model, A Simple Code generator, Register allocation and assignment, Peephole optimization.

Text Book:

1. Alfred V Aho, Jeffrey D Ullman, Principles of Compiler Design, Pearson Education, 2001.

Reference Books:

1. J P Trembly and P G Sorenson, The Theory and practice of Compiler Writing, McGraw Hill, 2005.
2. Alfred V Aho, Ravi sethi, Jeffrey D Ullman, Compilers-Principles, Techniques and Tools, Pearson Education, second edition.
3. Dick Grone, Henri E Bal, Ceriel J H Jacobs, Modern Compiler Design, Wiley Dreamtech, 2006.

BOS Members' Signatures:-

1. DR. SIDDHARTHA GHOSH Chairman, BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)
R20

Data Warehousing & Data Mining

B.Tech III Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes:
At the end of the course, student will be able to:
1. Understand the fundamentals of Data warehousing and OLAP technology.
2. Outline the Data Mining and Data pre-processing techniques.
3. Identify the frequent patterns using association algorithms.
4. Distinguish how classification algorithms are used on data sets.
5. Compare different clustering techniques on large data sets.

UNIT – I:
Data Warehouse and OLAP Technology: What is Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data ware housing to data mining.

UNIT – II:
Introduction to Data Mining: What motivated data mining? Why it is important? So- What is Data mining, Data Mining-On What Kind of Data, Data Mining Functionalities-What kind of patterns can be Mined, Are All of the patterns Interesting, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data warehouse system, Major issues in Data mining.

Data pre-processing:-Why Preprocess the Data, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

UNIT – III:
Mining Frequent Patterns, Associations and Correlations: Basic Concepts and a Road Map, Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT – IV:
Classification & Prediction: What is Classification? What is Prediction? Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back Propagation, Support Vector Machines, Associative Classification: Classification by Association Rule Analysis, Lazy Learners, Other Classification Methods, Prediction.

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence

R20

UNIT – V:

Cluster Analysis: What is Cluster Analysis, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

Text Books:

1. Data Mining- Concepts and Techniques by Jiawei Han, Micheline Kamber and Jian Pei Morgan Kaufmann publishers 2nd edition

References:

1. Data Mining Techniques Arun K Pujari, 2nd edition, Universities Press.
2. Data Warehousing in the Real World Sam Aanhory & Dennis Murray, Pearson Edn Asia, 2002.
3. Data Warehousing Fundamentals Paulraj Ponnaiah Wiley student Edition.

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9) DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

III YEAR B.Tech. AI – I Sem

L T P C

3 0 0 3

Cloud Computing (PE - 1)

Course Outcomes:

At the end of this course, the student would be able to:

1. Understand different Cloud Services
2. Analyze different cloud deploy and service models.
3. Understand various enterprise applications in cloud computing
4. Understand and apply the virtualization concepts
5. Understand the data security mechanism and SLA management in cloud.

UNIT - I:

Introduction to cloud computing: Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired Features of Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenge and Risks.

UNIT II:

Migration into a Cloud: Introduction, Broad Approaches to Migrating into the Cloud, the Seven-Step Model of Migration in to a Cloud.

Enriching the 'Integration as a Service' Paradigm for the Cloud Era: An Introduction, The Onset of Knowledge Era, The Evolution of SaaS, The challenges of SaaS Paradigm, Approaching the SaaS integration enigma, new integration scenarios, the integration. Methodologies, Saas integration products and platforms, SaaS Integration Services, Business to Business Integration (B2Bi) Services.

UNIT - III:

The Enterprise Cloud Computing Paradigm: Introduction, Background, Issues for Enterprise Applications on the Cloud, Transition Challenges, Enterprise Cloud Technology and Market Evolution, Business Drivers toward a Marketplace for Enterprise Cloud Computing, the Cloud Supply Chain.

UNIT - IV:

Virtual Machines Provisioning and Migration Services: Introduction and Inspiration, Background and Related Work, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action, Provisioning in the Cloud Context, Future Research Directions.

Secure Distributed Data Storage in Cloud Computing: Introduction, Cloud Storage: from LANs TO WANs, Technologies for Data Security in Cloud Computing, Open Questions and Challenges.

UNIT - V:

SLA Management in Cloud Computing: A Service Provider's Perspective: Inspiration, Traditional Approaches to SLO Management, Types of SLA, Life Cycle of SLA, SLA Management in Cloud, Automated Policy based Management.

Data Security in the Cloud: An Introduction to the idea of Data Security, The Current State of Data Security in the Cloud, Homo Sapiens and Digital Information, Cloud Computing and Data Security Risk, Cloud Computing and Identity, Digital Identity and Data Security, Content Level Security-Pros and Cons.
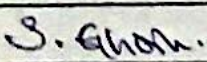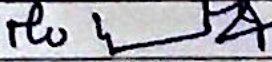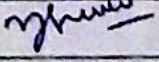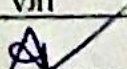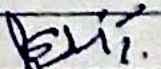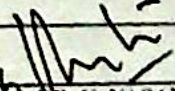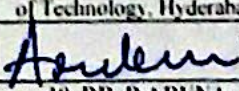
TEXT BOOK:

1. Rajkumar Buyya, James Broberg, AndrZejGoscinski, Cloud Computing Principles and Paradigms, Wiley Publications.

REFERENCE BOOKS:

1. Michael Miller, Cloud Computing – Web-Based Application That Change the Way You Work and Collaborate Online, Pearson Publications.
2. Thomas Erl, Zaigham Mahmood, & Ricardo Puttini, Cloud Computing- Concepts, Technology & Architecture Pearson Publications.
3. Kai Hwang, Geoffrey C.Fox, Jack J. Dongarra, Distributed and Cloud Computing – From Parallel Processing to the Internet of Things, ELSEVIER Publications.

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman, BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM. HOD. CSE. Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD. CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD. IT. VJIT	DATE OF BOS MEETING 14-07-2021

III YEAR B.Tech. AI – II Sem   **L   T   P   C**

0   0   2   1

Artificial Neural Networks (ANN) Lab

Course Outcomes:

- Learning basic techniques to implement ANN
- Learning the techniques to implement Perceptron in C, C++ and Python
- Understanding how to implement Multi Layer and Back Propagation ANN
- Understanding the real life application of ANN for prediction

WEEK 1 :
- Implement a Perceptron using C
- Implement an OR Gate using C++

Week 2 & 3 :
- Program a Neural Network in Python which implements the logical "And" function
- Create a primitive neural network which is only capable of creating straight lines going through the origin
- Create a neural network to implement $y = m.x + c$

Week 4 & 5 :
- Create a Neural Network with linearly separable data sets, which need a bias node to be separable. Use the make_blobs function from sklearn.datasets
- Create a Neural Network with 2 hidden layers for XOR problem
- A point belongs to a class 0, if $x_1 < 0.5$ and belongs to class 1, if $x_1 >= 0.5$. Train a network with one perceptron to classify arbitrary points. What can you say about the decision boundary? What about the input values x_2

Week 6 to 9
- Create a perceptron using Scikit Learn's Perceptron Class, IRIS Data Set and make a prediction
- Create a Multi-Layer Perceptron using Sklearn. Apply the MLP Classifier on the MNIST data and load in the data with pickle.
- Create a Neural Network with Back Propagation

S. Ghosh.   Dv. K. VASANTH

Artificial Neural Networks (ANN) Lab

Week 10 & 11 :

- Create a Multi Layer Neural Network to predict Stock

Week 12 & 13 :

- Real life Blockchain implementation
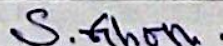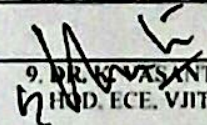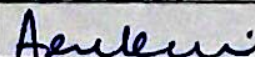
Week 14 :

- Implement Support Vector Machine (SVM) using Python

Week 15 & 16

- Mini Project using ANN

BOS Members' Signatures :-

S. Ghosh	*(signature)*	*(signature)*	*(signature)*
1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD. UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
(signature)	*(signature)*	*(signature)*	*(signature)*
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
(signature)	*(signature)*	*(signature)*	**DATE OF BOS MEETING**
9. DR. K VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

III YEAR B.Tech. AI – II Sem

L	T	P	C
0	0	2	1

ROBOTICS LAB

Course Outcome :
- Will be able to develop 3 different basic autonomous robots which are guided using sensors.
- Able to create line follower Robot
- Able to develop robot which can avoid/follow obstacles or light. Robots developed as part of this course

Week - 1 & 2 : Understanding Sensor Based Robot and robot making kits

1. Line Follower Robot
2. Phototropic/Obstacle Follower Robot
3. Photophobic/Obstacle Avoider Robot

Be thorough with Sensor Guided Robotic Kit and Arduino

- Arduino Uno
- Arduino USB Cable
- L293D Motor Driver Circuit
- Digital IR Sensors - 2 Nos.
- DC motors - 2 Nos.
- Wheels for Motors - 2 Nos.
- Castor Wheels - 1 No.
- Breadboard - 1 No.
- Chassis - 1 No.
- U Clamps - 2 Nos.
- Wire stripper - 1 No.
- Screwdriver - 1 No.
- Connecting Wires & Other miscellaneous items
- Multi meter and Battery (6F22 9V) are required

Week – 3 & 4 : Graphical Programming for Beginners

- Programming Arduino through Blocks
- Arduino Programming
- Introduction to Arduino IDE
- Structure of Arduino Programming
- First program in Arduino: Blinking LED

Week - 5 : Sensing Light using IR Sensors

- **Learn:** Sensors - Types & Working
- **Learn:** Semiconductors

- **Learn:** Working of IR Sensors
- **Do:** Interface Digital IR sensor with Arduino & Read Data
- **Do:** Calibration of Digital IR Sensor
- **Do:** Design Scratch Program to Control LED using IR Sensor
- **Do:** Design Arduino Sketch to Control LED based on Line Detection
- **Do:** Design Arduino Sketch to Control LED based on Obstacle Detection

Week - 6 : Motors & Motor drivers in Arduino based Robots

- **Learn:** DC Motors & their Working
- **Learn:** Motors & Motor Drivers for the Arduino Robot
- **Do:** Interface & Test Motor with Arduino
- **Do:** Control Motor using Arduino
- **Do:** Design Sketch to Control Motor

Week - 7 : Arduino based Robots - Build your Robot

- **Learn:** Structural Design of a Robot
- **Do:** Assemble the Chassis of the Robot
- **Do:** Fixing the Wheels to the Robot Chassis
- **Do:** Final Chassis Assembly of the Robot
- **Do:** Mount Arduino on Chassis & Interface Motor Driver

Week - 8 : Make Robot move

- **Learn:** Programming Logic for Robot Motion
- **Do:** Design Sketch to Move the Robot

Week - 9 : Programming the line follower Robot

- **Learn:** Line Follower Robot - Programming Logic
- **Do:** Design Scratch Program for Line Follower Robot

Week - 10 : Testing the line follower Robot
- **Do:** Line Follower Robot - Placement of Components & IR Sensors
- **Do:** Line Follower Robot - Final Connections & Calibration
- **Do:** Line Follower Robot - Test your Robot
- **Do:** Line Follower Robot - Test your Robot with Arduino Sketch

Week - 11 : Programming and Testing the Obstacle avoider Robot

- **Learn:** Obstacle Avoider Robot - Programming Logic
- **Do:** Design Arduino Sketch for Obstacle Avoider Robot
- **Do:** Obstacle Avoider Robot - Placement & Connection of IR Sensors
- **Do:** Obstacle Avoider Robot - Test your Robot with Arduino Sketch
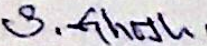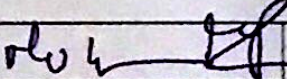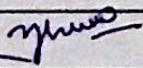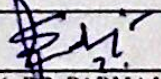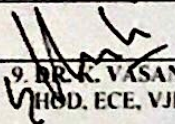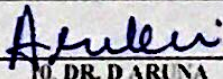
Week - 12 : Programming and Testing the Obstacle follower Robot

- **Learn**: Obstacle Follower Robot - Programming Logic
- **Do:** Design Arduino Sketch for Obstacle Follower Robot
- **Do:** Obstacle Follower Robot - Test your Robot with Arduino Sketch

Week – 13 – 16

Creating innovative Robots for solving real life problems. Can be performed in a group of 3-4 students

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD. CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

4th Yr.

R20

MAJOR PROJECT

L	T	P	C
0	0	20	10

B.Tech IV Year II Semester

Course Objectives:

1. To enhance the skills and knowledge acquired by each student during execution of the Mini Project.
2. To develop an AI/ML software solution which if needed can be marketed with required changes or can lead a student towards entrepreneurship.
3. To be aware of the industry level tools and standards in depth while executing the project.
4. To apply the concepts of UI/UX during the software development and deployment phases.
5. Is not just to implement a software product but also to see that it goes through all the testing phases with test cases recorded and the software is deployed properly.
6. A properly executed project can help a student to fetch a better job in the market.

Procedure to be followed:

1. The same team of mini project is encouraged to execute the final project also as a team.
2. The Dept. Staff Project coordinator will publish detailed guidelines to execute major project.
3. All the major Mini Project Execution steps, rules and guidelines will be carry forwarded here too. Additional guidelines will be added by the dept. time to time.
4. Student of fast track who will be going for full time internship/job during 4th year 2nd semester (only technical internship is considered) with the permission of Dept. only those students will have the freedom and permission to submit individual projects (not as a team) following other guidelines as usual. In such a case if more than one member leaves a 'previously built mini project team' then the team should be rebuilt by the staff project coordinator(s). The internship oriented project students should follow the other presentations/project seminar guidelines like any other student.
5. The Staff Project Coordinator will publish the guidelines and time lines of the project execution along with all the parameters and format at the end of 4 – I only.
6. Each student (team) will give minimum 4 seminars on project work upon completion of different phases mentioned in project time line.
7. An internal and external project viva will be held to evaluate the students as per time line given by exam section. Project book or report must avoid plagiarism.

IV YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Computer Vision

Course Outcomes:

1. Understanding Computer Vision and Image Processing Basics
2. Understanding the functionalities of different types of Cameras and Hence Lenses
3. Understanding Features Extraction of the image
4. Analysis of the Image Segmentation Techniques
5. Comprehension of Motion Analysis and shape of the object

UNIT – I
Introduction to Computer Vision:
Computer Imaging Systems, Digital Image Formation and Low-Level Processing, Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.

UNIT – II
Depth Estimation and Multi-Camera Views :
Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D Reconstruction Framework; Auto-Calibration.

UNIT – III
Feature Extraction :
Edges - Canny, LOG, DOG; Line Detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis-Image Pyramids and Gaussian Derivative Filters, Gabor Filters and DWT.
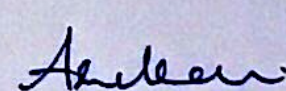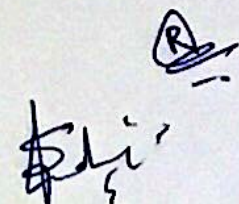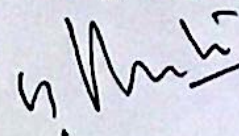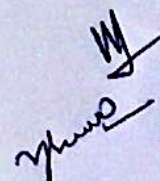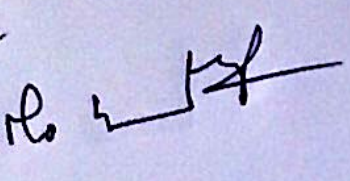
UNIT – IV
Image Segmentation :
Region Growing, Edge Based Approaches to Segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object Detection

[Not a part of the syllabus here but prerequisites : Pattern Analysis -Clustering K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function. Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods — are covered in other subjects like AI, ML etc]

S. Ghon.

Dr. S. VASANTA

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar C B Post, Hyderabad -500075)

R20

UNIT – V

Motion Analysis :

Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.

Shape from X :

Light at Surfaces; Phong Model; Reflectance Map; Albedo Estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, Colour, Motion and Edges.
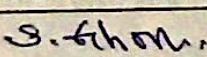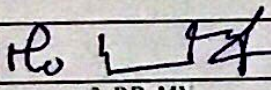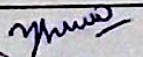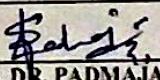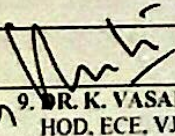
TEXT BOOKS :

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer
2. D. A. Forsyth, J. Ponce, "Computer Vision: A Modern Approach", Pearson Education

REFERENCE BOOKS :

1. Richard Hartley and Andrew Zisserman, "Multiple View Geometry in Computer Vision", Second Edition, Cambridge University Press
2. K. Fukunaga, "Introduction to Statistical Pattern Recognition", Second Edition, Academic Press, Morgan Kaufmann
3. R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Addison- Wesley

BOS Members' Signatures :-

(signature)	*(signature)*	*(signature)*	*(signature)*
1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
(signature)	*(signature)*	*(signature)*	*(signature)*
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V, VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
(signature)	*(signature)*	*(signature)*	**DATE OF BOS MEETING**
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad - 500075)
R20

IV YEAR B.Tech. A1 – I Sem

L	T	P	C
3	0	0	3

Deep Learning

Course Outcomes:

- Understanding Deep Learning and it's applications
- Understanding the importance of Simple Neural Networks in Deep Learning
- Gaining confidence on building and visualizing Neural Networks
- Analysis of Regularization and Batching of neural networks
- Analysis of Probabilities , Nonlinearities and Activation Functions

UNIT – I
Introduction to Deep Learning:
Definition, History, Application of Deep Learning – Self Driving Car, Fraud Detection, Automated Machine Translation, Object Classification in Images and Videos, Automated Text or Story creation.

Introduction to Neural Prediction:
Forward Propagation, Simple Neural Network and Prediction, Prediction with Multiple inputs and outputs.

UNIT – II
Introduction to Neural Learning:
Predict Compare and Learn, Hot and Cold Learning, Measuring Error, Gradient Decent, Breaking Gradient Decent, Alpha in Code, Memorizing. Gradient Decent Learning with Multiple Inputs and Outputs.

UNIT – III
Building First Deep Neural Network:
Introduction to Backpropagation, Matrices and the Matrix Relationship, Steps in Building a Neural Network, Full, Batch, and Stochastic Gradient Descent, Neural Networks Learn Correlation, Up and Down Pressure, Conflicting Pressure, Overfitting, Long-Distance Error Attribution and Backpropagation, Linear vs. Nonlinear, Visualizing a Neural network

UNIT – IV
Introduction to Regularization and Batching
Three layer Neural Network, Memorization vs. Generalization, the Simplest Regularization: Early Stopping, Industry Standard Regularization: Dropout, Why Dropout Works: Ensembling works, Batch Gradient Descent.

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E, New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

UNIT – V

Modeling Probabilities and Nonlinearities: Activation Functions :

Activation Function, Standard Hidden-Layer Activation Functions, Standard Output Layer Activation Functions, Inputs Softmax Computation, Activation Installation Instructions, Multiplying Delta by the Slope, Converting Output to Slope (derivative)

Convolutional Neural Networks - Reusing Weights in Multiple Places, the Convolutional Layer
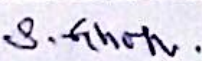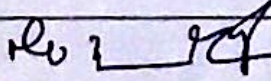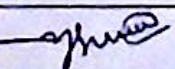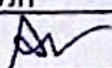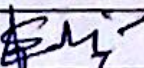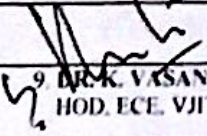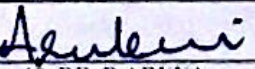
TEXT BOOKS :

1. Andrew W. Trask, "Grokking Deep Learning", Manning Publications
2. Francois, Chollet, "Deep Learning with Python", Manning Publications

REFERENCE BOOKS :

1. Aston Zhang, Zachary C Lipton, Mu Li, Alexender J Smola, "Diving into Deep Learning", Open Source Book - March 2019

BOS Members' Signatures :-

S. Ghosh			
1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

IV YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

R Programming (PE - 3)

Course Outcomes:

1. Apply operations on basic data types using R
2. Apply various operators on data frames, factors and list
3. Develop functions using iterative programming for real world problems
4. Analyze the data by plotting using R
5. Formulate linear and multiple regression models for time series data & web data

Unit – I
Basics of R:

Introduction, R-Environment Setup, Programming with R, Basic Data Types, Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector Subsetting, Matrices: Creating and Naming Matrices, Matrix Subsetting, Arrays, Class.

Unit – II
Factors and Data Frames :

Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, Subsetting of Data Frames, Extending Data Frames, Sorting Data Frames

Lists: Introduction, Creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors, Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements

Unit – III
Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List.

Functions in R: Introduction, Writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R, Cumulative Sums and Products, Calculus in R, Input and Output Operations

Unit – IV
Apply Family in R :

Introduction, Using Apply in R, Using L apply in R, Using S apply, Using T apply in R: Split Function, Using M apply in R, Charts and Graphs : Introduction, Pie Chart: Chart Legend, 3D Pie Chart, Bar Chart, Box Plot, Histogram, Line Graph: Multiple Lines in Line Graph, Scatter Plot

Unit-V
Data Interfaces:

Introduction, CSV Files: Syntax, Importing a CSV File, Excel Files: Syntax, Importing an Excel file, Binary Files: Syntax, XML Files, Web Data, Databases

Statistical Applications: Introduction, Basic Statistical Operations, Linear Regression Analysis, Chi-Squared Goodness of Fit Test, Chi-Squared Test of Independence, Multiple Regression, Time Series Analysis
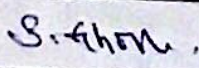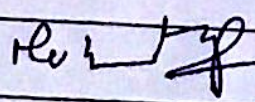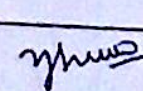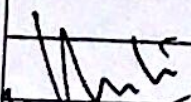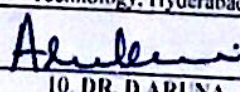
TEXT BOOKS:
1. K G Srinivas, G M Siddesh "Statistical programming in R", Oxford Publications.

REFERENCES:
1. Mark Gardener,Wrox, "K Beginning R: The Statistical Programming Language",
2. 2.Y. Anchang Zhao ," R and Data Mining: Examples and Case Studies", Elsevier in December 2012
3. Avril Coghlan, "A Little Book of R For Time Series", Release 0.2.
4.

BOS Members' Signatures :-

1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Azız Nagar, C B Post, Hyderabad -500075)

R20

IV YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Block Chain Technologies (PE - 3)

Course Outcomes:

1. Understanding the basic functionalities of Blockchain
2. Understanding the basic and popular cryptographic algorithms
3. Analysis of block chain 2.0 and 3.0
4. Analysis of security issues in Blockchain
5. Understanding Blockchain life cycle and development techniques

UNIT – I
Introduction to Blockchain:
Basic Cryptographic Primitives used in Blockchain – Secure, Hash Functions, Collision-Resistant, Puzzle friendly Hash, Collision Resistant Hash, Digital Signatures, Public Key Crypto, Verifiable Random Functions, Zero - Knowledge Systems

UNIT – II
Basic Distributed System Concepts :
Distributed Consensus and Atomic Broadcast, Byzantine Fault-Tolerant Consensus Methods

Basic Blockchain (Blockchain 1.0)
Concepts Germane to Bitcoin and Contemporary Proof-of-Work based Consensus Mechanisms, Operations of Bitcoin Blockchain, Crypto-Currency as Application of Blockchain Technology

UNIT – III
Blockchain 2.0 :
Blockchains with Smart Contracts and Turing Complete Blockchain Scripting – Issues of Correctness and Verifiability, Ethereum Platform and its Smart Contract Mechanism

Blockchain 3.0
Plug-and-Play Mechanisms for Consensus and Smart Contract Evaluation Engines, Hyperledger Fabric Platform

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi. Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

UNIT – IV
Privacy, Security issues in Blockchain :
Pseudo - Anonymity vs. Anonymity, Zcash and Zk-SNARKS for Anonymity Preservation, Attacks on Blockchains – such as Sybil Attacks, Selfish Mining, 51% Attacks - Advent of Algorand, and Sharding Based Consensus Algorithms to Prevent
Beyond Cryptocurrency – Applications of Blockchain in Cyber Security, Integrity of Information, E-Governance and Other Contract Enforcement Mechanisms

UNIT – V
Limitations of Blockchain as a Technology, and Myths vs. Reality of Blockchain Technology
Case Studies : Asset Management, Decentralized Finance, Global Trade & Commerce, Payments & Money, Real Estate
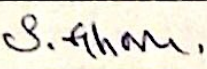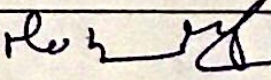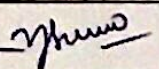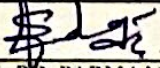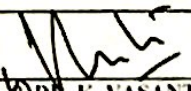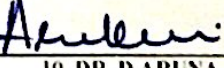
TEXT BOOKS :
1. S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, "Blockchain Technology: Cryptocurrency and Applications", Oxford University Press, 2019
2. Josh Thompson, "Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming", Create Space Independent Publishing Platform, 2017.

REFERENCE BOOKS :
1. Vint Cerf, "AI + Blockchain"
2. Branden Lee, "Blockchain"

BOS Members' Signatures :-

S. Ghosh			
1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR. A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

IV YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Mobile Application Development (PE - 3)

Course Outcomes:
At the end of this course, the student would be able to:
1. Understand the basics of Android devices and Platform.
2. Acquire knowledge on basic building blocks of Android programming required for App development.
3. Understand persistence Data storage mechanism in Android
4. Understand advanced application concepts like networking, Animations and Google Maps services etc.
5. Develop and publish Android applications in to Android Market

UNIT I:
JAVA FX TECHNOLOGY FOR RICH CLIENT APPLICATIONS
Introduction: Introduction to mobile application development, Android platform features and architecture, versions, comparison added features in each version,ART (Android Runtime), ADB (Android Debug Bridge).
Development environment/IDE: Android studio and its working environment, gradle build system, emulator setup.
Application anatomy: Application framework basics: resources, layout, values, asset XML representation and generated R.javafile, Android manifest file,creating a simple application.

UNIT II:
ANDROID UI DESIGN
GUI for Android: Introduction to activities, activities life-cycle
Intent: intent object, intent filters, linking activities.
Views and View Groups: Basic views, picker views, adapter views, Menu, App Bar etc, basics of screen design; different layouts. App widgets.
Material design: Card layouts, Recycler View
Fragments: Introduction to activities, activities life-cycle.

UNIT III:
DATA PERSISTENCE
Different Data persistence schemes: Shared preferences, File Handling, Managing data using SQLite database
Content providers: User content provider, Android in build content providers.

UNIT IV:
BACK GROUND RUNNING PROCESS, NETWORKING AND TELEPHONY SERVICES
Services: introduction to services local service, remote service and binding the service, the communication between service and activity, Intent Service.

Multithreading: Handlers, AsyncTask

Android network programming: HttpUrlConnection, Connecting to REST-based and SOAP based Web services

Broad cast receivers: LocalBroadcastManager, Dynamic broadcast receiver, System Broadcast, Pending Intent, Notifications

Telephony Manager: Sending SMS and making calls.

UNIT V:

Location based services: Displaying Maps, Obtaining the Maps API Key, Displaying the zoom control, changing views, navigating to a specific location, Getting the location that was touched, Geocoding and Reverse Geocoding, Getting Location Data, Monitoring a Location
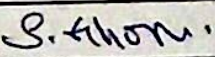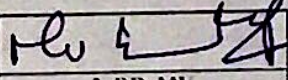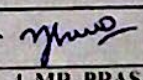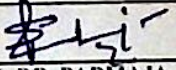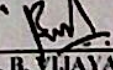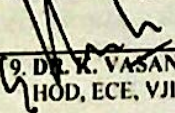
TEXT BOOKS:
1. Dawn Griffiths, David Griffiths,"Head First: Android Development" , OReilly2015,ISBN: 9781449362188
2. J.F.DiMarzio's, "Android 4 Application Development"

REFERENCE BOOKS:
1. Greg Milette,Adam Stroud,"PROFESSIONALAndroid™ Sensor Programming", John Wiley and Sons, Inc2012,ISBN/9781112650555,9781280678943,9781112227459
2. Paul Deital,HarveyDeital, Alexander Wald, "Android 6 for Programmers,App Driven approach",2015, Prentice Hall,*ISBN*: 9780134289366

BOS Members' Signatures :-

1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 23– 06 – 2020

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Azız Nagar, C.B. Post, Hyderabad - 500075)

R20

IV YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Programming with Julia (PE - 3)

Course Outcomes:

1. Understanding Julia programming language.
2. To understand basic concepts of Julia.
3. Applying Julia to a real world problem.
4. Understanding mathematical functions in Julia.
5. Applying Julia in engineering and science applications

Unit 1 :
Introduction to programming with Julia, Features of Julia, **Advantages** of Julia, **Disadvantages** of Julia, **Application of Julia**, Julia adoption by data science, Julia extensions, IDE's, packages.
Basics: handling files, organizing code in JL files, referencing code.

Unit 2 :
DataSets: data sets descriptions, downloading & loading datasets, coding & testing simple machine learning algorithm in Julia, saving workspace into data file, Variable, in Julia, Integers and floating-point numbers, Mathematical Operations and Elementary Functions, Complex and Rational Numbers, Strings in Julia.
Learning Ropes of Julia: datatypes, arrays, dictionaries, basic commands & functions, mathematical functions, array & dictionary functions, miscellaneous.

Unit 3 :
Operators, Loops & Conditionals: alpha-numeric operators, logical operators, for loop, while loop, break command, Understanding Julia's ecosystem, Programming concepts with Julia, Numerical and scientific computation with Julia
Data visualization and Plotting, Data visualization and graphics, Connecting with databases, Best Practices (Julia's Internals). The Julia REPL.

Unit 4 :
Beyond the Basics in Julia: string manipulation, custom functions, function example, Implementing simple algorithm, creating complete solution.
Julia goes all Data Science: data science pipeline, data engineering, data modelling, information distillation, applying data science pipeline to a real world problem

Dr. B. Vasanti

Unit 5 :
Julia-The Data Engineer: data frames, importing & exporting data, cleaning up data, formatting & transforming data, applying data transformations to numeric data, feature evaluation.

Exploring Datasets: listening to data, computing basic statistics & correlations, plots, hypothesis testing, The Standard Library and Packages, Creating Our First Julia App, Setting Up the Wiki Game, Building the Wiki Game Web Crawler, Adding a Web UI for the Wiki Game, Implementing Recommender Systems with Julia, Machine Learning for Recommender Systems

TEXT BOOKS :
1. Julia for Data Science, Zacharias Voulgaris, Technics Publications, First Edition.
2. Julia 1.0 Programming: Dynamic and high-performance programming to build fast scientific... by Ivo Balbaert.

REFERENCE BOOKS :
1. Julia 1.0 Programming Complete Reference Guide: Discover Julia, a high-performance language for... by Ivo Balbaert.
2. Beginning Julia programming, Sandeep Nagar, Apress, First Edition
3. Julia for Data Science by Zacharias Voulgaris
4. Tanmay Teaches Julia for Beginners: A Springboard to Machine Learning for All Ages 1st Editionby TanmayBakshi (Author)

BOS Members' Signatures :-

1. DR. SIDDARTHA GHOSH Chairman . BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science. Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR.K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)
R20

IV YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Big Data Analytics (PE - 4)

Course Outcomes:
At the end of this course, the student would be able to:
1. Explain the foundations, definitions, and challenges of Big Data.
2. Use Hadoop file system interfaces.
3. Program using HADOOP and Map reduce.
4. Understand various Hadoop Eco Systems like Pig, Hive.
5. Outline Hadoop Eco System using HBase, Zookeeper.

UNIT-I:
Introduction to Big Data and Hadoop
Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analyzing Data with UNIX tools, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System.

UNIT-II:
HDFS (Hadoop Distributed File System)
The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT-III:
Map Reduce
Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

UNIT-IV:
Hadoop Eco System-I
Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.
Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad -500075)

R20

UNIT-V:

Hadoop Eco System-II

HBase: HBasics, Concepts, Clients, Example, Hbase versus RDBMS.

Zookeeper: The Zookeeper Services, Zookeeper in Production.
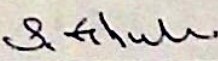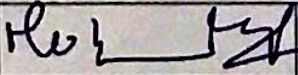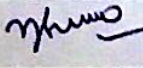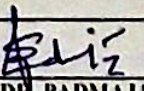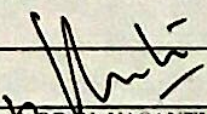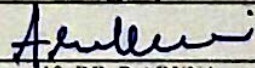
TEXT BOOK:

1. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

REFERENCE BOOKS:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.

BOS Members' Signatures :-

1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

	L	T	P	C
IV YEAR B.Tech. AI – I Sem	3	0	0	3

Internet of Things (PE - 4)

Course Outcomes: After completion of the course, student would be able to:
1. Describe various IoT enabled technologies.
2. Understand the concepts of M2M with necessary protocols.
3. Illustrate Python programming for IoT
4. Examine the Python programming with Raspberry PI
5. Design web applications for IoT

UNIT-I
Introduction to Internet of Things :

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

UNIT-II
IoT and M2M :

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

UNIT-III
Introduction to Python :

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

UNIT-IV
IoT Physical Devices and End points :

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

UNIT-V
IoT Physical Servers and Cloud Offerings :

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad -500075)

R20

Introduction to Cloud Storage models and communication APIs. Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API.
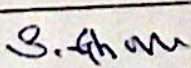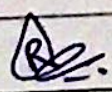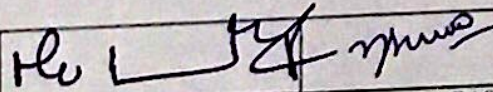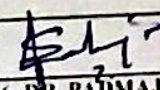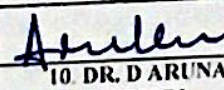
TEXT BOOKS
1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014

REFERENCE BOOKS:
1. Getting started with the Internet of Things: connecting sensors and micro controllers to the cloud CUNO Pfister, O' Reily publications.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

BOS Members' Signatures :-

1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD. UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**DATE OF BOS MEETING** 14-07-2021

IV YEAR B.Tech. AI – I Sem

L	T	P	C
3	0	0	3

Advance Databases (PE - 4)

Course Outcomes:

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

1. Understand the concepts of Distributed Database Systems.
2. Identify different Architectural Models for Distributed DBMS.
3. Characterize the query processors.
4. Design Algorithms for Concurrency control Mechanisms.
5. Decide different Parallel DBMS Techniques based on given constraints.

UNIT-I:

Introduction

Distributed Data Processing, Distributed Database System, Promises of DDBSs, Design Issues.

UNIT-II:

Distributed DBMS Architecture: ANSI SPARC, Centralized DBMS Architecture, Architectural Models for Distributed DBMS.

Distributed Database Design: Top-Down Design Process, Distribution Design issues, Fragmentation, Allocation.

UNIT-III:
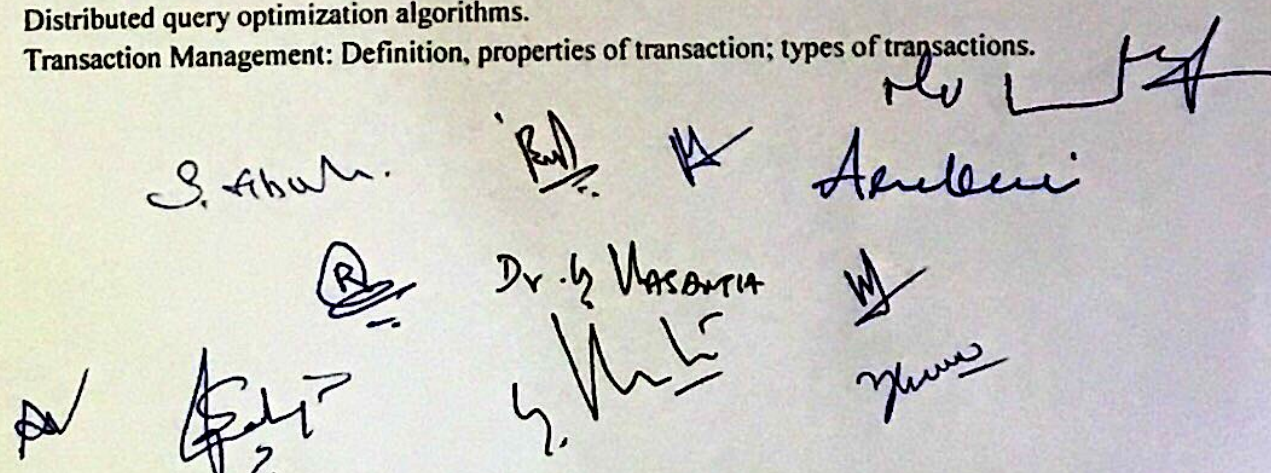
Introduction to RDBMS: Overview of Relational DBMS: Relational Database Concepts, Normalization, And Relational Data Languages.
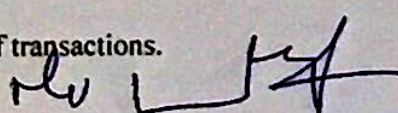
Query Processing and Decomposition: Query Processing Objectives, Characterization of query processors, layers of query processing, query decomposition, Localization of distributed data.

UNIT–IV:
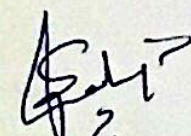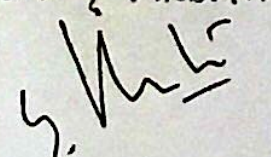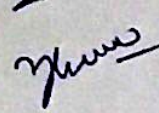
Distributed Query Optimization: Query optimization, centralized query optimization, Distributed query optimization algorithms.

Transaction Management: Definition, properties of transaction; types of transactions.

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B Post, Hyderabad -500075)

R20

UNIT-V:

Distributed Concurrency Control: Serializability theory, Concurrency control Mechanisms & Algorithms; Time stamped & Optimistic concurrency control algorithms, Deadlock Management, Relaxed Concurrency Control.
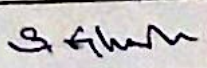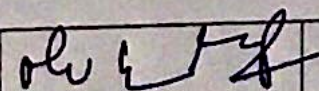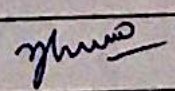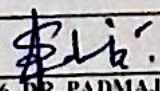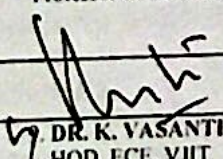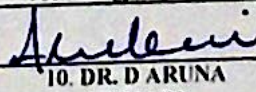
TEXT BOOKS:

1. Principles of Distributed Database Systems, M.Tamer Ozsu, Patrick Valduriez, 3rd Edition, Springer.
2. RaghuRamaKirshna,JohannesGehrk,DatabaseManagementSystemITataMcGraw Hill 3rd Edition.

REFERENCE BOOKS:

1. Distributed Databases Stefano Ceri and Willipse Pelagatti:, McGraw Hill.
2. M.Tamer OZSU and Pauck Valduriez: Principles of Distributed DatabaseSystems, Pearson Edn. Asia, 2001.
3. Henry F Korth, a Silberchatz and Sudershan: Database System Concepts. Tata MGH.

BOS Members' Signatures :-

1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)
R20

IV YEAR B.Tech. AI – I Sem

L T P C

3 0 0 3

Human Computer Interaction (PE - 4)

Course Outcomes:
1. Explain the capabilities of both humans and computers from the viewpoint of human information processing.
2. Describe and use HCI design principles, standards and guidelines.
3. Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
4. Discuss about different mobile applications and related design issues.
5. Analyze and discuss HCI issues in virtual reality, multimedia, and Word Wide Web-related environments.

UNIT I

FOUNDATIONS OF HCI: The Human :

I/O channels, Human Memory, Thinking: Reasoning and problem solving; **The Computer-** Display Devices, Memory, processing and networks; **The Interaction-** Models of interaction, frameworks and HCI, Ergonomics, Interaction styles, Elements of the WIMP interface, Interactivity; Paradigms.

UNIT II

DESIGN PROCESS: Interaction Design basics:
The process of design, Scenarios, Navigation design, Screen Design and layout, Iteration and prototyping
HCI in software process – software life cycle, Usability engineering, Prototyping in practice, Design rationale
Design rules – Principles to support usability, Standards, guidelines Golden rules and heuristics; Evaluation Techniques, Universal Design.

UNIT III

MODELS AND THEORIES:
Cognitive models, Socio-Organizational issues and stake holder requirements, Communication and collaboration models.

UNIT IV:

MOBILE HCI: Mobile Ecosystem :

Platforms, Application frameworks

Types of Mobile Applications: Widgets, Applications, Games; Mobile Information Architecture

Mobile Design: Elements of Mobile Design, Tools , Mobile 2.0.

UNIT V
WEB INTERFACE DESIGN: Drag & Drop, Overlays, Inlays and Virtual Pages, Process Flow.
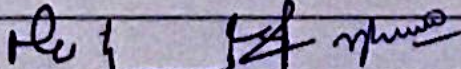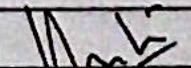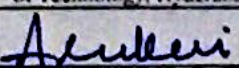
TEXT BOOKS :
1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I , II & III)
2. Brian Fling, "Mobile Design and Development", First Edition , O'Reilly Media Inc., 2009 (UNIT –IV)
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O'Reilly, 2009.(UNIT-V)

REFERENCE BOOKS :
1. The essential guide to User Interface Design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface, 3rd Edition Ben Shneidermann, Pearson Education Asia.
3. Interaction Design, Prece, Rogers, Sharps, Wiley Dreamtech.

BOS Members' Signatures :-

1. DR. SIDDHARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. Dr.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH, HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence

IV YEAR B.Tech. AI – I Sem

L T P C

0 0 2 1

Computer Vision Lab

Course Outcomes:

1. Learning basic techniques to handle images using python and OpenCV
2. Learning the techniques to load any images and handle them using python
3. Understanding how to use OpenCV to convert between color spaces and segment out ranges.
4. Understanding Motion Analysis

WEEK 1 & 2 :

- Installation of Python , OpenCV, Understanding the functionalities of OpenCV
- Importing an Image with OpenCV, NumPy and Matpltlib
- Convert the Image into RGB
- Convert the image into gray scale
- Plot the three channels of the image
- Transform the image into HSV and HLS models
- Drawing rectangle, lines, circle on Image
- Adding Text on Image

Week 3 & 4
Storing and Accessing many Images using Python (pickle) :

- Storing images on disk
- Storing images in lightning memory-mapped databases (LMDB)
- Storing images in hierarchical data format (HDF5)

Week 5 & 6
Image Segmentation Using Color Spaces in OpenCV + Python

- Color Spaces and Reading Images in OpenCV
- Visualizing Nemo in RGB Color Space
- Visualizing Nemo in HSV Color Space
- Picking Out a Range
- Using OpenCV to convert between color spaces and segment out ranges.

Week 7 & 8

- Face Detection in Python, OpenCV - Using a Webcam
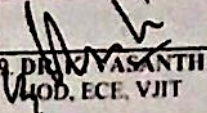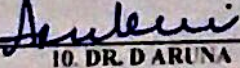- Face Recognition with Python
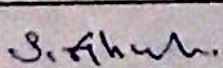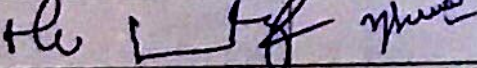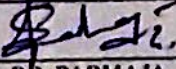
Week 9 & 10

- Handling Images with Tensorflow over CoLab

Week 12 & 13

- Converting normal Image to cartoon image using OpenCV & Python
- Line detection in python with OpenCV | Houghline method

BOS Members' Signatures :-

S. Ghosh	*sign*	*sign*	*sign*
1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
sign	*sign*	*sign*	*sign*
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
sign	*sign*	*sign*	**DATE OF BOS MEETING**
9. DR. K VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)
R20

IV YEAR B.Tech. AI – I Sem

L   T   P   C

0   0   2   1

R Programming Lab

Course outcomes:
1. Explore R environment
2. Visualize data insights using charts and graphs
3. 3. Analysis data with linear regression model

Week-1:

Installation and Environment set up R and Rstudio

Week-2:

Experiments on Vector Arithmetic operations

Week-3:

Experiments on Matrices operations

Week-4

Experiments on Arrays functions

Week-5:

Experiments on Factors

Week-6:

Experiments on Data Frames

Week-7:

Experiments on List operations

Week-8:

Write R scripts which demonstrate logical operations and Conditional Statements

Week-9:

Write R scripts which demonstrate Looping Over List

Week-10:

Write R scripts which demonstrate Nested Functions and Function Scoping

Week-11:

Experiments on Mathematical Functions in R

Week-12:

Experiments on Calculus in R

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad - 500075)

R20

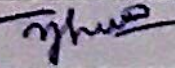**Week13:**

Experiments on Lapply, Sapply and Apply functions
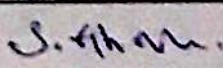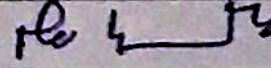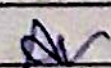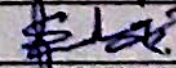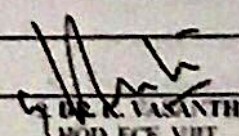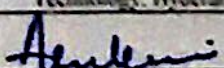
Week-14:

Generate different Charts and Graphs using R

Week – 15 & 16

Mini Projects

BOS Members' Signatures :-

signature	*signature*	*signature*	*signature*
1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
signature	*signature*	*signature*	*signature*
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
signature	*signature*	*signature*	**DATE OF BOS MEETING**
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E. New Delhi, Permanently Affiliated to JNTU, Hyderabad)
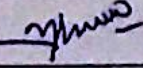(Azız Nagar, C B Post, Hyderabad - 500075)

R20

IV YEAR B.Tech. AI – I Sem

L T P C

0 0 2 1

Block Chain Technologies Lab

Course Outcomes:

1. Learning basic techniques to implement wallets
2. Learning the techniques to create cryto currency and make them in use
3. Understanding how to make Initial Coin Offerings (ICOs)
4. Understanding the real application of Blockchain and their development techniques

WEEK 1 & 2 :

- Creating wallets and sending cryptocurrency
- Starting a Wordpress website

Week 3 & 4

- Blockchain explorer, create your own cryptocurrency
- Implementation of Crypto-anarchism and Cypherpunks
- Implementing Hash cryptography, mining and consensus

Week 5 & 6

- Implement tokenization and trading cryptocurrencies
- Start your own Initial Coin Offerings (ICOs)
- Exchanges -ICO en STO.

Week 7 & 8

- Building a Minimal Blockchain in Python

Week 9 & 10
- Develop a Blockchain Client using Python
- Creating Multiple Transactions, Block Class, Genesis Block, Block Chain, Adding Genesis Block, Create Miners , Adding Blocks

Week 11 & 12
- Real life Blockchain implementation
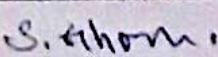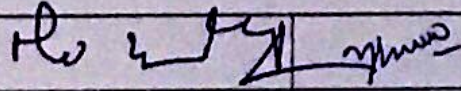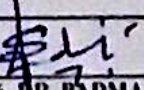
Vidya Jyothi Institute of Technology (Autonomous)
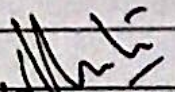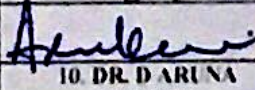## Department of Artificial Intelligence
(Approved By A I C T E, New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

Week 14 – 16

- Create a Blockchain Application to solve a real life problem in innovative way. 3-4 students can club together and make a team and work for this.

BOS Members' Signatures :-

S. Ghosh	*(signature)*	*(signature)* *(signature)*	*(signature)*
1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD. UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
(signature)	*(signature)*	*(signature)*	*(signature)*
5. DR. A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
(signature)	*(signature)*	*(signature)*	**DATE OF BOS MEETING**
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	14-07-2021

IV YEAR B.Tech. AI – I Sem

L	T	P	C
0	0	2	1

Mobile Application Development Lab

Week – 1 :

Installation of Java J2ME Toolkit (J2ME)

Week – 2 :

Working with J2ME Features

1. Menu Creation
2. Menu Events
3. On Line Help MIDlet
4. Input validation – Phone number

Week – 3 :

Threads and High-level User Interfaces

1. Text Slide Show
2. Image Slide Show
3. Implementing Non Interactive Gauge
4. Quiz MIDLet

Week – 4 :

Working on Drawing and Images

1. Immutable Image
2. Image Clip Region
3. Implementing Bar Graph
4. Implementing Pie Graph
5. Keypad Events

Week – 5 & 6 :

Developing Networked Applications using the Wireless Toolkit

Dr. B. VASANTH

Week – 7 & 8 :

Authentication with Web Server

Week – 8 & 9 :

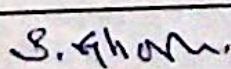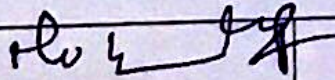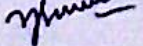Web Application using J2ME – case study: web application using J2ME
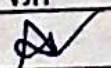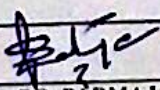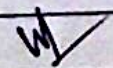
Week – 10- 13

Create a mobile App for self learning purpose for any subject like Maths, Java etc

Week – 14- 16

Create a mobility app to solve a real life problem

BOS Members' Signatures :-

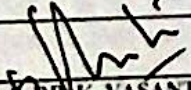|			
1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A.I.C.T.E., New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C.B. Post, Hyderabad -500075)

R20

IV YEAR B.Tech. AI – I Sem

L	T	P	C
0	0	2	1

Programming with Julia Lab

Course outcomes:

1. Understanding Julia using strings.
2. Understanding Julia with Science.
3. Understanding Julia in Mathematics.
4. Understanding the Julia using Data Structures.
5. Building the Wiki Game Web Crawler

Week - 1

a) Installation of Julia Software

b) The classical introductory exercise. Just say 'Hello, World!'.

Week - 2

a) Given a year, report if it is a leap year.

b) Calculate the hamming difference between two DNA strands.

c) Given a DNA strand, return its RNA Compliment Transcription.

Week - 3

a) Implement run-length encoding and decoding.

b) Determine if a sentence is pangram.

Week - 4

a) Given a word and a list of possible anagrams, select the correct sublist.

b) Implement a binary search algorithm.

Week - 5

a) Given a DNA string, compute how many times each nucleotide occurs in the string.

b) Determine if a triangle is equilateral, isosceles, or scalene.

Week - 6

a) Find the difference between the square of the sum and the sum of the squares of the first N natural numbers.

b) Compute Pascal's triangle up to a given number of rows.

Dr. B. VASANTH

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E , New Delhi, Permanently Affiliated to JNTU, Hyderabad)

(Aziz Nagar, C B Post, Hyderabad -500075)

R20

Week - 7

a) Convert a number to a string, the content of which depends on the number's factors.

b) Given a word, compute the Scrabble score for that word.

Week - 8

a) Use the Sieve of Eratosthenes to find all the primes from 2 up to a given number.

b) Determine if a word or phrase is an isogram.

Week - 9

a) Take input text and output it transposed.

b) Convert a trinary number, represented as a string. (e.g. '102012'), to its decimal equivalent.

Week - 10

a) Given a decimal number, convert it to the appropriate sequence of events for a secret handshake.

b) Clean up user entered phone numbers so that they can be sent SMS messages.

Week - 11

a) Compute the prime factors of a given natural number.

b) Add the numbers to a minesweeper board.

Week - 12

a) Creating Our First Julia App

b) Setting Up the Wiki Game

c) Building the Wiki Game Web Crawler

d) Adding a Web UI for the Wiki Game

Week – 13 – 16

Create a real world solution using Julia.

Dr. B. VASANTH

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E, New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)
R20

BOS Members' Signatures :-

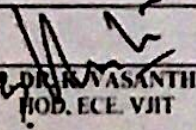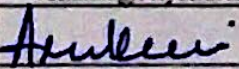|			
S. Ghosh.	*(sign)*	*(sign)* *(sign)* *(sign)*	
1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
(sign)	*(sign)*	*(sign)*	*(sign)*
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
(sign)	*(sign)*	*(sign)*	**DATE OF BOS MEETING**
9. DR. K.VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	**14-07-2021**

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E, New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

INDUSTRY ORIENTED MINI PROJECT

B.Tech. IV Year I Semester

L	T	P	C
0	0	0	3

Course Outcomes:

At the end of the course the student should be able to

1. Understand the working environment of an Industry
2. Create an avenue in the industry in terms of a mini project
3. Predict a timeline for the project
4. Evaluate the requirements of the projects in terms of different subsystems
5. Create a dissemination report for the mini project.

METHOD OF EVALUATION:

The students in a group of 3 to 4 works on an industry oriented topic approved by the head of the department and prepare a comprehensive mini project report after completing the work to the satisfaction. The progress of the project is evaluated based on a minimum of two reviews. The review committee may be constituted by the Head of the Department. A mini project report is required at the end of the semester. The mini project work is evaluated based on oral presentation and the mini project report jointly by external and internal examiners constituted by the Head of the Department.

IV YEAR B.Tech. AI – II Sem

L	T	P	C
3	0	0	3

Industrial Artificial Intelligence

Course Outcomes:

1. Understanding Different AI Applications in Industry
2. Analysis of challenging's of Industrial AI vs Regular AI
3. Understanding Industry 4.0
4. Analysis of Automotive Industry
5. Learning from AI case studies

UNIT – I
Introduction to Industrial AI :
Regular AI vs Industrial AI, Embedding Industrial AI in Existing products, Industrial AI in Automobiles, Industrial AI in Manufacturing, Industrial AI for Automation, Industrial AI for collaborative Robot Arms, Industrial AI for Modeling Large Scale Systems, Industrial AI for Knowledge Discovery

UNIT – II
Challenges of Industrial AI :
Cost of projects, Availability of Experts, Myth of loosing job for Industrial AI, Data, Speed, Interpretability, No Existing Framework, High Fidelity Requirement

UNIT – III
Industrial AI and Industry 4.0 :
Definition – Industry 4.0, Industrial AI as a part of Industry 4.0, Industrial AI impact on manufacturing, Evolution of disruptive Manufacturing 4.0 Technologies – Smart Manufacturing, Maintenance vs Predictive Maintenance, quality 4.0, Human Robot Collaboration in Industry 4.0, Market Adaption and Supply Chain, AI in waste reduction, Ai in Production Optimization,

UNIT – IV
Industrial AI Case Study 1 : Automotive Industry
Definition - Introduction to Self Driving Car (SDC) or Automated Vehicles (AV), Existing Products in the market - Waymo, Robo Taxis, Google FireFly, Hardware and Software, use of CARLA software, Glossary of Terms, Taxonomy of Driving

UNIT – V

Industrial AI Case Study 2 : Manufacturing Industry

AI for Quality Inspection and Assurance – Automated Optical Inspection, Image Classification and finding faulty machines/parts with the help of Computer Vision, Manufacturing Process Optimization – use of autonomous machines or robots, Use of Reinforcement Learning Techniques, Manufacturing Robots for Robots
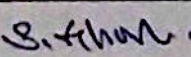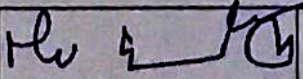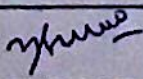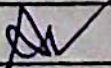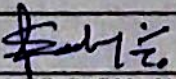
Text Books

1. Jay Lee, "Industrial AI: Applications with Sustainable Performance", Springer
2. Spyros G, Henk, "Artificial Intelligence in Industrial Decision Making, Control and Automation

Reference Books

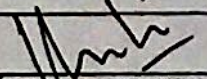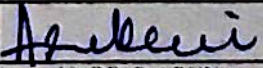1. Matt Ward, "Artificial Intelligence in Practice", Wiley
2. Paul R Daugherty, H. James Wilson, "Human + Machine"

BOS Members' Signatures :-

1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

	L	T	P	C
IV YEAR B.Tech. AI – II Sem	3	0	0	3

Software Project Management

Course Outcomes:

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

1. Compare and contrast the various CSM models.
2. Understand the principle of software engineering.
3. Examine the lifecycle phases, artifacts of the process and model based software architectures.
4. Compare various work flow process models.
5. Evaluate different software product metrics.

UNIT I:

Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

UNIT II:

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

The old way and the new: The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process.

UNIT III:

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

Model based software architectures: A Management perspective and technical perspective.

UNIT IV:

Work Flows of the process: Software process workflows, Inter trans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning. Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

Process Automation: Automation Building Blocks, the Project Environment.

UNIT V:

Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Example: Future Software Project Management: Modern Project Profiles Next generation Software economics, modern Process transitions.

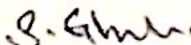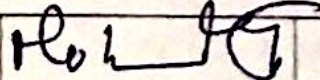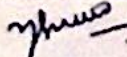**Case Study:** The Command Center Processing and Display System-Replacement (CCPDS-R)
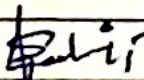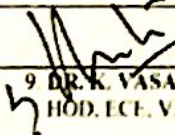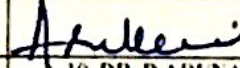
TEXT BOOKS:

1. Software Project Management, Walker Royce, Pearson Education, 1998

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition,Tata Mc-Graw Hill,2006
2. Applied Software Project Management, Andrew Stellman& Jennifer Greene, O'Reilly, 2006.
3. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.

BOS Members' Signatures :-

|			
1. DR. SIDDARTHA GHOSH Chairman , BOS for AI, VJIT	2. DR. OBV RAMANAIAH JNTUH Nominee	3. DR. MV KRISHNAMURTHY MD, UOSD Pvt. Ltd.	4. MR. PRASAD YERRAMSETTI Lead Program Manager in Data Science, Microsoft
5. DR.A. OBULESU Professor in AI, VJIT	6. DR. PADMAJA SAVARAM, HOD, CSE, Keshav Memorial Institute of Technology, Hyderabad	7. DR. V. VIJAYA KUMAR DEAN CSE & IT, Anurag Group of Institutes	8. DR. B. VIJAYA KUMAR HOD, CSE, VJIT
9. DR. K. VASANTH HOD, ECE, VJIT	10. DR. D ARUNA KUMARI Professor in CSE, VJIT	11. PROF. B. SRINIVASULU HOD, IT, VJIT	DATE OF BOS MEETING 14-07-2021

TECHNICAL SEMINAR

L	T	P	C
0	0	4	2

B.Tech IV Year II Semester

Course Objectives:

1. To build the Technical Competency, Communication skills, Research interest among the students.
2. To make the students aware of the modern technique which might be beyond books and syllabus but used across the globe towards knowledge enhancement in the domain of AI and ML.
3. To make the students understand the various research components while giving technical presentation.
4. To make them understand the importance of technical seminars/presentations from professional point of view.
5. To make the students habituated on reading research papers and creating study and analysis report on them.

Procedure to be followed:

1. The Technical Seminar is an individual effort and hence to team work is encouraged here.
2. The Faculty Seminar in-charge will publish the seminar dates and thrust (R&D) areas on AI and ML at the mid of the semester.
3. Each student then will collect a minimum of 5 top level latest research papers on the area chosen by him/her for seminar.
4. The collected papers with a one page report need to be submitted to the staff seminar coordinators for suggestions, input and updations, at least a week before of the given seminar dates.
5. The seminar will be around 20 -30 mns duration.
6. After the successful presentation of the seminar each student will submit a seminar report (4-5 pages) with the base papers attached along with.
7. The dept. may ask a student for a re-seminar if this is found that the standards were not maintained by the student.

Vidya Jyothi Institute of Technology (Autonomous)
Department of Artificial Intelligence
(Approved By A I C T E, New Delhi, Permanently Affiliated to JNTU, Hyderabad)
(Aziz Nagar, C B Post, Hyderabad -500075)

R20

COMPREHENSIVE VIVA-VOCE

L	T	P	C
0	0	0	2

B.Tech IV Year II Semester

Course Objectives:

1. To prepare the students holistically and making them ready for professional world and industry.
2. To make the students understand that the fundamental subjects of CSE and AI has a major role in their career building.
3. To make the students to go back to the 1st yr, 2nd yr level subjects to make their base strong.
4. To help the students to overcome he fear of facing interviews taken out side by more than one recruiters either in govt, public or pvt sector selection process.

Procedure to be followed:

1. The dept. staff coordinator will publish a viva-voce calendar with dates and time well ahead of the time.
2. A list of minimum 6 subjects (to a max of 10 subjects) will be published by the staff coordinator which follows the standard syllabus mentioned in syllabus book.
3. A team of faculty members from the dept. will be the part of this viva-voce process and each students will be evaluated individually.

S. Thru

Dr k. VASANTH

VidyaJyothi Institute of Technology

Department of Artificial Intelligence

The following subjects are offered by the Department of Artificial Intelligence to other departments.

S.No	Category	Year-Sem.	Open elective Subject Names
1	OE-1	III-I	Foundation of Artificial Intelligence (FAI)
2	OE-2	III-II	Introduction to Machine Learning (IML)
3	OE-3	IV-I	Foundation of Data Science (FDS)

S. Ghosh.

Dr K. VASANTH

III YEAR B.Tech. I Sem

L	T	P	C
3	0	0	3

Foundation of Artificial Intelligence

Course Outcomes:
Student will be able to:

1. Understand the basic concepts and environment of Artificial intelligence.
2. Analyze various uniformed and informed search algorithm related to artificial intelligence.
3. Design various simple and complex network with real time applications.
4. Analyze the basic principles Markov Decision with real time applications.
5. Illustrate various types of Reinforcement Learning learning.

Unit – I
Concept of AI, History, Current Status, Scope, Intelligent Agents, Environments, Problem Formulations, Review of Tree and Graph Structures, State Space Representation, Search Graph and Search Tree.

Unit – II
Uninformed and Informed Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search : Generate & Test, Hill Climbing, Best first search

Unit – III
Probabilistic Reasoning : Probability, Conditional Probability, Bayes Rule, Bayesian Networks- Representation, Construction and Inference, Hidden Markov Model, Dynamic Bayesian networks (DBN)

Unit – IV
Markov Decision Process, MDP Formulation, Utility Theory, Utility Functions, Value Iteration.
Unit – V
Reinforcement Learning : Passive Reinforcement Learning, Direct Utility Estimation, Adaptive dynamic Programming, Temporal Difference Learning.

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill

REFERENCE BOOKS:

1. Trivedi, M.C., "A Classical Approach to Artificial Intelligence", Khanna Publishing House, Delhi.
2. SarojKaushik, "Artificial Intelligence", Cengage Learning India, 2011

III YEAR B.Tech.– II Sem .	L	T	P	C
	3	0	0	3

Introduction to Machine Learning

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

1. Understanding Machine Learning & it's applications
2. Understanding Supervised, Unsupervised and Reinforcement Machine Learning
3. Understanding important Machine Learning Algorithms
4. Learning different Machine Learning tools
5. Comprehension of clustering and classification problems

Unit – I

Introduction to Machine Learning, History, Current Status, Application of Machine Learning, Relation between Artificial Intelligence and Machine Learning, Data Driven Machine Learning, Types of Machine Learning : Supervised Learning, Unsupervised Learning, reinforcement learning , Learning Systems

Unit – II

Decision Tree learning : Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning.

Artificial Neural Networks (ANN) : Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm.

Unit – III

Support Vector Machines : (Paper handouts) Maximum margin linear separators. Quadractic programming solution to finding maximum margin separators.

Bayesian learning: Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities

Unit – IV

Instance-Based Learning : Constructing explicit generalizations versus comparing to past specific examples, k-Nearest-neighbor algorithm.

Text Classification : Bag of words representation. Vector space model and cosine similarity. Relevance feedback and Rocchio algorithm,

Unit – V
Clustering and Unsupervised Learning :Learning from unclassified dat,. Clustering.Hierarchical Aglomerative Clustering.k-meanspartitional clustering.

Classification problems in language: word-sense disambiguation, sequence labelling, Hidden Markov models (HMM's), Veterbi algorithm for determining most-probable state sequences.

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

REFERENCE BOOKS :
1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ. Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001.

S. Ghosh.

Dr B. Vasanta

IV YEAR B.Tech. – I Sem

L	T	P	C
3	0	0	3

Foundation of Data Science

Course Outcomes:

1. Understanding the fundamental concepts of Data Science
2. Understanding how data is collected, managed and stored for data science
3. Understand the real-world applications of data scientists
4. Visualize and present the inference using various tools
5. Implement data collection and management scripts using MongoDB

UNIT – I
Introduction to core concepts and technologies:
Introduction to Data Science, Terminology, Data Science Process, Data Science Toolkit, Types of Data, Example Applications, DataScience Tools.

UNIT – II
Data Collection and Management:
Sources of data, Data Collection and APIs, Exploring and Fixing Data, Data Storage and Management.

UNIT-III
Data Analysis:
Terminology and Concepts, Applying statistics, Central Tendencies and Distributions, Variance, Distribution Properties and Arithmetic, Samples/CLT, Basic Machine Learning Algorithms, Linear Regression, SVM, Naive Bayes.

UNIT-IV
Data Visualization:
Types of data Visualization, Data for Visualization: Data Types, Data Encodings, Retinal Variables.

UNIT-V
Different Technologies for Visualization, Bokeh (Python), Recent Trends in Various Data Collection and Analysis Techniques, Various Visualization Techniques.

TEXT BOOKS :

1. Cathy O'Neil, Rachel Schutt, "Doing Data Science, Straight Talk from The Frontline", O'Reilly

2. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", Manning Publications Co., 1st Edition, 2016

REFERENCE BOOKS :

1. Jure Leskovek, AnandRajaraman, Jeffrey Ullman, "Mining of Massive Datasets", v2.1, Cambridge University Press, 2014.

2. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly, 1st Edition, 2015