



Annasaheb Dange
College of Engineering and Technology
Ashta

An Autonomous Institute affiliated to Shivaji University
Kolhapur

Curriculum Structure

S.Y. B. Tech.
ARTIFICIAL INTELLIGENCE AND
DATA SCIENCE

SEM III & SEM IV

(Academic Year 2023- 2024)

Annasaheb Dange College of Engineering and Technology
Artificial Intelligence and Data Science Department
Teaching and Evaluation Scheme

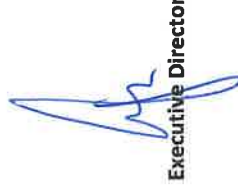
S. Y. B. Tech Semester III																			
Course Code	Course Name	Teaching Scheme						THEORY						PRACTICAL					
		L		T		P		ISE		MSE + ESE		Total		ISE		ESE		Total	
1ADPC201	Discrete Mathematics and Theory of Computation	3	1	-	4	-	4	Max 40	Min 16	MSE 30	ESE 24	Total 100	40	Max -	Min -	Max -	Min -	Total -	100
1ADPC202	Data Structures	3	-	2	4	-	4	Max 40	Min 16	MSE 30	ESE 24	Total 100	40	Max 50	Min 20	Max 50	Min 20	Total 100	200
1ADPC203	Operating Systems	3	-	2	4	-	4	Max 40	Min 16	MSE 30	ESE 24	Total 100	40	Max 50	Min 20	Max -	Min -	Total 50	150
1ADPC204	Foundations of Artificial Intelligence	3	-	2	4	-	4	Max 40	Min 16	MSE 30	ESE 24	Total 100	40	Max 50	Min 20	Max -	Min -	Total 50	150
1ADHS205	Psychology	2	-	-	2	-	2	Max 50	Min 20	-	-	50	20	Max -	Min -	Max -	Min -	Total -	50
1ADHS207	Constitution of India	1	-	-	1	-	1	Max 25	Min 10	-	-	25	10	Max -	Min -	Max -	Min -	Total -	25
1ADVS206	Python for Data Science	2	-	2	3	-	3	Max -	Min -	-	-	-	-	Max 50	Min 20	Max 50	Min 20	Total 100	100
1ADCC208	Aptitude and Reasoning Part - I	-	-	2	1	-	1	Max -	Min -	-	-	-	-	Max 50	Min 20	Max -	Min -	Total 50	50
		17	1	10	23	-	23												825
	Total Contact Hours	28																	



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Class	S Y B. Tech Sem III
Course Code & Course Title	1ADPC201- Discrete Mathematics and Theory of Computation
Prerequisite/s	-
Teaching Scheme (Lecture/ Tutorial /Practical)	3/1/0
Credits	4
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPC201_1	Proficiently calculate permutations and combinations to solve given problems using appropriate formulas.
1ADPC201_2	Proficiently solve problems of mathematical logic and set theory using appropriate formulas/laws.
1ADPC201_3	Accurately Build finite state machines for regular language or regular expression over a given alphabet and convert one form of finite state machine to another form by using appropriate conversion method.
1ADPC201_4	Proficiently Construct grammars (context free/ regular) for given language (context free/ regular) over a given alphabet and convert given context free grammar in CNF Form by using conversion method.
1ADPC201_5	Accurately Build deterministic and non-deterministic pushdown automata for given language or grammar over a given alphabet and stack symbols.
1ADPC201_6	Proficiently Construct Turing Machines for given language, function over a given alphabet and tape symbols.

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Permutations, Combinations and Discrete Probability: Permutations and Combinations: rule of sum and product, Permutations, Combinations, Conditional Probability, Bayes' Theorem	06 Hrs.
Unit 2	Mathematical logic: Introduction, statements and notations, connectives – negation, Conjunction, disjunction, conditional, bi-conditional, Statement formulas and truth tables, well-formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, normal forms	06Hrs.



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Unit 3	Set theory and Algebraic systems: Basic concepts of set theory, operations on sets, orderedpairs, Cartesian Product, relation, properties of binary relations, matrix and graph representation, partition and covering of set, equivalence relation, composition of relations, POSET and Hassediagram, Function – definition, types Algebraic Systems, homomorphism, Semigroups and Monoids, properties and examples, Groups: Definition and examples	08 Hrs.
Unit 4	Mathematical Induction, Regular Languages & Finite Automata Regular expressions and corresponding regular languages, examples and applications, Finite automata-definition and representation, Non-deterministic F.A.,NFA with null transitions, Equivalence of FA's , NFA's and NFA's with null transitions.	08 Hrs.
Unit 5	Grammars and Languages Types of Languages, Derivation and ambiguity, Union, Concatenation and *'s of CFLs, eliminating production & unit productions from CFG, Eliminating useless variables from a context Free Grammar. CNF Notation.	05 Hrs.
Unit 6	Push Down Automata and Turing Machines PDA Definition, Deterministic PDA & types of acceptance, Equivalence of CFG's & PDA's. TM- Models of computation, definition of Turing Machine as Language acceptors, combining Turing Machines	06 Hrs.

Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Discrete Mathematical Structures with application to Computer Science (Unit 2,3)	J. P. Tremblay & R. Manohar	Tata MGH International	-	2007
2	Elements of Discrete Mathematics(Unit1)	C. L. Liu and D. P. Mohapatra	SiE Edition, TataMcGraw- Hill	4 th	2013
3	Introduction to languages & theory of computations (Unit 4,5,6)	John C. Martin	Tata McGraw Hill Edition	3 rd	2007
4	Introduction to Automata Theory, Languages and computation	John E. Hopcraft, Rajeev Motwani,Jeffrey D. Ullman	Pearson Edition	3 rd	2006



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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Discrete Mathematics and its Applications	Kenneth H. Rosen (AT&T Bell Labs) (mhhe.com/rosen)	Tata Mc Graw Hill	7 th	2012
2	Discrete Mathematics, Schaum's outlines.	Semyour Lipschutz, Marc Lipson	Tata Mc Graw Hill	3 th	2012
3	Introduction to theory of computations	Michael Sipser	Cengage Learning	3 rd	2012
4	Theory of Computation- A problem solving Approach	Kavi Mahesh	Wiley india	1 st	2005



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Class	S Y B. Tech Sem III
Course Code & Course Title	1ADPC202 - Data Structures
Prerequisite/s	Problem-Solving Using C
Teaching Scheme (Lecture/ Tutorial /Practical)	3/0/2
Credits	4
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30
Evaluation Scheme Practical: ISE/ ESE	50/50

Course Outcomes (COs) : The students will be able to:	
1ADPC202_1	Describe fundamentals in data structures
1ADPC202_2	Explain the fundamental concepts of structuring, managing and organizing the data using linear data structures with ADTs
1ADPC202_3	Apply appropriate solution to solve the problem using linear data structure
1ADPC202_4	Demonstrate the fundamental concepts of structuring, managing and organizing the data using nonlinear data structures with ADTs
1ADPC202_5	Apply appropriate solution to solve the problem using nonlinear data structure
1ADPC202_6	Design Compare and analyze different data structure algorithms and searching, sorting methods using concepts like complexity

Course Contents:		
Unit No	Unit Name	Contact Hours
Unit 1	Basics of Data Structures: Algorithm, ADT, Space and Time Complexity, Direct and Indirect recursion, analysis of recursive functions e.g. Towers of Hanoi	4 Hrs
Unit 2	Lists Definition, representation, operations, implementation and applications of singly, doubly and circular linked lists.	6Hrs
Unit 3	Stack and Queue Stacks as ADT, operations, representation using static and dynamic structures, applications of stack Queue as ADT, operations, representation using static and dynamic structures, circular queue, priority queue, double ended queue.	8 Hrs
Unit 4	Searching and Sorting Techniques Linear search, binary search, Internal and External Sorts, bubble sort, selection sort, insertion sort, merge sort, quick sort, radix sort, heap sort. Hashing – Definition, hash functions, overflow, collision, Collision resolution techniques, Open addressing, Chaining.	9 Hrs
Unit 5	Trees Basic terminology, representation, binary tree, traversal methods, binary search tree, AVL search tree, Heaps- Operations and their applications, Introduction to M-way trees.	7 Hrs
Unit 6	Graphs Basic concept of graph theory, storage representation: adjacency matrix, adjacency list, adjacency multi-lists, graph traversal techniques- BFS and DFS	5 Hrs


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List of Experiments	
1.	Programs based on array, function, pointer, structures
2.	Singly Linked List
3.	Doubly Linked List
4.	Circular Linked List
5.	Stack ADT – Static and Dynamic
6.	Queue ADT – Static and Dynamic
7.	Stack application, circular and double ended queue
8.	Searching – Linear, Binary and Hashing
9.	Sorting – Bubble, Selection, Insertion,
10.	Sorting – Merge and Quick
11.	Binary Search Tree, Traversal of Trees
12.	Micro project / Graph using adjacency list and traversal

Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data Structures- A Pseudocode Approach with C	Richard F. Gilberg and Behrouz A. Forouzon	Cengage Learning	2 nd	2004
2	Data Structures with C Schaum's Outlines Series	S. Lipschutz	Tata McGraw-Hill	-	2017
3	Data Structure using C	Reema Thareja	Oxford	2 nd	2014

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Data Structure using C	A. M. Tanenbaum, Y. Langsam, M. J. Augenstein	Prentice-Hall Of India Pvt. Limited	-	2003
2	Understanding Pointers in C	Yashavant Kanetkar	BPB Publication	1 st	2009
3	C and Data Structures	N. B. Venkateshwarlu, E. V. Prasad	S. Chand and Company	-	2010
4	Let Us C	Yashavant Kanetkar	BPB Publication	15 th	2016



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Class	S Y B. Tech Sem III
Course Code & Course Title	1ADPC203- Operating Systems
Prerequisite/s	Problem Solving Using C, Computer Networks
Teaching Scheme(Lecture/ Tutorial /Practical)	3/0/2
Credits	4
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30
Evaluation Scheme Practical: ISE	50

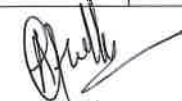
Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPC203_1	Analyze basic concepts of operating system and their structures to compare various operating systems using various OS parameters.
1ADPC203_2	Analyze issues related to inter process communication, process scheduling and resource management with the help of different scheduling algorithm.
1ADPC203_3	Develop appropriate solution to solve critical section problem by using accurate operating system algorithm.
1ADPC203_4	Use deadlock avoidance techniques and Memory management techniques with suitable algorithm to handle a deadlock situation and memory management in OS.
1ADPC203_5	Synthesize the concepts of I/O management, file system implementation and problems related to security and protection using appropriate security parameters.

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Overview Introduction to Operating Systems, Operating System functions, Computer System organization, Operating System Architecture, Operating System Structure, Operating System operations, Types of Operating Systems, Operating System Services, User - Operating System interface, System calls, Types of system Calls, System programs, Kernel, Types of kernel.	06 Hrs.
Unit 2	Process Management Process concept: Process scheduling, Operations on processes, Inter-process communication, Multi-Threaded Programming: Overview, Multi-Threaded Models, Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple-Processor scheduling	08 Hrs.
Unit 3	Process Synchronization Background, Mutual Exclusion, the critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of Synchronization	06 Hrs.
Unit 4	Deadlock System model, deadlock characterization, methods for handling deadlocks, deadlock preventions, deadlock avoidance, deadlock detection, deadlock recovery.	07 Hrs.
Unit 5	Memory Management	06 Hrs.


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	Memory Management Strategies: Background, swapping, contiguous memory allocation, paging, structure of the page table, Segmentation. Virtual Memory Management: Background, demand paging, copy-on-write, page replacement	
Unit 6	Storage Management& I/O Subsystem File System: File concept, access methods, directory and disk structure, file-system mounting, file sharing, protection, Overview of I/O system, I/O hardware, Application I/O interface, Kernel I/O subsystem.	06Hrs.

List of Experiments	
1.	Installation of Multiple Operating System.
2.	Study and demonstration of basics of Linux/UNIX commands.
3.	Program based on CPU Scheduling Algorithms.
4.	Program to demonstrate critical section and mutual exclusion.
5.	Program based on Bankers algorithm for Deadlock Avoidance.
6.	Program based on Bankers Algorithm for Deadlock Prevention.
7.	Program based on Page Replacement Policies.
8.	Program to simulate Paging technique of memory management.
9.	Program based on various I/O System calls of UNIX operating System.
10.	Program to simulate producer-consumer problem using semaphores.
11.	Case study on
12.	Micro project

Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Operating System Concepts [Unit 1-6]	Silberschatz, Galvin,	John Wiley	8	2009
02	Operating systems concepts and design [Unit 1]	Dhananjay M Dhamdhare	Tata McGraw Hill	2	2006
03	Operating Systems - A Concept Based approach	Dhananjay M Dhamdhare	Tata McGraw Hill	3	2007
04	Understanding Operating System	Understanding Operating System	Ann McHoes & Ida M. Flynn,(Thomson)	6	2014
05	The design of Unix Operating System	Maurice J. Bach	(PHI)	1 st	2006
06	A practical Guide to Linux commands, Editors and shell programming	Mark G. Sobell	Pearson Education India	3 rd	2013
07	Operating Systems concepts and design	Milan Milenkovic	TMGH	2 nd	2001



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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Operating System A Design Oriented Approach	Charles Crowley	Tata McGraw Hill	1 st	2001
02	Operating System with Case Studies in Unix, Netware and Windows NT	Achyut S. Godbole	Tata McGraw Hill	5 th	2007
03	Operating Systems: Internals and Design Principles	William Stallings	Pearson Education International	8 th	2014
04	Linux System Programming	Robert Love	SPD, O' REILLY	2 nd	2007
05	Unix concepts and administration	Sumitabha Das	TMGH	4 th	2006
06	A practical Guide to Unix system V	Mark G. Sobell	Benjamin cummings Pub.	2 nd	2005



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Class	S Y B. Tech Sem III
Course Code & Course Title	1ADPC204 Foundations of Artificial Intelligence
Prerequisite/s	Problem Solving Using C
Teaching Scheme (Lecture/ Tutorial /Practical)	3/0/2
Credits	4
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30
Evaluation Scheme Practical: ISE	50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ADPC204_1	Understand the basics of Artificial Intelligence
1ADPC204_2	Develop fundamental understanding of different problem-solving methods and search strategies
1ADPC204_3	Apply Knowledge Representation and Planning in Knowledge based systems
1ADPC204_4	Demonstrate ideas behind software agents to solve a problem
1ADPC204_5	Design applications for NLP that use Artificial Intelligence

Course Contents:		
Unit No.	Unit Name	Contact Hours
Unit 1	AI Introduction Introduction – Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to AI problems.	06 Hrs.
Unit 2	PROBLEM SOLVING METHODS Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Constraint Satisfaction Problems (CSP) - Backtracking Search - Optimal Decisions in Games – Alpha - Beta Pruning -Games that include an element of chance.	07 Hrs.
Unit 3	SOFTWARE AGENT SYSTEMS Introduction to Logical Agents, Uncertainty-Probability -Inference-Independence and Bayes' Rule- Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems	06 Hrs.
Unit 4	KNOWLEDGE REPRESENTATION First order logic, Syntax and semantics for first order logic, Knowledge engineering in first order logic, Inference in First order logic, prepositional versus first order logic– Unification and Lifting – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation	08 Hrs.


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Unit 5	Planning Classical Planning- algorithms for Classical Planning- Heuristics for planning- hierarchical planning- non-deterministic domains- time, schedule and resources- analysis	05 Hrs
Unit 6	APPLICATIONS AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot	07 Hrs.

List Of Experiments

1	Implement basic search strategies – 8-Puzzle, 8 - Queens problem,
2	Implement Crypt arithmetic.
3	Implement A* algorithms
4.	Implement memory bounded A* algorithms
5.	Implement Minimax algorithm for game playing (Alpha-Beta pruning)
6.	Solve constraint satisfaction problems
7.	Implement propositional model checking algorithms
8.	Implement forward chaining, backward chaining
9.	Implement resolution strategies
10.	Build naïve Bayes models
11.	Implement Bayesian networks and perform inferences
12.	Micro-Project

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Artificial Intelligence –A Modern approach	Stuart J. Russell, Peter Norwig,	Pearson Education	3rd	2016
2	Artificial Intelligence	Elaine Rich and Kevin Knight	Tata McGraw Hill Publishing Company, New Delhi,	-	2014



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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Prolog: Programming for Artificial Intelligence,	I. Bratko	Addison-Wesley Educational Publishers Inc.,	Fourth edition	2015
2	The Quest for Artificial Intelligence	Nils J. Nilsson	Cambridge University Press	6th	2013
3	Artificial Intelligence: Foundations of Computational Agents	David L. Poole and Alan K. Mackworth	Cambridge University Press	-	2012
4	Multi Agent Systems	Gerhard Weiss	, MIT Press	Second Edition	2013



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Class	S Y B. Tech Sem III
Course Code & Course Title	1ADHS205- Psychology
Prerequisite/s	--
Teaching Scheme (Lecture/Practical/Tutorial)	2/0/0
Credits	2
Evaluation Scheme Theory: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADHS205_1	Identify types of emotions, domains of emotional intelligence and their effects on individual and group behavior for fostering empathy and positive relationships.
1ADHS205_2	Explain human behavior, cognition, and emotions by psychological theories in real-life scenarios and contexts.
1ADHS205_3	Discuss effective time management strategies to overcome time-related challenges.
1ADHS205_4	Interpret psychological factors that contribute procrastination to recognize the situational triggers.
1ADHS205_5	Apply the A-B-C model to manage stress for well-being.

Course Contents:

Unit No.	Unit Name	Contact Hrs
Unit 1	Psychology –Definition of Psychology, Different fields of Psychology, Introduction and Need of psychology	2Hrs
Unit 2	Emotional Intelligence (EI) (Part one) – Role of Emotions, Types of Emotions, Emotions/ stress and performance	3Hrs
Unit 3	Emotional Intelligence (EI) (Part Two) – Definition of Emotional Intelligence, Key signs of emotional Intelligence, How EI helps students, Marshmallow Experiment, Five domains of Emotional Intelligence	6Hrs
Unit 4	Time Management – Definition of Time Management, Need and importance of Time management for an individual, Effective steps/ strategies of Time Management, Obstacles of Time Management	4Hrs
Unit 5	Procrastination – Definition of Procrastination, Types of Procrastination excuses , How to work on excuses, Why Do People Procrastinate?, Procrastination Cycle, Challenging Your assumptions, techniques to beat Procrastination	6Hrs
Unit 6	Stress Management – Definition of Stress, A-B-C model for Stress, Identifying Stressful Thoughts and identifying cognitive distortions, Restructuring, Behavioral Coping Strategies	5Hrs


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Text Books:					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Organizational Behaviour- An Evidence-Based Approach	Fred Luthan	McGraw-Hill/Irwin	12th	2011
2	Essentials of Organizational Behaviour	Stephen P. Robbins Timothy A. Judge Katherine E. Breward	Pearson	-	2018
3	Essentials of organizational Behaviour	Stephen P. Robbins	Prentice Hall	7th	2002
4	Understanding and Managing Organizational Behaviour	Jennifer M. George Gareth R. Jones	Pearson	6th	2012
5	Emotional Intelligence at Work A Professional Guide	Dalip Singh	Response Books A division of Sage Publications	3rd	2006



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Class	S Y B. Tech Sem III
Course Code & Course Title	1ADVS206 Python for Data Science
Prerequisite/s	Problem Solving Using C
Teaching Scheme (Lecture/ Tutorial /Practical)	2/0/2
Credits	3
Evaluation Scheme Practical: ISE/ESE	50/50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADVS206_1	Apply various fundamentals concept of python programming to solve real world problems by using IDLE.
1ADVS206_2	Apply modular approach like OOP, functions, Exception handling, file handling to solve various real world scenarios using Python IDE.
1ADVS206_3	Apply various inbuilt functions of NumPy Library for efficient storage and data operations by using IDE.
1ADVS206_4	Analyze the data using different inbuilt functions of Pandas by using IDE.
1ADVS206_5	Design and develop micro project to solve real world problems by using python programming.

Course Contents:

Unit 1	Basics of Python Basics of Python Introduction to Data Science - Why Python? - Essential Python libraries - Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion- Operators. Decision Control Statement: If statement, If..el-if.. else statement Repetitive Control Statement: While loop, for loop, The range statement Selection Control Statement: Break & continue, Else clause	05 Hrs.
Unit 2	Modular Programming: Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance, overlapping and overloading operators, Adding and retrieving dynamic attributes of classes Function: What is function, Define a function, Pass arguments, Arguments with default values, Arbitrary arguments, Local and global variables, Return a value from function, Mathematical functions, Random number functions, Mathematical constants, Recursive functions	05Hrs.
Unit 3	Exception Handling, File Handling Errors, Exception handling with try, handling multiple exceptions, writing your own exception File Handling: File handling modes, reading files, writing and spending to files, Handling file exceptions, The with statement.	03Hrs



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Unit 4	Introduction To Numpy and Scikit learn: NumPy Basics: Arrays and Vectorized Computation- The NumPyndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes. Universal Functions: Fast Element-Wise Array Functions. Introduction scikit learn library for data science.	05 Hrs.
Unit 5	Data Manipulation with Pandas: Introduction to pandas Data Structures: Series, Data Frame, Essential Functionality: Dropping Entries- Indexing, Selection, and Filtering-Function Application and Mapping- Sorting and Ranking. Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.	04Hrs.
Unit 6	Data Cleaning, Preparation and Visualization Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers-String Manipulation: Vectorized String Functions in pandas. Plotting with pandas: Line Plots, Bar Plots, Histograms	04 Hrs.

Experiments List:	
1	Implement basic Python programs to demonstrate fundamental concepts by reading input from console.
2	Implement Python programs to demonstrate decision control and looping statements.
3	Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem
4.	Implement OOP concepts like Data hiding and Data Abstraction.
5.	Create user-defined functions with different types of function arguments
6.	Perform File manipulations operations- open, close, read, write, append and copy from one file to another.
7.	Handle Exceptions using Python Built-in Exceptions
8.	Implement various in built functions of NumPy library.
9.	Create Pandas Series and Data Frame from various inputs.
10.	Import any CSV file to Pandas Data Frame and perform the following: (a) Visualize the first and last 10 records (b) Get the shape, index and column details (c) Select/Delete the records (rows)/columns based on conditions. (d) Perform ranking and sorting operations. (e) Do required statistical operations on the given columns. (f) Find the count and uniqueness of the given categorical values. (g) Rename single/multiple columns.
11.	Import any CSV file to Pandas Data Frame and perform the following: (a) Handle missing data by detecting and dropping/ filling missing values. (b) Transform data using apply() and map() method. (c) Detect and filter outliers. (d) Perform Vectorized String operations on Pandas Series. (e) Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.


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12	Micro Project / Case Study
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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Introduction to computing and Problem Solving with Python	Jeeva Jose and SojanLal	Khanna Book Publishing Co. (P) Ltd	1	2016
02	Programming Python	Mark Lutz	O'reilly	2	2001
03	Introduction to Programming using Python"	Y. Daniel Liang	Pearson	--	2012
04	Python Data Science Handbook: Essential Tools for Working with Data	JakeVanderPlas	O'Reilly	--	2017

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Core Python Programming	Wesley J. Chun	Prentice Hall	--	2006
02	Learning Python	Mark Lutz,	O'reilly	4 th	2009



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Class	S Y B. Tech Sem III
Course Code & Course Title	1ADHS207- Constitution of India
Prerequisite/s	-
Teaching Scheme (Lecture/ Tutorial /Practical)	1/0/0
Credits	1
Evaluation Scheme Theory: ISE	25

Course Outcomes (COs)	
Upon successful completion of the course students will be able to:	
1ADHS207_1	Explain the meaning, important facts and history related to Indian
1ADHS207_2	Illustrate the features of Indian constitution and interpretation of Preamble.
1ADHS207_3	Interpret fundamental rights and duties of the Indian Citizen to inculcate
1ADHS207_4	Identify different laws and regulations based upon Information Acts.
1ADHS207_5	Distinguish the functioning of Indian parliamentary system and legislative system at the centre and state level.

Course Contents:		Hrs
Unit 1	Constitution: Basic Structure Meaning of the constitution law and constitutionalism, Historical perspective of the constitution of India, Government of India Act of 1935 and Indian Independence Act of 1947.	02Hrs
Unit 2	Making of Indian Constitution: Enforcement of the Constitution, Meaning and importance of Constitution, Making of Indian Constitution – Sources, Salient features of Indian Constitution, Preamble.	02Hrs
Unit 3	Fundamental Rights: Fundamental Rights – Features and characteristics, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies.	03Hrs
Unit 4	Fundamental Duties: Directive Principles-Definition and Meaning, 42 nd Constitutional Amendment Act, List and Importance of Fundamental Duties.	02Hrs
Unit 5	Regulation to Information: Introduction, Right to Information Act:2005, Information Technology Act 2000, Electronic Governance in India, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal.	02Hrs
Unit 6	Government of The Union and States: President of India – Election and Powers, Prime Minister of India - Election and Powers, Lok Sabha - Structure, Rajya Sabha – Structure, Governor of State, Chief Minister and Council of Ministers in a state.	02Hrs


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Text Books:					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Introduction to the Constitution of India	Durga Das Basu	LexisNexis	23	2018
2	India's Constitution	M.V.Pylee	S. Chand Pub	16	2017
3	The Constitutional Law of India	J.N. Pandey	Central Law Agency	55	2018

Reference Books:					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Shorter Constitution of India	D.D. Basu	Prentice Hall of India		1996
2	Indian Constitutional Law	M.P. Jain	Wadhwa & Co		2005



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Class	S Y B. Tech Sem III
Course Code & Course Title	1ADCC208 Aptitude and Reasoning Part-I
Prerequisite/s	Basic mathematics
Teaching Scheme (Lecture/Tutorial/Practical)	0/0/2
Credits	1
Evaluation Scheme Practical: ISE	50

Course Outcomes (COs) : The students will be able to:	
1ADCC208_1	Solve problems based on Vedic Mathematics, Calendar, Average, and Age.
1ADCC208_2	Solve problems based on Speed Time distance and equations
1ADCC208_3	Solve problems based on Blood Relations, Directions, Time Rate Work, Pipes and Tanks, Percentage, Profit and Loss
1ADCC208_4	Solve Problems based on Spot the Error and Jumbled Para

Course Contents:		
Unit No	Unit Name	Contact Hours
Unit 1	Vedic Mathematics, Calendar	4 Hrs
Unit 2	Average, Ages	4 Hrs
Unit 3	Speed Time Distance, Equations	4 Hrs
Unit 4	Blood Relations, Directions, Time Rate Work, Pipes and Tanks	4 Hrs
Unit 5	Percentage, Profit and Loss	4 Hrs
Unit 6	Spot the Error, Jumbled Para	4 Hrs
	Self-Study Module	6 Hrs

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	R.S. Agarwal (Quantitative aptitude)	R.S.Agarwal	S Chand	-	2019
2	R.S. Agarwal (Verbal & Non-verbal Reasoning)	R.S.Agarwal	S Chand	-	2010
3	Wren & Martin (Verbal, Grammar)	P.C.Wren	S Chand	-	2017

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	APTIPEDIA (Quantitative, Logical, Verbal Aptitude)	Face	Wiley	-	2017
2	Wiley (Quantitative Aptitude)	P.A.Anand	Maestro	-	2015
3	Arun Sharma (Verbal Ability)	Meenakshi Upadhyay	McGraw Hill	-	2020

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Annasaheb Dange
College of Engineering and Technology
Ashta

An Autonomous Institute affiliated to Shivaji University
Kolhapur

Curriculum Structure

S.Y. B. Tech.
ARTIFICIAL INTELLIGENCE AND
DATA SCIENCE

SEM III & SEM IV

(Academic Year 2023- 2024)

Annasaheb Dange College of Engineering and Technology
Artificial Intelligence and Data Science Department

Teaching and Evaluation Scheme

S. Y. B. Tech Semester IV[#]

S. Y. B. Tech Semester IV [#]																				
Course Code	Course Name	Teaching Scheme					THEORY							PRACTICAL						GRAND TOTAL
							ISE		MSE + ESE			Total	Min	ISE		ESE		Total	Min	
									MSE	ESE	Min					Max	Min			
1ADBS209	Statistics Probability and Fuzzy Logic	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
1ADPC210	Database Management Systems	3	-	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200	
1ADPC211	Data Analytics	2	-	2	3	40	16	30	30	24	100	40	50	20	-	-	50	20	150	
1ADPE21*	Professional Elective - I	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
1ADAI216	Minor Course - 1 ^	2	-	-	2	50	20	30	30	24	100	40	-	-	-	-	-	-	100	
1ADVS219	Web Technology	1	-	2	2	-	-	-	-	-	-	-	50	20	50	20	100	40	100	
1ADHS218	Environmental Studies	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50	
1ADHS217	Universal Human Values	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50	
1ADEL220	Innovation / Prototype	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
1ADCC221	Aptitude and Reasoning Part - II	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
		17	0	10	22														950	
	Total Contact Hours	27																		

[#] All Students Should Undergo Inplant Training / Internship for a Minimum of 15 Days During the 4th Semester Vacation Period

[^] Multi Disciplinary Minor

Professional Elective - I	
1ADPE212	Ethics in Artificial Intelligence and Data Science
1ADPE213	Microprocessors and Microcontrollers
1ADPE214	Sensors for Engineering Applications
1ADPE215	Advanced Data Structures




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Class	S Y B. Tech Sem IV
Course Code & Course Title	1ADBS209 Statistics, Probability and Fuzzy Logic
Prerequisite/s	-
Teaching Scheme (Lecture/ Tutorial /Practical)	3/0/0
Credits	3
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ADBS209_1	Apply statistical techniques to interpret the given data.
1ADBS209_2	Solve given problems by using probability distribution
1ADBS209_3	Using test of hypothesis to assess plausibility of given sample data
1ADBS209_4	Construct different fuzzy sets using basic definitions of fuzzy sets.
1ADBS209_5	Use the extension principle on fuzzy numbers/sets to develop arithmetic operations

Course Contents:		
Unit No.	Name of the Unit	Contact Hours
Unit 1	Measures of Central Tendency: Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode Partition values: Quartiles, Deciles and Percentiles	06 Hrs.
Unit 2	Measures of Dispersion: Concept of dispersion, Range, Quartile Deviation, Mean Deviation, Mean Square Deviation, Variance and Standard Deviation, Moments, Skewness by Karl Pearson's method, Kurtosis	07 Hrs.
Unit 3	Probability Distribution Random variable, Binomial Distribution, Poisson Distribution, Normal Distribution.	06 Hrs.
Unit 4	Statistical Interference- Test of Hypothesis Sampling distributions, Testing of Hypothesis, Level of Significance Testing of Significance for large sample, Testing of Significance for small sample: Students t-distribution and Chi- Square Test	07 Hrs.
Unit 5	Introduction to Fuzzy sets. Basic concepts of Fuzzy Sets, Crisp Set and Fuzzy Set, Membership Functions, Basic operations on fuzzy sets, Properties of fuzzy sets.	07 Hrs.
Unit 6	Fuzzy Arithmetic Fuzzy Numbers, Fuzzy Cardinality, Operations on Fuzzy Numbers, Fuzzy Equations of Type $A + X = B$ and $A.X = B$.	06 Hrs.



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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Higher Engineering Mathematics	Dr. B. S Grewal	Khanna Publishers	44 th	2018
02	A Text Book of Engineering Mathematics (For Unit 1)	N. P. Bali, Manish Goyal	Laxmi Publications(P) Ltd	8 th	2011
03	Advanced Engineering Mathematics	H. K. Dass	S. Chand	22 nd	2018
04	Fuzzy Sets & Fuzzy Logic Theory and Applications (For Unit 2 & 3)	George J. Klir and Bo Yuan	PHI Learning Private Limited	-	2013

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Probability and Statistics for Computer Science	James L. Johnson	Wiley	1 st	2008
02	Probability and Statistics for Engineers	Dr. J. Ravichandran	Wiley	1 st	2012
03	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley Publishers	9 th	2013
04	Fuzzy Logic with Engineering Applications	Timothy J. Ross	Wiley	3 rd	2013


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Class	S Y B. Tech Sem IV
Course Code & Course Title	1ADPC210- Database Management Systems
Prerequisite/s	Data structures
Teaching Scheme (Lecture/ Tutorial /Practical)	3/0/2
Credits	4
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30
Evaluation Scheme Practical: ISE/ ESE	50/50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPC210_1	Explain different concepts of database and conceptual database design, relational algebraic SQL and normalization.
1ADPC210_2	Design ER model for given system and prepare the relational database schema for the using integrity constraints, validate it by applying different normalization techniques.
1ADPC210_3	Summarize SQL queries in pure languages to access essential information from the database.
1ADPC210_4	Describe file organization concepts of indexing for efficient system performance, transaction management and concurrency control.
1ADPC210_5	Use concepts of indexing, concurrency protocols and recovery algorithms with real-world examples.

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Introduction to databases and ER Model Introduction: Introduction to database, advantages and applications, Database View - Levels of data abstraction, Data models, Database System Architecture. ER Model: Entity concept, Entity set, Relationship sets, Relationship types, Keys	06 Hrs.
Unit 2	Relational Model and SQL Relational Model: Relational model concept, Relational Database structure, Conversion of ER model into Relational schemas, Relational algebra queries SQL: Introduction to SQL, Data definition statements with constraints, Insert, Update and Delete, Set operations, Group by and having aggregate functions, clauses, Nested Queries, Joins.	07 Hrs.
Unit 3	Functional Dependency and Normalization Importance of a good schema, Motivation for normalization forms, Atomic domains and INF, Dependency- functional dependencies, closure of a set of FD's, Concepts of 2NF, 3NF and BCNF, Decomposition algorithms, Multivalued dependencies, Join dependencies.	07 Hrs.
Unit 4	Data Storage & Indexing Data storage and its types, file organization, organization of records into files, Data Dictionary, Database Buffer Indexing: Concept, Ordered Indices-Primary, Secondary, Multilevel,	07 Hrs.

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	hashing, Hash Indices, Dynamic hashing.	
Unit 5	Transaction Management & Concurrency Control Transaction Processing: Transaction processing concept, ACID properties, Transaction states, Implementation of atomicity, isolation and durability, Serializability, Concurrency Control: Lock-based protocols, Timestamp - based Protocols, Validation -based Protocols, Deadlock handling.	07 Hrs.
Unit 6	Recovery System Failure classification, Storage structure, Implementation of stable and Atomicity, Log based recovery, Checkpoints, Shadow paging, crash recovery.	05 Hrs.

Expt. No.	Title of Experiment
1.	Drawing an E-R Diagram for any organization and Converting E-R diagram into Relational Tables.
2.	Installation and Demonstration of DBMS Oracle / MySQL / SQL Server / Postgre SQL etc.
3.	Study and Implementation of Data Definition Language (DDL) Queries (e.g. create, alter and drop tables).
4.	Study and Implementation of Data Manipulation Language (DML) Queries (e.g. insert, delete, update and select statements).
5.	Study and Implementation of Basic SQL SELECT statement for displaying / extracting data from single table or multiple tables.
6.	Study and implementation of SQL constructs for aggregating data, use of group by, having clauses.
7.	Study and implementation of nested sub-queries, complex queries, views and Joins.
8.	Study and Implementation of Triggers.
9.	Study and Implementation of Functions and Stored Procedures.
10.	Implementation of Database connectivity with object oriented language (Java).
11.	Few aspects of authorization such as creating and managing users, roles, granting and revoking of privileges etc.
12.	Creating Indices for the tables, implementing static hashing.
13.	Micro Project / Study of Transaction processing and concurrency control techniques.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Database system concepts	A. Silberschatz, H.F. Korth, S. Sudarshan	McGraw Hill Education	6 th	2011
2	Database Systems - Design, Implementation and Management	Rob & Coronel	Thomson Course Technology	5 th	2008
3	Database Systems- A practical approach to Design, Implementation	Thomos Connolly, Carolyn Begg	Pearson Education	4 th	2009


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Reference Books:					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1.	Database Systems: Design, Implementation and Management	Peter Rot'. Carlos Coronel	Cengage Learning	7 th	2014
2.	Fundamentals of Database Systems	Ramez Elmasri and Shamkant Navathe	Pearson Education	4 th	2007
3.	Principles of Database System	J. D. Ullman	Galgotia publications	1 st	2011
4.	SQL: A Complete Reference	Alexis Leon, Mathews Leon	McGraw Hill Education	1 st	2002



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Class	S Y B. Tech Sem IV
Course Code & Course Title	1ADPC211- Data Analytics
Prerequisite/s	Data structures, Python for Data Science
Teaching Scheme (Lecture/ Tutorial /Practical)	2/0/2
Credits	3
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30
Evaluation Scheme Practical: ISE	50

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ADPC211_1	Understand the concept of sampling
1ADPC211_2	Apply the knowledge to derive hypotheses for given data
1ADPC211_3	Understand the concept of hypotheses
1ADPC211_4	Demonstrate the skills to perform various test on given data
1ADPC211_5	Analyze the ANOVA test in various samples
1ADPC211_6	Articulate the concept regression stats models

Course Contents:		
Unit No.	Unit Name	Contact Hours
Unit 1	INFERENCE STATISTICS Data analysis vs Data Analytics Types of analytics Diagnostic Analytics, Predictive Analytics, Prescriptive Analytics, Samples, Random sampling, probability and statistics, sampling distribution, Creating a sampling distribution, hypothesis, Types of hypothesis	5Hrs
Unit 2	T-TEST t-test for one sample, sampling distribution of t, t-test procedure, degrees of freedom, estimating the standard error, case studies t-test for two independent samples, sampling distribution, test procedure, p-value, estimating effect size, t-test for two samples	5Hrs
Unit 3	ANALYSIS OF VARIANCE F-test least ANOVA, estimating effect size ,multiple comparisons, Two-factor experiments ,three f-tests ,two factor-ANOVA ,other types of ANOVA	4Hrs
Unit 4	PREDICTIVE ANALYTICS Linear least squares, Implementation, goodness of fit, testing a linear model, weighted resampling Regression using stats models, multiple regression, logistic regression, Time series analysis	4Hrs
Unit 5	ESTIMATION THEORY Unbiased estimators – Method of moments – Maximum likelihood estimation - Curve fitting by principle of least squares.	4Hrs
Unit 6	APPLICATION OF ANALYTICS Web Analytics-Basics, URLS-Cookies, search Analytics –Internal search, SEO and PPC Health care Analytics –Advanced data analytics for health care, computer assisted medical image analysis system, Mobile Imaging and analytics for biomedical data	4Hrs


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Course Contents:	
1	Download, install and explore the features of, Jupyter environment
2	Download, install and explore the features of, colab environment, understand the Anaconda
3	Working with Numpy arrays
4	Working with Pandas data frames
5	Perform various types of data cleaning operations on the data collected in previous lab using data exploration, imputation etc.
6	Perform dimensionality reduction on a given dataset and create various visualizations like histograms, scatter-plots, etc.
7	Implement Linear and logistic Regression
8	Perform association analysis on a given dataset and evaluate its accuracy.
9	Build a recommendation system on a given dataset and evaluate its accuracy.
10	Build a time-series model on a given dataset and evaluate its accuracy.
11	Build cartographic visualization for multiple datasets involving various countries of the world; states and districts in India
12	Micro Project / Apply and explore various plotting functions on UCI data sets. a. Normal curves b. Density and contour plots c. Correlation and scatter plots

Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Statistical inference for data science	Brain Cuffo	Lean pub	-	2016
2	statistics" 11 TH Edition	Robert S Witte John S. Witte	Wiley publication	-	2017
3	Think stats: Exploratory data analysis in python	Allen B. Downey	Green tea press	-	2014
4	Web Analytics The Art of Online Accountability and Science Of Customer	Avinash Kaushik	Centricity, Sybex	1st edition	2009
5	Data Science Fundamentals and Practical Approaches	Gypsy Nandi, Rupam Sharma	BPB Publications	-	2020.
6	The Data Science Handbook	Field Cady, John Wiley & Sons			2017


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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Python data science hand book	Jake Vanderplas	O Reilly	-	2016
2	Big Data Analytics made easy	Dr.Laxmi Prasad	Notion Press	-	2016
3	Healthcare data analytics	Chandan K Reddy and Charu C Agarwal	Taylor & Francis	-	2015
4	A Semantic Web Primer	Paul Groth, Frank van Harmelen, Rinke Hoekstra,	MIT press	Third edition	2012



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Class	S Y B. Tech Sem IV
Course Code & Course Title	1ADPE212 Ethics in Artificial Intelligence and Data Science
Prerequisite/s	Design Thinking
Teaching Scheme (Lecture/ Tutorial /Practical)	2/0/0
Credits	2
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30

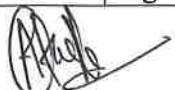
Course Outcomes (COs):


Upon successful completion of this course, the student will be able to:

1ADPE212_1	Explain Responsibility in the ethics of technology for privacy
1ADPE212_2	Analyze anonymity and data validity with the help different case studies.
1ADPE212_3	Explain algorithmic fairness and Societal Consequences and Code of Ethics
1ADPE212_4	Design ethical frameworks for different real-life applications
1ADPE212_5	Discuss issues and challenges regarding AI policies

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Introduction to Ethics What are Ethics, History, Concept of Informed Consent, Data Ownership Introduction to Ethics of AI, Responsibility in the ethics of technology	04 Hrs.
Unit 2	Privacy Privacy, History of Privacy, Degrees of Privacy, Modern Privacy Risks, Case Study: Targeted Ads, Sneaky Mobile Apps	04 Hrs.
Unit 3	Anonymity and Data Validity Anonymity, De-identification Has Limited Value, Case Study: Credit Card Statements, Validity, Choice of Attributes and Measures, Errors in Data Processing, Errors in Model Design, Case Study: Three Blind Mice, Case Study: Algorithms and Race, Case Study: Algorithms in the Office,	05 Hrs.
Unit 4	Algorithmic Fairness Algorithmic Fairness, Correct but Misleading Results, P Hacking, Case Study: High Throughput Biology, Case Study: Geopricing, Case Study: Your Safety Is My Lost Income Societal Consequences and Code of Ethics Societal Impact, Ossification, Surveillance, Case Study: Social Credit Scores, Case Study: Predictive Policing, Code of Ethics, Case Study: Algorithms and Facial Recognition	05 Hrs.
Unit 5	Case-studies, examples and ethical frameworks Ethics of autonomous vehicles, Autonomous weapons and the digitalization of conflicts, Digital medicine, Sustainability and	04 Hrs.


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	environmental impact, Cybersecurity and AI	
Unit 6	Issues and challenges Human decisions and AI, Human decisions and AI, what is the value of privacy in information society, what is the value of privacy in information society, Moralizing technologies, Governance and policies AI policies Ethics of AI: a paradigmatic change	04Hrs.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Artificial Intelligence - The Practical Legal Issues	Buyers John	Law brief publishing	2 nd Edition	2019
2	The Ethics of AI	Alberto Chierici	Atlantic	1 st	2021

Other Books/E-material

Sr. No	Title	Author	Publisher
01	Coursera video lectures	Coursera Author	https://www.coursera.org/learn/ethics-of-artificial-intelligence
02	Coursera video lectures	Coursera Author	https://www.coursera.org/learn/data-science-ethics




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Class	S.Y.B.Tech Sem IV
Course Code & Course Title	1ADPE213 Microprocessors and Microcontrollers
Prerequisite/s	Analog Electronics, Digital Electronics
Teaching Scheme (Lecture/ Tutorial /Practical)	2/0/0
Credits	2
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPE213_1	Explain the architecture of 8085, 8051 and PIC16f877 to understand PIN configuration of each processor.
1ADPE213_2	Compare microprocessor and microcontrollers for analyzing interfacing between peripheral devices.
1ADPE213_3	Design Pin description of 8051 microcontroller to understand the internal design and features of 8051 microcontroller by using advanced simulator.
1ADPE213_4	Interface stepper motor, DC motor and on board peripheral to communicate with 8051 and PIC using trainer kit.
1ADPE213_5	Write programs over 8085 microprocessor, 8051 and PIC microcontroller in assembly and C using instruction set.

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Microprocessor Architecture and Microcomputer System Microprocessor Architecture and its operation- Microprocessor initiated operations, internal operation, and Peripheral operation. Memory-,memory classification, Input and output devices.	4Hrs
Unit 2	8085 Microprocessor Architecture The 8085 MPU, Microprocessor communication and bus timing, De-multiplexing address and Data bus, Generating control signals, The 8085Architecture, and 8085 based microcomputer-machine cycles and bus timing, op-code fetch machine cycle,	4Hrs
Unit 3	8085 assembly language programming The 8085 programming model, instruction classification, instruction and data format, Writing and execution of assembly language program. The 8085 instruction-data transfer operations, addressing modes, Arithmetic operation, Flag concept and cautions, Logic operations, Branch operations.	5Hrs
Unit 4	Introduction to 8 Bit Microcontroller 8051 Difference between general purpose microprocessor and microcontrollers, Introduction to MCS51family, Architecture of 8051, Functional pin out diagram of 8051, Reset circuit, Machine cycle, oscillator circuit, programming model, memory organization, instruction set, addressing modes, assembly language programming, Boolean instructions.	4Hrs



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Unit 5	Architecture of PIC microcontroller & instruction set CPU architecture: Harvard architecture & pipelining, program memory considerations, register file structure, instruction set, addressing modes: immediate, direct, Indirect CPU registers: status word, FSR, INDF, PCLATH, PCL, assembly language programming, Pin diagram of 16f8xx, features of PIC	5Hrs
Unit 6	Embedded 'C' Programming for 8051 Introduction to compiler, assembler, debugger, interpreter, C data types, I/O programming, programming for LCD, LED, DC motor, stepper motor using embedded 'C'	4Hrs

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Microprocessor Architecture – programming and applications with 8085	Ramesh Gaonkar	Penram International	4 th	2007
2	The INTEL Microprocessors - Architecture, Programming and Interfacing	Barry B. Brey S	PHI Ltd	8 th	2010
3	The 8051 Microcontroller and Embedded systems using assembly and C	Mazidi & D Mackinlay	Pearson Education	2 nd	2011
4	Design with PIC microcontrollers	John B Peatman	Pearson Education	1 st	2012

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Microprocessors and Microcontrollers	N. Senth Kumar, M. Saravanan and S. Jeevananthan	Oxford University Press	2 nd	2001
2	Microprocessor 8086: Architecture, Programming and Interfacing	Mathur Sunil	PHI Publication	4 th	2011
3	8051 Microcontroller	Subrata Ghoshal	Pearson Education	1 st	2010
4	8051 microcontroller	Kenneth J Ayala	Cengage Learning	3 rd	2012



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Class	S Y B. Tech Sem IV
Course Code & Course Title	1ADPE214 Sensors for Engineering Applications
Prerequisite/s	Analog electronics, Digital electronics
Teaching Scheme (Lecture/ Tutorial /Practical)	2 / 0 / 0
Credits	2
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPE214_1	Identify sensors, actuators, Micro sensors and Micro actuators to solve a problem using sensor fundamentals and its characteristics.
1ADPE214_2	Use Micro sensors and Micro actuators to solve the problems in different scenarios using Arduino IDE.
1ADPE214_3	Design a solution for given problem using sensors and ESP32 with Arduino IDE.
1ADPE214_4	Design sensor system for real world applications using Raspberry Pi.
1ADPE214_5	Connect sensors and actuators with ESP32 to solve a problem using pin description of ESP32 microcontroller.

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Sensor fundamentals and Characteristics Introduction, Basic principles of sensor, sensor classification, Understanding various sensors, sensor selection and characteristics: Range, resolution, sensitivity, error, precision, repeatability, linearity and accuracy, impedance response time and backlash, Performance measures of sensors.	4 Hrs.
Unit 2	Types of sensors and their applications Temperature sensor, Proximity sensors, Infrared sensor, Ultrasonic sensor, Light sensor, Smoke and Gas sensor, Alcohol sensor, Humidity sensor, automobile sensor, home appliance sensors. Real time application of sensors, Technologies related to sensors: Metal detector, Global Positioning system, Blood Glucose monitoring, Photoelectric sensor.	4 Hrs.
Unit 3	Actuators Definition, types and selection of Actuators, working principle of actuators, Linear actuators, Rotary actuators, Logical and continuous actuators, Pneumatic actuator, Hydraulic actuators- control valves, Electrical actuating system: solid state switched, solenoids, electric motors- principle of operation and its application, DC motors, AC motors, Synchronous motors, Stepper motors.	5 Hrs.
Unit 4	Micro Sensors and Micro Actuators Micro Sensors: Principles and examples, Force and pressure micro sensors, position and speed micro sensors, acceleration micro sensors, chemical sensors, biosensors, temperature micro sensors and flow micro	5 Hrs.


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	sensors. Micro Actuators: Actuation principle, shape memory effects-one way, two way and pseudo elasticity. Types of micro actuators	
Unit 5	Introduction to ESP32 and Raspberry Pi Overview of ESP32 and its features, Block diagram of ESP32, Specifications, Layout, Pin description for ESP32, Introduction to Raspberry Pi.	4 Hrs.
Unit 6	Case Studies Sensors and actuators in Smart cities, Agriculture, Health Care, Activity Monitoring, Weather monitoring system, Forest fire detection.	4 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Sensors and Actuators in Mechatronics, Design and Applications	Andrzej M. Pawlak	CRC Press, Taylor & Francis group	1 st	2007
2	Hand Book of Modern Sensors: Physics, Designs and Application	Jacob Fraden	Springer	5 th	2016
3	Sensors and Transducers	Patranabis. D	Wheeler publisher	4 th	1994

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Mechatronic systems, Sensors and Actuators Fundamentals and Modelling	Robert H. Bishop	Taylor & Francis Group	1 st	2006
2	Micro actuators Electrical, Magnetic, thermal, optical, mechanical, chemical and smart structures	Massood Tabib and Azar	Kluwer academic publishers, Springer	1 st	1997
3	Microsystem Technology and Microbotics	Sergej Fatikow and Ulrich Rembold	Springer	1 st	1997
4	ESP32 web server with Arduino IDE, step-by-step project guide	Rui Santos and Sara Santos	-	-	-


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Class	S Y B. Tech Sem IV
Course Code & Course Title	1ADPE215 Advanced Data Structures
Prerequisite/s	Data Structures
Teaching Scheme (Lecture/ Tutorial /Practical)	2/0/0
Credits	2
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
1ADPE215_1	Describe various advanced data structure techniques such as advanced linked list, advanced trees, graphs.
1ADPE215_2	Describe various hashing techniques and collision resolution techniques.
1ADPE215_3	Demonstrate the knowledge of advanced data structures in solving problems.
1ADPE215_4	Analyze the algorithms and compare the working of various data structures.
1ADPE215_5	Evaluate the performance of various data structures with help of different case studies.

Course Contents:		
Unit 1	Advanced Linked List Memory Efficient Doubly Linked List, XOR Linked List, Skip List, Self-Organizing List	4Hrs.
Unit 2	Advanced Trees Segment Tree, Binary Indexed Tree, Binary Search Tree, Self-Balancing BST, Red Black Tree, Splay Tree	5 Hrs.
Unit 3	Data Structure Transformations Making Structures Dynamic, Making Structures Persistent Data Structures for Strings Tries and Compressed Tries, Dictionaries Allowing Errors in Queries, Suffix Trees,	4 Hrs.
Unit 4	Graph Problem: Edge Coloring, Vertex coloring, Max flow- mincut theorem, Probabilistic models	4 Hrs.
Unit 5	Dynamic Graphs: Link Cut Trees, Preferred Path Decomposition, Dynamic Connectivity, Euler Tour Trees.	4 Hrs.
Unit 6	Hashing Hashing, Hashing techniques, Open Addressing for Collision Handling. Index Mapping, Collision resolution techniques, Cuckoo Hashing	5 Hrs.



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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Introduction to Algorithms	Thomas H Cormen, Charles Leiserson, Ronald Rivest	PHI	3 rd	2009
02	Computational Geometry- Algorithms and Application	Mark De Berg, Otfried Cheong, Mark Overmars	Springer	3 rd	2008
03	Advanced Data Structure	Erik Demaine	MIT Open Courseware	-	-

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Computational Geometry in C	Joseph O'Rourke	Cambridge University Press	-	-
02	Graph Theory	Reinhard Diestel	Spinger-Verlag	-	2000
03	Advanced Data Structures	Peter Brass	Cambridge University Press	-	-


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Class	S Y B. Tech Sem IV
Course Code & Course Title	1ADAI216 Foundations of Artificial Intelligence (Minor course-I)
Prerequisite/s	Problem Solving Using C
Teaching Scheme (Lecture/ Tutorial /Practical)	2/0/0
Credits	2
Evaluation Scheme Theory: ISE/ MSE/ ESE	40/30/30

Course Outcomes (COs):	
Upon successful completion of this course, the student will be able to:	
1ADAI216_1	Understand the basics of Artificial Intelligence
1ADAI216_2	Develop fundamental understanding of different problem-solving methods and search strategies
1ADAI216_3	Apply Knowledge Representation and Planning in Knowledge based systems
1ADAI216_4	Demonstrate ideas behind software agents to solve a problem
1ADAI216_5	Design applications for NLP that use Artificial Intelligence

Course Contents:		
Unit No.	Unit Name	Contact Hours
Unit 1	AI Introduction Introduction – Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to AI problems.	04 Hrs.
Unit 2	PROBLEM SOLVING METHODS Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Constraint Satisfaction Problems (CSP) - Backtracking Search - Optimal Decisions in Games – Alpha - Beta Pruning -Games that include an element of chance.	05 Hrs.
Unit 3	SOFTWARE AGENT SYSTEMS Introduction to Logical Agents, Uncertainty-Probability -Inference-Independence and Bayes' Rule- Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining	04 Hrs.
Unit 4	KNOWLEDGE REPRESENTATION First order logic, Syntax and semantics for first order logic, Knowledge engineering in first order logic, Inference in First order logic, prepositional versus first order logic– Unification and Lifting – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation	05 Hrs.


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Unit 5	Planning Classical Planning- algorithms for Classical Planning- Heuristics for planning- hierarchical planning- non-deterministic domains- time, schedule and resources- analysis	04hrs
Unit 6	APPLICATIONS AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot	04 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Artificial Intelligence –A Modern approach	Stuart J. Russell, Peter Norwig,	Pearson Education	3rd	2016
2	Artificial Intelligence	Elaine Rich and Kevin Knight	Tata McGraw Hill Publishing Company, New Delhi,	-	2014

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Prolog: Programming for Artificial Intelligence,	I. Bratko	Addison-Wesley Educational Publishers Inc.,.	Fourth edition	2015
2	The Quest for Artificial Intelligence	Nils J. Nilsson	Cambridge University Press	6th	2013
3	Artificial Intelligence: Foundations of Computational Agents	David L. Poole and Alan K. Mackworth	Cambridge University Press	-	2012
4	Multi Agent Systems	Gerhard Weiss	MIT Press	Second Edition	2013


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Class	S.Y, B. Tech, Semester. -IV
Course Code and Course Title	1ADHS217 Universal Human Values
Prerequisite/s	Students Induction Program (SIP)
Teaching Scheme: Lecture/Tutorial	02 / 00
Credits	02
Evaluation Scheme Theory: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADHS217_1	Integrate the process of self-exploration to achieve Harmony in the human being's based on Holistic perspective of value education.
1ADHS217_2	Understand Harmony in human being, family, society and nature /existence, based on methods to fulfill human aspiration.
1ADHS217_3	Apply the human values for maintaining the relationships with oneself and others using the principals of harmony.
1ADHS217_4	Adopt the methods of maintaining harmony with the society, nature, and its existence by utilizing the human order systems.

Course Contents:

Sr. No.	Unit Name	Contact Hours
Unit 1	Introduction to Value Education Introduction, Need, Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration —what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation - as the process for self-exploration. Continuous Happiness and Prosperity - A look at basic Human Aspirations, Right understanding , Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.	4Hrs
Unit 2	Understanding Happiness and Prosperity Understanding Happiness and Prosperity correctly, Prevailing sources of happiness , Prosperity and its implications Method to fulfil the human aspirations: understanding and living in harmony at various levels.	4Hrs
Unit 3	Understanding Harmony in the Human Being - Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility Understanding the Body as an instrument of 'I'	5Hrs


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	(I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health.	
Unit 4	Understanding Harmony in the Family - Harmony in Human-Human Relationship Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship Understanding the meaning of Trust; Difference between intention and competence Understanding the meaning of Respect, Difference between respect and differentiation; Peer Pressure the Concerns and its Resolution the other salient values in relationship.	6Hrs
Unit 5	Understanding Harmony in the Society Understanding the harmony in society: Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals Human order systems and dimensions	4Hrs
Unit 6	Understanding Harmony in the Nature and Existence Understanding the harmony in the Nature, Inter-connectedness and mutual fulfilment among the four orders of nature, recyclability and self-regulation in nature	3Hrs

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Understanding Human Being, Nature and Existence Comprehensively	UHV Team	UHV	1 st	2022
2	A Foundation Course in Human Values and Professional Ethics	R. R. Gaur, R Asthana, G P Bagaria	Excel Books	2 nd	2019
3	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics	R. R. Gaur, R Asthana, G P Bagaria	Excel Books	2 nd	2019
4	Human Values	A.N Tripathy	New Age International	2 nd	2006



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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria	Excel Books	3 rd	2010
2	Indian Ethos and Modern Management: Amalgam of the Best of the Ideas from the East and the West	B.L. Bajpai	New Royal Book	1 st	2004
3	Small Is Beautiful	E. F. Schumacher	Hartley & Marks	1 st	1999
4	An Introduction to Ethics	William Lilly	Allied	1 st	1967



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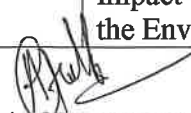


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Class	S. Y. B. Tech, Sem.-IV
Course Code and Course Title	1ADHS218 Environmental Studies
Prerequisite/s	--
Teaching Scheme: (Lecture/ Tutorial /Practical)	2/0/0
Credits	2
Evaluation Scheme Theory: ISE	50

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
1ADHS218 _1	Comprehend the concepts and principles of sustainable development and its importance in environmental preservation.
1ADHS218 _2	Explain ethical and legal responsibility of an engineer and his role in effective implementation of sustainable activities through EIA and EMS in the corporate sector.
1ADHS218 _3	Predict impact of contemporary issues (Population Explosion, Climate change, Environmental pollution) on the environment.
1ADHS218 _4	Classify and analyze different types of environmental pollution, understand their causes and effects, and propose control measures.
1ADHS218 _5	Prepare a technical report highlighting importance of environment in human life by using techniques like survey, case studies, mini project.

Course Contents: The main objective of the course is to infuse an understanding of the various environmental concepts on scientific basis in the functional area of Engineering and technology. The course will provide a foundation to critically assess the approaches to pollution control, environmental and resource management, sustainable development, cleaner technologies, Environmental Legislation based on an understanding of the fundamental, environmental dimensions. The course will help to explore the modern concept of green industry and the impact of excess human population, globalization, and climate change on the environment.		
Unit No.	Title	Hrs.
Unit 1	Introduction to Environment and concept of Sustainable development: Natural and Built Environment, Environmental Education: Definition, Scope, Objectives and importance. Components of the Environment: Atmosphere, Hydrosphere, Lithosphere and Biosphere. Biological Diversity: Introduction, Values of biodiversity, Threats to biodiversity, Conservation of biodiversity. Sustainable development goals, pillars of sustainable development.	4Hrs
Unit 2	Energy and Natural Resources Energy Scenario: Conventional Energy Sources and Non- Conventional Energy Sources, Urban problems related to energy. Future projections of Energy Demand, Utilization of various Energy Sources. Natural Resources: Food, Water, Forest, Geological, Equitable Use of Resources for Sustainable lifestyle. Concept of life cycle analysis.	5Hrs
Unit 3	Introduction to global environmental issues, Impact of modernization Climate change: Global warming, Ozone depletion, Acid Rain etc. Environmental Impact: Impact of Modern agriculture on the Environment, Impact of Mining on the Environment, Impact of modern development on the Environment. Case study.	4Hrs


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Unit 4	Environmental Pollution and control measures Definition, Causes, effects and control measures of, Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. E waste management. Role of an individual in prevention of pollution.	5Hrs
Unit 5	Environmental Management and Legislation Environmental ethics: Introduction, Ethical responsibility, issues and possible solutions. Environmental Management: Introduction to Environmental Impact Assessment, Environmental Management System: ISO 14001 Standard, Environmental Auditing, National and International Environmental protection agencies pertaining to Environmental Protection. Introduction to Environmental Legislation.	4Hrs
Unit 6	Cleaner technology: Consumerism and Waste Products, Green buildings, Green products, Minimization of Hazardous Products, Reuse of Waste, By-products, Rainwater Harvesting, Translocation of trees. Some Success Stories. Role of Information Technology in Environment protection.	4Hrs

Assessment methods:

- 01. Mini Project (in a group of 4 to 5 students): 15 marks**

Mini Project should be based upon:

- a. Recent technology relevant to Environment protection

OR

- b. Case study on polluted sites.... Urban/Rural/Industrial/Agricultural

OR

- c. Life cycle analysis of any product.


(Mini project report submission is mandatory)

- 02. Seminar : 10 Marks**

Topic should be from the content of the course.

Text Books					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Environmental Studies	Anindita Basak	PEARSON	First edition	2017
02	Environmental Studies	N.K Uberoi	Excel Books Publications New Delhi,	First edition	2005.
03	Environmental Studies from crisis to cure	R. Rajagopalan	Oxford university press,	Second edition	2011

Reference Books / Handbooks					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Environmental Science:	William Cunningham	WCB/McGraw	Fifth	1999


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Class	S Y B. Tech Sem III
Course Code & Course Title	1ADVS219 Web Technology
Prerequisite/s	OOP, Database management
Teaching Scheme (Lecture/ Tutorial /Practical)	1/0/2
Credits	2
Evaluation Scheme Practical: ISE/ESE	50/50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADVS219_1	Construct a basic website using HTML and CSS.
1ADVS219_2	Design a web application for different sized screens using Bootstrap ,Javascript and ReactJS
1ADVS219_3	Develop a web application for given problem statement using NodeJs, ExpressJS and MongoDB.
1ADVS219_4	Plan, develop, debug, and implement interactive client-side and server-side web applications for real time problems using client side and serverside web techniques.
1ADVS219_5	Build scalable web apps quickly and efficiently using appropriate toolkits and framework.

Course Contents:

Unit 1	Responsive web design with HTML5 HTML5 Basics, Tables, Lists, Working with Link, Image Handling, Frames, iFrame, HTML Forms for user Input, New Form Elements, HTML5 Client-Side Storage	04 Hrs
Unit 2	CSS3 CSS-Introduction, CSS-Syntax, CSS-Text Fonts, CSS-Lists Tables, CSS-Box Model , CSS-Display Positioning, CSS-Floats, Color, Gradients, Background Images, and Masks, Border and Box Effects, Working with Colors, Layout: Columns, Flex Box, Implementing CSS3, Transforms, Transitions, and animations	04 Hrs
Unit 3	Bootstrap and JavaScript Introduction to Bootstrap, Bootstrap Grid, Bootstrap, Components, Bootstrap Plugins, JavaScript Fundamentals BOM (Browser Object Model),DOM (Document Object Model),AJAX Development, Typescript, MotionUI.	05 Hrs.
Unit 4	ReactJS React Introduction, React Essential Features and Syntax, React Components, Props and State, Styling Components, Debugging React Apps, React Component lifecycle ,React Component in Details, HTTP Requests/AJAX Calls, React Routing, React Forms and Form Validation, Deploying React App to the Web Testing React apps with JEST.	04Hrs.
Unit 5	NodeJS Introduction to NodeJS, Setup Dev Environment, Event Loop, Node JS Modules, Node Package Manager, Creating Web server, File System, Debugging Node JS Application Events.	05Hrs.


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	ExpressJs, Routing, Template engines, Middleware, Web Application components, Error handling, Testing application Express application.	
Unit 6	MongoDB MongoDB – Overview, CRUD Operations, Basic Operations, Aggregations, Indexing, Replication and Sharding.	04 Hrs.

Experiment List:


1	Programs based on newly introduced elements of HTML5.
2	Programs based on Typography and background properties of CSS3, animation effect by using the transition feature of CSS.
3	Programs based on JavaScript operators, functions and objects.
4	Programs based on JQuery selectors, JQuery events.
5	Program to demonstrate concept of DTD and its types.
6	XSLT styles-sheet to convert XML document to HTML.
7	program to implement PHP variables, Expression, arrays, control structure
8	Design a web form and validate it using PHP using regular expressions
9	Design a web page to perform CRUD operations on MySQL database using PHP
10	Write a program to manage session in PHP
11	Installation of CMS and designing web pages using CMS.
12	Micro project / CMS theming and plugins

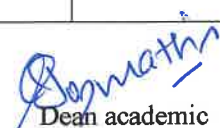
Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Advanced Internet Technology	Deven Shah	Dreamtech Press	1 st	2015
02	XML in a Nutshell	ElliotteRustyHarold, W. Scott Means	O'Reilly Publication	3 rd	2004
03	Web Technologies: Black book	Kogent Learning Solutions Inc.	Dreamtech Press	1 st	2009
04	Web Content Management	Deane Barker	O'Reilly Media	1 st	2016

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Learning PHP, MySql, Java Script, CSS and HTML5	Robin Nixon	O'really	3 rd	2014
02	Learning PHP, MySql, Java Script with JQuery, CSS and HTML5	Robin Nixon	O'really	4 th	2012


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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
03	Search Engine Optimization All-in-One for Dummies	Bruce Clay	John Wiley & Sons	3 rd	2015
04	Learning Responsive Web Design: A Beginner's Guide	Clarissa Peterson	O'Reilly Media, Inc.	1 st	2014



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Class	S Y B. Tech Sem IV
Course Code & Course Title	1ADEL220 Innovation/ Prototype
Prerequisite/s	Design Thinking
Teaching Scheme (Lecture/ Tutorial /Practical)	0/0/2
Credits	1
Evaluation Scheme Practical: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:


1ADEL220_1	Proficiently Apply the innovative thinking techniques to empathize the customer through arranging survey and/or interview
1ADEL220_2	Accurately Identify and Formulate the solution for real world problem using innovative technique
1ADEL220_3	Proficiently Create and Exhibit Prototype, for defined real world problem using innovative approach
1ADEL220_4	Accurately Comply &Test developed prototype for defined real world problem to meet user's requirements
1ADEL220_5	Routinely Adapt professional skills and ethical practices to provide a reliable solution for defined real world problem through participating in team activities

Course Contents:

Unit 1	Design thinking for innovation Introduction of design thinking process, innovation and their role, Process of thinking in right direction, Incubation, Final ideation, Brain Storming, Psychological aspect of creativity.	26 Hrs
Unit 2	Human and Culture Centered Design Design for Society, better existing design, Design for change Cultural change, social change, Life style change	
Unit 3	Visual communication and sketching Anyone can sketch, expression of thinking and problem solving through sketch and graphic design	
Unit 4	Prototyping & Fabrication Process of Prototype design, Problems of different stages in prototype design, refines Prototype, Finalize Prototype	
Unit 5	Engineering aspect of design Electrical, Mechanical, Design, Material, Aspect, Safety and Reliability aspect	
Unit 6	Introduction of Startup with entrepreneurship approach: What is entrepreneurship, being an entrepreneurship, Challenges and possibilities of Entrepreneurship? How to Start up, Start-up Fundamental, Being Successful.	

Experiments:

8-10 experiments based on above topics will be conducted


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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Understanding Design Thinking, Lean, and Agile	Jonny Schneider	O'Reilly	---	2017
02	Engineering Design	John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson	Cengage learning	2 nd	2013.
03	Design for How People Think	John Whalen	O'Reilly	---	2019

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Creative Confidence: Unleashing the Creative Potential Within Us All	Kelley, D. & Kelley, T	New York: William Collins	--	2014
02	The Design of Business: Why Design Thinking is the Next Competitive Advantage	Roger Martin	Harvard Business Press	--	2009
03	Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School	Idris Mootee	John Wiley & Sons	--	2013



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Class	S Y B. Tech Sem IV
Course Code & Course Title	1ADCC221 Aptitude and Reasoning Part-II
Prerequisite/s	Basic mathematics
Teaching Scheme (Lecture/Tutorial/ Practical)	0/0/2
Credits	1
Evaluation Scheme Practical: ISE	50

Course Outcomes (COs) : The students will be able to:

1ADCC221_1	Solve problems based on HCF, LCM, Interest, Clock, Cubes and Puzzles
1ADCC221_2	Solve problems based on Coding and Decoding, Seating Arrangements and Venn diagrams.
1ADCC221_3	Solve problems based on Ratio Proportion, Partnership, Allegation, Divisibility and Number Theory
1ADCC221_4	Demonstrate presentations using concepts delivered on confidence building and time management skills.

Course Contents

Unit No	Unit Name	Contact Hours
Unit 1	HCF LCM, Simple Interest, Compound Interest	4 Hrs
Unit 2	Coding- Decoding, Seating Arrangement Venn Diagrams	4 Hrs
Unit 3	Clocks, Cubes, Puzzles,	4 Hrs
Unit 4	Ratio Proportion, Partnership	4 Hrs
Unit 5	Confidence Building, Time Management	4 Hrs
Unit 6	Allegation, Divisibility and Number Theory	4 Hrs
	Self-Study Module	6 Hrs

Text Books:

Unit No					Unit Name	Contact Hours
Sr. No	Title	Author	Publisher	Edition	Year of Edition	Sr. No
1	R.S. Agarwal (Quantitative aptitude)	R.S.Agarwal	S Chand	-	2019	1
2	R.S. Agarwal (Verbal & Non-verbal Reasoning)	R.S.Agarwal	S Chand	-	2010	2


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3	Wren & Martin (Verbal, Grammar)	P.C.Wren	S Chand	-	2017	3
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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition	Sr. No
1	APTIPEDIA (Quantitative, Logical, Verbal Aptitude)	Face	Wiley	-	2017	1
2	Wiley (Quantitative Aptitude)	P.A.Anand	Maestro	-	2015	2



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College of Engineering and Technology
Ashta

An Autonomous Institute affiliated to Shivaji University
Kolhapur

Curriculum Structure

T.Y B.Tech.
ARTIFICIAL INTELLIGENCE AND
DATA SCIENCE

SEM V & SEM VI

(Academic Year 2024- 2025)

Artificial Intelligence and Data Science Department																
Teaching and Evaluation Scheme																
T. Y. B. Tech Semester V ^{NA}																
Course Code	Course Name	Teaching Scheme					THEORY					PRACTICAL				
		L	T	P	Credits	Total	ISE	MSE + ESE			Total	Min	ISE		ESE	
								Max	Min	MSE	ESE	Min	Max	Min	Max	Min
11LOE3**	Open Elective - I	3	-	-	3	50	20	50	20	-	-	50	20	-	-	50
1ADPC301	Design and Analysis of Algorithms	3	-	2	4	40	16	40	16	30	30	24	50	20	50	200
1ADPC302	Data Exploration and Visualization	2	-	2	3	40	16	40	16	30	30	24	50	20	50	200
1ADPC303	Machine Learning	3	-	2	4	40	16	40	16	30	30	24	50	20	50	150
1ADHS304	Entrepreneurship	-	-	2	1	50	20	50	20	-	-	-	-	-	-	50
1ADAI305	Minor Course - 2 ^ Python Programming	3	-	-	3	40	16	40	16	30	30	24	50	20	50	100
1ADPE3**	Professional Elective - II	2	-	2	3	-	-	-	-	-	-	-	50	20	-	50
1ADEL310	Inplant Training / Internship	-	-	-	1	-	-	-	-	-	-	-	50	20	-	50
1ADCC311	Aptitude and Reasoning Part - III	-	-	2	1	-	-	-	-	-	-	-	50	20	-	50
		16	0	12	23											900
	Total Contact Hours	28														

* Industrial Inplant Training / Internship Assessment should to be carried out during this semester

^ Minor courses project work continuously assessed from Semester V. The final submission will at VIII semester

Professional Elective - II	
1ADPE306	Data science using R
1ADPE307	Software Engineering & Testing
1ADPE308	IoT Embedded systems for AI
1ADPE309	Data Annotations


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Artificial Intelligence and Data Science Department
Teaching and Evaluation Scheme


T. Y. B. Tech Semester VI																				
Course Code	Course Name	Teaching Scheme					THEORY						PRACTICAL					GRAND TOTAL		
							ISE		MSE + ESE			Total	Min	ISE		ESE			Total	Min
							Max	Min	MSE	ESE	Min			Max	Min	Max	Min			
11LOE3**	Open Elective - II	3	-	-	3	50	20	-	-	-	50	20	-	-	-	-	-	-	-	50
1ADPC312	Computer Vision	3	-	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200	
1ADVS313	Cloud Computing	2	-	2	3	40	16	30	30	24	100	40	50	20	50	20	100	40	200	
1ADPC314	Deep Learning	3	-	2	3	40	16	30	30	24	100	40	50	20	-	-	50	20	150	
1ADPE3**	Professional Elective - III	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
1ADAI319	Minor Course - 3 ^ Information Retrieval	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100	
1ADEL320	Mini Project	-	-	4	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
1ADCC321	Aptitude and Reasoning Part - IV	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50	
		17	0	12	22														900	
	Total Contact Hours	29																		

Professional Elective - III	
1ADPE315	Game Theory in AI
1ADPE316	Intelligent Precision Agriculture
1ADPE317	AI in Robotics
1ADPE318	Advanced Databases


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Sant Dnyaneshwar Shikshan Santha's
Annasaheb Dange College of Engineering and Technology, Astha
(An Autonomous Institute affiliated to Shivaji University, Kolhapur)

Artificial Intelligence and Data Science Department

Academic Year: 2024-25

Semester: Odd

Open Elective-1 List of Courses

Sl.No	Course Code	Course Category	Course Name
1	1ILOE351	Health Care Management	<u>Economics of Health and Education</u>
2	1ILOE352	Business Marketing	<u>Business to Business Marketing (B2B)</u>
3	1ILOE353	Intellectual Property Rights	<u>Patent Law for Engineers and Scientists</u>
4	1ILOE354		<u>Economics of Innovation</u>
5	1ILOE355	Business Laws	<u>E-Business</u>
6	1ILOE356	Finance and Accounting	<u>Management Accounting</u>
7	1ILOE357	Banking and Insurance	<u>Economics of Banking and Finance Markets</u>
8	1ILOE358	Investment Management	<u>Quantitative Investment Management</u>
9	1ILOE359	Human Resource Management	<u>Human Resource Development</u>
10	1ILOE360	Business Management	<u>Advanced Business Decision Support Systems</u>
11	1ILOE361	Language	<u>Introduction to Japanese Language and Culture - II</u>
12	1ILOE362		<u>German - I</u>
13	1ILOE363	Retail and Channel Management	<u>Operations and Supply Chain Management</u>


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Course Details:

Class	TY B. Tech, Sem. V
Course Code & Course Title	1ADPC301 Design and Analysis of Algorithms
Prerequisite/s	1ADPC202
Teaching Scheme (Lecture Practical/Tutorial)	3/0/2
Credits	04
Theory Evaluation Scheme: ISE/ MSE /ESE	40/30/30
Practical Evaluation Scheme: ISE/ESE	50/50

Course Outcomes (COs) : Upon successful completion of the course, the students will be able to:	
1ADPC301_1	Understand Algorithm Design Techniques and Analyze Algorithm Efficiency
1ADPC301_2	Evaluate solvability, insolubility, Correctness of a problem and computational models of parallel algorithm.
1ADPC301_3	Solve Searching ,traversing ,branch bound techniques ,NP
1ADPC301_4	Apply backtracking technique for efficient graph traversal.
1ADPC301_5	Analyze complexity of different algorithm designs.

Course Contents:		
Unit No.	Unit Name	Contact Hours
Unit 1	Divide and Conquer Method Introduction: Algorithm, Algorithm specification, performance analysis, Randomized Algorithms, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, Selection sort	07 Hrs.
Unit 2	The Greedy Method The general method, Knapsack problem, Job sequencing, minimum-cost spanning trees – Prim's and Kruskal's Algorithms, Optimal storage on tapes, Graph coloring problem, Single source shortest path.	06 Hrs.
Unit 3	Dynamic Programming Introduction, Characteristics of dynamic programming, Shortest Path: Bellman ford, Reliability design, Traveling Sales person problem. , Multistage graphs, All pair shortest paths, Optimal binary search trees, 0/1 knapsack	06 Hrs.
Unit 4	Basic Traversal and Search Techniques Techniques for trees, Techniques for Graphs, Breadth first Search & Traversal ,Depth First Search & Traversal, AND/OR graphs, Connected components and Spanning Trees, Biconnected components and depth first search	07 Hrs.


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Unit 5	Branch & Bound, Backtracking Branch & Bound: Traveling Sales person problem, 15 Puzzle problem Backtracking: 8-queen problem, sum of subsets, Hamiltonian Cycle, Graph Coloring	08 Hrs.
Unit 6	NP and Parallel computation Infeasibility: P and NP-classes, NP-hard problems Parallel Computational models: PRAM, MESH, HYPERCUBE - Fundamental Algorithms	05 Hrs.

Experiment List:	
1	Implement maximum and minimum using iterative version and divide & conquer method. Compare the time complexity of both.
2	Implement job sequencing using Greedy problem.
3	Implement graph coloring using Greedy Method.
4	Program based on minimum-cost spanning trees.
5	Program based on General method of Dynamic Programming.
6	Program based on Dynamic Programming.
7	Program based on general method of backtracking.
8	Program based on backtracking.
9	Program based on AND/OR graph.
10	Using Open MP, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements.
11	Micro Projects: Work in Teams on Algorithmic Projects to solve real time problems

Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Fundamentals of Computer Algorithms	Ellis Horowitz, Satraj Sahani, Saguthevar Rajasejaram	University Press	2	2008
02	Introduction to Algorithms	Thomas Cormen, Charles Leiserson, Ronald Rivest, Clifford Stein	PHI	3	2009
03	Algorithms in a Nutshell	G. T. Heineman, G. Pollice, S. Selkow	O'Reilly	1	2008
04	Fundamentals of algorithms	G. Brassard, P. Bratley	Pearson Education	1	2015


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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Design and Analysis of Algorithms	Aho, Hopcraft and Ullman	Pearson Education	1	2000
02	Algorithms	Kenneth Berman, Jerome Paul	CENAGE Learning	1	2010


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Course Details:

Class	TY B. Tech., Sem. V
Course Code & Course Title	1ADPC302 Data Exploration And Visualization
Prerequisites	1ADVS206
Teaching Scheme (Lecture / Tutorial / Practical)	2/0/2
Credits	03
Evaluation Scheme Theory: ISE /MSE/ ESE	40/30/30
Evaluation Scheme Practical: ISE / ESE	50/50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPC302_1	Identify the relationships between variables and Articulate the transformations
1ADPC302_2	Analyze the concept of single variable ,numerical summaries
1ADPC302_3	Analyze the concept of visualization, networks, graphs, maps
1ADPC302_4	Correlate data sets main characteristics, often using graphics and other data visualization methods.
1ADPC302_5	Discover the way to visually represent connections between entities in data, social data analysis.

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Exploratory Data Analysis Introduction to Single variable: Distribution Variables - Numerical Summaries of Level and Spread - Scaling and Standardizing – Inequality - Smoothing Time Series	04 Hrs.
Unit 2	Working With Two Variable And Three Variable Relationships between Two Variables - Percentage Tables - Analyzing Contingency Tables - Handling Several Batches - Scatterplots and Resistant Lines – Transformations - Introducing a Third Variable - Causal Explanations - Three-Variable Contingency Tables and Beyond - Longitudinal Data.	04 Hrs.


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Unit 3	Introduction To Data Visualization The Seven Stages of Visualizing Data - Getting Started with Processing - Mapping - Time Series - Connections and Correlations - Scatterplot Maps - Trees, Hierarchies, and Recursion ,Networks and Graphs ,Acquiring Data ,Parsing Data	05Hrs.
Unit 4	Visualization Design And Tools visual display of quantitative information, data-ink maximization, graphical design, exploratory data analysis, heat map, SVG , Visualization tools: Line plots, area plots, histogram, bar charts, pie charts, bubble plots, waffle charts, word clouds	04Hrs.
Unit 5	Collaboration Graph Visualization and Navigation, Online Social Networks, Social Data Analysis, Collaborative Visual Analytics, Text, Map, Geospatial data, 2-D Graphics, 3-D Graphics, Photorealism, Non-Photorealism, the human retina: Perceiving Two Dimensions	04Hrs.
Unit 6	Techniques And Applications Basic Data Exploration Techniques - Basic Data Visualization Techniques - Visualizing Geographic Data with gmap, United States - Case Study – Single Family Residential Home and Rental Values, Introduction of web crawling	05Hrs.

Experiment List:

Expt. No.	Title of Experiment
1	Implement distribution of variables and Numerical Summaries of Level and Spread on iris dataset.
2	Perform scaling and standardizing operation on iris dataset
3	Implement Line plots, area plots, Histogram, bar charts, pie charts, bubble plots, waffle charts, word clouds on sample data points.
4	Examine how two variables relate to each other. This can involve identifying correlations, dependencies, or causal relationships.
5	Analysis of data points collected or recorded at specific time intervals with sample data points.
6	Identify and visualize relationships between variables on iris dataset.
7	Visualizing hierarchical data structures using various techniques like dendrograms, tree maps, and sunburst charts with sample data points.
8	Visualize textual data to reveal patterns, trends, and insights.
9	United States - Case Study: Single Family Residential Home and Rental Values


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10	Visualize geographic data to understand spatial relationships and patterns.
11	Implement Web crawling process of automatically navigating and extracting information from websites
12	Micro project

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Visualization Analysis and Design	Tamara Munzner	CRC Press	-	2014
2	Introduction to data visualization tools	Dr. S. Karpagavalli	Blue Hill publishers	-	2020
3	Beginner's Guide for Data Analysis using R Programming,	Jeeva Jose	Khanna Publishing	-	2019.

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Exploring Data: An Introduction to Data Analysis for Social Scientists	Catherine Marsh, Jane Elliott	Wiley Publications.	2nd Edition,	2008
2	Data Visualization Handbook	J. Koponen, J. Hildén	CRC Press	-	2019
3	The Book of Trees: Visualizing Branches of Knowledge	M. Lima, Princeton	Architectural Press	-	2014


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADPC303 Machine Learning
Prerequisite/s	1ADPC211
Teaching Scheme: Lecture/Tutorial/Practical	3/0/2
Credits	04
Evaluation Scheme: ISE/ MSE /ESE	40/30/30
Practical Evaluation Scheme: ISE	50

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

1ADPC303_1	Understand the fundamental concepts of machine learning.
1ADPC303_2	Implement machine learning algorithms & libraries & Tools for various applications.
1ADPC303_3	Analyze and evaluate the performance of different types of machine learning models.
1ADPC303_4	Explore advanced topics and current trends in machine learning & study real time applications
1ADPC303_5	Develop skills to solve real-world problems using machine learning techniques& algorithms.

Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Introduction to Machine Learning Overview of Machine Learning, why machine learning? Problems Machine Learning can solve, Types of Machine Learning: Supervised, Unsupervised, Semi-supervised, Reinforcement Learning, Python libraries & Tools- Jupyter Notebook, Colab , Numpy , Scipy ,matplotlib ,pandas , Applications of Machine Learning	7 Hrs.
Unit 2	Supervised Learning Classification and Regression, Generalization, Overfitting, Under fitting Regression: Linear Regression, Logistic Regression, Ridge Regression, Bayesian Linear Regression Classification: -k-Nearest Neighbors, Decision Trees, Random Forest model, Support Vector Machines. Model evaluation techniques.	6 Hrs.


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Unit 3	Unsupervised Learning Types of Unsupervised learning, Challenges in Unsupervised learning, preprocessing & Scaling, different types of preprocessing, Dimensionality Reduction, Feature Extraction, Manifold Learning- PCA, NMF, t-SNF, Clustering-K-Means, Agglomerative Clustering	7 Hrs.
Unit 4	Advanced Learning Reinforcement Learning, Representation Learning, Basic Neural Networks, Ensemble Learning, Bootstrap Aggregation, Association Rule Learning- Apriori Algorithm, Model Evaluation and Optimization- Cross Validation, Grid Search and Random Search, Hyper parameter Tuning	7 Hrs.
Unit 5	Recommendation System and Time series analysis Topic modeling Popularity based recommender engines, Content based recommendation engines, Classification based recommendation engine, collaborative filtering Date and Time Handling, Correlation, Time Series Forecasting	6 Hrs.
Unit 6	Study of Applications Image Recognition, Speech Recognition, Email spam and Malware Filtering, Online fraud detection, Medical Diagnosis, Product recommendations, Current Trends and Future Directions- Transfer Learning, AutoML	6 Hrs.

Experiment List:

Expt. No	Title of Experiment
1.	Data Preprocessing with Python - Load datasets, handle missing values, perform feature scaling.
2.	Implementing Linear Regression Build a linear regression model, evaluate performance.
3.	Classification with Logistic Regression and KNN Implement logistic regression and KNN, compare their performance
4.	Detecting Spam mails using Support vector machine
5.	Model Evaluation with Cross-Validation Implement cross-validation techniques to evaluate models.
6.	Dimensionality Reduction with PCA Perform PCA on a dataset and interpret the results.
7.	Implement Image Recognition using MLP
8.	Association Rule Mining with Apriori Generate association rules using the Apriori algorithm.
9.	Implement Recommender System for Movie Recommendations
10.	Hyperparameter Tuning Use grid search and random search for model optimization.
11.	Choose best machine learning algorithm to implement online fraud detection


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12.	Micro-project: students work in team on any socially relevant problem that needs a machine learning based solution, and evaluate the model performance
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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Introduction to Machine Learning	Ethem Alpaydin	Prentice Hall of India	3 rd Edition	2015
2	Master machine learning algorithms	Jawson Browleen	Machine learning Master2016	-	2016
3	Introduction to Machine Learning	Prentice Hall of India,	-	3 rd Edition	2015
4	Machine Learning	Tom Mitchell	McGraw-Hill	-	2017

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Pattern Recognition and Machine Learning	Christopher M. Bishop	Springer Publications	-	2011
2	Artificial Intelligence: A Modern Approach	Stuart Jonathan Russell	Prentice Hall	3 rd	2020
3	Machine Learning Dummies	John Paul Muller, Luca Massaron	Wiley Publications	-	2021


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Course Details:

Class	TY B. Tech., Sem. V
Course Code and Course Title	1ADHS304- Entrepreneurship
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	1
Evaluation Scheme: ISE –I/ISE-II	25/25

Course Outcomes (COs):


1ADHS304_1	Identify and evaluate potential business opportunities in the engineering domain.
1ADHS304_2	Conduct market research and analyze the competitive landscape.
1ADHS304_3	Craft a comprehensive business plan, including financial projections.
1ADHS304_4	Understand the fundamentals of marketing, sales, and operations for engineering ventures.
1ADHS304_5	Pitch their business ideas to potential investors.
1ADHS304_6	Grasp the legal and ethical considerations of starting a business.


Course Contents:

1. The Entrepreneurial Ecosystem
2. Idea Identification and Prototyping
3. Testing, Validation and Commercialisation
4. Market Analysis and Competitive Landscape
5. Legal Procedure to setup an Startup Business
6. Understanding Finance Basics
7. Business Planning and Development
8. Marketing and Sustainability
9. Pitching and Fundraising
10. Startup Case Studies


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Reference Materials:

1. <https://www.startupindia.gov.in/content/sih/en/international/go-to-market-guide/indian-startup-ecosystem.html>
2. https://www.startupindia.gov.in/content/sih/en/learning-and-development_v2.html
3. https://onlinecourses.nptel.ac.in/noc24_mc93/preview



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Course Details:

Class	TY B. Tech., Sem. V
Course Code and Course Title	1ADAI305 Minor Course 2: Python Programming
Prerequisite/s	1ADPC105
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits	03
Evaluation Scheme: ISE / MSE /ESE	40/30/30

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

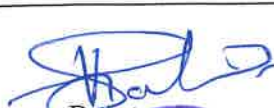
1ADAI305_1	Understand basic programming concept in python
1ADAI305_2	Implement conditional & Looping statement in python
1ADAI305_3	Apply OOPs concepts in python programming
1ADAI305_4	Illustrate Functions, Tuples, Dictionaries and Sets in Python
1ADAI305_5	Implement File And Exception handling

Course Contents:

Unit No	Unit Name	Hours
Unit 1	Introduction to Python: Introduction of Python and history of Python, Features of Python, Installation of Python Environment Setup, Python Identifiers, Keywords and Indentation, Comments, Variables, Variable Names, Variables - Assign Multiple Values, Python - Output Variables, Global Variables, Data Types, Operators	7Hrs
Unit 2	Control Statement & Strings Sequence Control – Precedence of operators, Type conversion Conditional Statements: if, if-else, nested if-else, Looping- for, while, nested loops, loop control statements (break, continue, pass) a. Strings: declaration, manipulation, special operations, escape character, string formatting operator, Raw String, Unicode strings, Built-in String methods.	7Hrs
Unit 3	Object Oriented Concept Classes and objects declaration, Constructor, Inheritance: Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Regular Expressions, Principles of Object Orientation, Iterators, Polymorphism, Encapsulation and abstraction, Operator Overloading	6Hrs
Unit 4	Lists Tuples and Dictionaries Python Lists: Concept, creating and accessing elements, updating &	


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	deleting lists, traversing a List, reverse Built-in List Operators, Concatenation, Repetition, In Operator, Tuples, Accessing values in Tuples, Tuple Assignment, and Tuples as return values, Variable-length argument tuples, and Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in tuple functions, indexing, slicing and matrices. Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys.	6Hrs
Unit 5	Function In Python: Built-in List functions and methods. Functions: Definitions and Uses, Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Flow of Execution, Parameters and Arguments, Variables and Parameters, Void Functions, Anonymous functions.	6Hrs.
Unit 6	I/O and Error Handling In Python Python File Open, Python Read File, File Write, Python Delete File, Writing Binary Files Manually, Using Pickle to Write Binary Files, What is Exception?, Handling an exception, try....except...else, try-finally clause, Argument of an Exception.	7Hrs

Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Programming Python	Mark Lutz	O'Reilly	4 th	-
2.	Python for Everybody: Exploring Data in Python	Charles R. Severance	Kindle Edition	3 rd	-

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Core Python Programming	Wesley J.	Prentice	Hall PTR First Edition	-
2.	Exploring Python	T. Budd	TMH	1 st	2011
3.	Programming Python	Mark Lutz	O'Reilly	4 th	-


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Course Details:


Class	TY B.Tech., Sem. V
Course Code and Course Title	1ADPE306 Professional Elective II Data science using R
Prerequisite/s	1ADPC210
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	3
Practical Evaluation Scheme: ISE	50


Course Outcomes(COs):	
Upon successful completion of this course, the student will be able to:	
1ADPE306_1	Understand the basic concepts of data science and the R programming environment.
1ADPE306_2	Apply appropriate data structures for different types of data and its manipulation.
1ADPE306_3	Apply R programming fundamentals to solve problems and manage data.
1ADPE306_4	Implement import and export data using R.
1ADPE306_5	Manipulate data and create visualizations using R.
1ADPE306_6	Develop and evaluate linear models using R.

Course Contents:		
Unit No.	Unit Name	Hours
Unit 1	Introduction to Data Science and R Definition and importance of data science, Overview of the data science process (data collection, preparation, analysis, modeling, evaluation, and deployment), Installation and setup of R and RStudio, Basic operations in R	04 Hrs.
Unit 2	Data Types and Structures in R Data Types-Numeric, character, factor, and logical data types, Type conversion, Data Structures-Vectors, Matrices, Lists, Data frames	05 Hrs.
Unit 3	R programming fundamentals Conditions and loops, Functions in R, Objects and Classes, Debugging, String operations in R, Regular Expressions, Dates in R	04 Hrs
Unit 4	Data Import and Export in R Reading CSV and Excel files, Reading data from databases (SQL), Writing Data-Exporting data to CSV, Excel, and other formats, Saving R objects (RDS files)	04 Hrs.


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Unit5	Data Manipulation and Visualization Data Manipulation -List Management, Data Transformation, Merging Data Frames, Outlier Detection, Combining multiple vectors Data Visualization - Creating bar chart and dot plot, Creating histogram and box plot, Plotting with base graphics, Plotting and coloring in R	05 Hrs.
Unit 6	Linear Models Using R Linear Models, Simple Linear Regression and Multiple Regression, Generalized Linear Models, Nonlinear Models, Splines- Decision-Random Forests.	04 Hrs.

Experiment List:

Exp No	Experiment Name
1	Installing R and R studio, Create a folder DS_R and make it a working directory, installing the "ggplot2", "caTools", "CART" packages.
2	Learn all the basics of R-Programming (Data types, Variables Operators etc.)
3	Implement R-Loops with different examples.
4	Learn the basic of functions in R and implement with examples.
5	Create a data set and do statistical analysis on the data using R.
6	Write a R Program to Convert a given matrix into 1 dimensional array, Create an 3 dimensional array of 24 elements using the dim () function.
7	Write an R Program to create a vector, add two vectors of integer type, and find sum, mean and product of a vector.
8	Implementation of Data frame and its corresponding operators and functions
9	Write an R Program to read data from the file and writing output back to specified file.
10	Create bar charts, line, scatter plots, histogram using R.
11	Implementation of the linear and multiple linear regression using R.
12	Micro-project: students work in team on any socially relevant problem that needs a Data science using R based solution, and evaluate the model performance

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	R programming for data science	Roger D Peng	Leanpub	-	2014
2	Beginning R- The Statistical Programming Language	Mark Gardener	Wiley & Sons, I c	-	2012


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Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Beginning R-The Statistical Programming Language	Mark Gardener	John Wiley & Sons, Inc	-	2012
2	Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics	Nathan Yau	Wiley	-	2011
3	The Book of R	Tilman M. Davies	Nostar chpress	-	2015


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Course Details:

Class	TY B. Tech., Sem. V
Course Code and Course Title	1ADPE307- Professional Elective II: Software Engineering & Testing
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	03
Theory Evaluation Scheme: ISE /MSE/ESE	-
Practical Evaluation Scheme: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPE307_1	Understand the principles of Software Engineering and process models for developing a software project
1ADPE307_2	Apply various methods of capturing, specifying, visualizing, and analyzing software requirements
1ADPE307_3	Apply Design and Testing principles to S/W project development
1ADPE307_4	Design UML diagrams, plan, and schedule project
1ADPE307_5	Estimate Project Metrics and use Software Configuration management

Course Contents:

Unit No.	Unit Name	Contact Hours
Unit 1	Introduction to Software Engineering, Software Process Models Nature of Software, Software Engineering Principles, The Software Process, Software Myths. Process Models: A Generic Process Model, Prescriptive Process Models: The Waterfall, Incremental Process(RAD), Evolutionary Process, Unified Process, Concurrent. Advanced Process Models & Tools: Agile software development: Agile methods, Plan-driven and agile development	04Hrs.
Unit 2	Software Requirements Engineering & Analysis Requirements Engineering: User and system requirements, Functional and non-functional requirements, Types & Metrics, A spiral view of the requirements engineering process. Software Requirements Specification (SRS): The software requirements Specification document, The structure of SRS, structured & tabular SRS.	04 Hrs.


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Unit 3	Design Engineering Design Process & quality, Design Concepts, The design Model, Pattern-based Software Design. Architectural Design: Design Decisions, Views, Patterns, Application Architectures, Modeling Component level Design: component, Designing class-based components, conducting component-level design, User Interface Design: The golden rules	05 Hrs.
Unit 4	Project Estimation Project Estimation: Observations on Estimation, Project Planning Process, Software Scope and feasibility, Resources: Human Resources, Reusable software, Environmental Resources. Software Project Estimation, Decomposition Techniques, Empirical Estimation Models: Structure, COCOMO Model	04 Hrs.
Unit 5	Software Configuration The SCM repository, SCM process, Configuration management for Web Apps, Case study: CVS and Subversion Tools, Visual Source Safe from Microsoft & Clear Case. Maintenance & Reengineering: Software Maintenance, Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering.	05 Hrs.
Unit 6	Software Testing Introduction to Software Testing, Principles of Testing, Testing Life Cycle, Phases of Testing, Types of Testing, Verification & Validation, Defect Management, Defect Life Cycle, Bug Reporting, GUI Testing, Test Management and Automation.	04 Hrs.

Experiment List:

Exp No	Title of Experiment
1	Identify the Requirements from Problem Statements
2	To prepare the Software Requirement sheet for the problem statement
3	Identify entity sets, their attributes, and various relationships and represent the data model through ER diagram
4	To estimate Project Metrics for the examination management system
5	To Design UML Use Case Diagrams and Capturing Use Case Scenarios
6	To generate the UML diagram for the library management system
7	To generate the UML diagram for the course reservation system
8	To generate Gantt/ PERT Chart for the development plan
9	To develop a set of test cases that will completely test the program in languages like C/ C++/ Python
10	To estimate Test Coverage Metrics and Structural Complexity
11	To design Test Suite
12	Micro project: Prepare a report using all Software engineering and testing concept


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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Software Engineering: A Practitioner's Approach	Roger Pressman,	McGraw Hill, ISBN 0-07-337597-7	7 th	2010
02	Software Engineering	Ian Sommerville	Addison and Wesley, ISBN 0-13-703515-2	9 th	2010

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Fundamentals of Software Engineering	Carlo Ghezzi,	Prentice Hall India, ISBN-10: 0133056996	2 nd	2002
2	Fundamentals of Software Engineering	Rajib Mall	Prentice Hall India, ISBN-13: 978-8120348981	4 th	2014


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Course Details:

Class	TY B.Tech., Sem.V
Course Code and Course Title	1ADPE308 IoT Embedded System for AI
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	02
Evaluation Scheme: ISE	50

Course Outcomes(COs):

Upon successful completion of this course, the student will be able to:

1ADPE308_1	Understand the fundamentals of IoT and embedded systems
1ADPE308_2	Design and implement IoT solutions for data collection and communication
1ADPE308_3	Apply machine learning algorithms to analyze IoT data and derive insights
1ADPE308_4	Demonstrate practical skills in prototyping and testing IoT applications.
1ADPE308_5	Analyze ethical and societal implications of AI-powered IoT systems.

Course Contents:

Unit No.	Unit Name	Hours
Unit 1	Introduction to IoT and Embedded Systems Overview of IoT (Internet of Things) and its applications, Basics of embedded systems and their role in IoT, Hardware components and architectures of embedded system IoT Enabling Technologies	04 Hrs.
Unit 2	IoT Communication Protocols Communication stack for IoT ,Machine to machine communication(M2M),Introduction to various protocols such as Message Queue Telemetry Transport (MQTT), Constrained Application Protocol (CoAP), 6LoWPAN	05 Hrs.
Unit 3	Embedded System Programming Introduction to microcontrollers (e.g. Arduino, Raspberry Pi) , Interfacing of sensors to Arduino or Raspberry Pi, Wi-Fi and Bluetooth-enabled microcontrollers	04 Hrs.


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Unit 4	Embedded Software Development Real time operating systems, Kernel architecture: hardware, task/process control subsystem, device drivers, system calls, programming languages :assembly languages, high level language.	05 Hrs.
Unit 5	IoT Data generation and storage Introduction to Cloud Storage models and communication APIs Web server for IoT, Cloud for IoT, RESTful web API	04 Hrs.
Unit 6	Applications of IoT, case studies Home Automation, smart cities, Environment, Agriculture, Productivity Application	04 Hrs.

Experiment List:

Exp No	Title of Experiment
1	To interface LED to Arduino Uno or Raspberry Pi
2	To interface LCD to Arduino Uno or Raspberry Pi
3	To interface temperature sensor to Arduino Uno or Raspberry Pi and display temperature on LCD
4	To interface Wi Fi module to Arduino Uno or Raspberry Pi
5	To interface PIR (Passive Infrared) sensor with an Arduino or Raspberry Pi to detect motion.
6	To create a Things Speak account for uploading the sensors data.
7	To control devices connected to Arduino Uno by Application created using Remote XY
8	To remotely control an actuator (e.g., LED, motor) connected to an ESP8266 device using a cloud-based MQTT broker.
9	To set up an MQTT-based communication system between a client (ESP8266) and a broker (Mosquitto) for sending and receiving messages.
10	To design any IoT application using Arduino/Raspberry Pi /open platform


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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Internet of Things	Jeeva Jose	Khanna Book Publishing Company	-	2021
2.	The Internet of Things	Samuel Green Gard	MIT Press	1 st	2015

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Mastering Internet of Things: Design and Create your own IoT Applications using RaspberryPi3	Peter Waher	Packt Publishing Ltd	1 st	2018


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Course Details:

Class	TY B. Tech., Sem. V
Course Code and Course Title	1ADPE309- Professional Elective II: Data Annotations
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	03
Practical Evaluation Scheme: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:


1ADPE309_1	Understand concepts of data annotation, Benefits of data annotation, and Applications of data annotations in machine learning
1ADPE309_2	Elaborate on the concepts of data labeling, data labeling approaches, and the working of data labeling
1ADPE309_3	Illustrate Text annotation, image annotation, video annotation, audio, and key point annotation in real-world examples
1ADPE309_4	Summarize the use of annotation in real-world applications

Course Contents:

Unit No.	Unit Name	Hours
Unit 1	Introduction to data annotation Introduction to annotation, Manual vs. Automated Data Annotation, Benefits of data annotation, Principles of Data Annotation, Types of data annotation Applications of data annotations in machine learning, Data annotation tools -brat rapid annotation tool, Web-based annotation tool , Data storage structure, Data annotation quality	05 Hrs.
Unit 2	Data annotation Introduction to data labeling for image classification, unlabeled data vs label data, Human-in- the-Loop(HITL),data labeling approaches, common types of data labeling, data annotation with Computer vision annotation tools , Data labeling for object detection, Introduction to key point annotation	04 Hrs.
Unit 3	Text annotation Basics of Text Annotation, Types of Text Annotation ,Working of text annotation, use cases of text annotation, uses of text annotation, NLP text annotation, Text labeling for sentiment analysis, Labeling text data, Multilingual Support, Propagate regex from UI	04 Hrs.


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Unit 4	Image annotation Basics of image annotation, need of image annotation, types of image annotation, image classification , object detection, Semantic Segmentation, Instance segmentation, image annotation techniques, image annotation use cases, Key point Annotation, Polygon Annotation, Bounding Box Annotation	04 Hrs.
Unit 5	Video annotation Introduction to video annotation, purpose of video annotation in machine learning, how video annotation works, types of video annotation, video annotation for machine learning, Challenges and critical considerations in video annotation, AI video annotation, Video annotation tools and platform, Video annotation for medical imagery, Skeletal annotation	05 Hrs.
Unit 6	Audio Annotation Introduction to audio annotation, Importance of audio annotation, Different types of audio annotation , Tools and Techniques for Audio Annotation - Praat, Audacity, ELAN, Techniques for Accurate Annotation, Multi-level Annotations	04 Hrs.

Experiment List:

Exp. No	Title of Experiment
1	To Perform the Data Annotation & Audio Annotation for existing data.
2	To perform Semantic Segmentation & Image Annotation
3	To perform object detection and Segmentation of Instance
4	To Perform Image Annotation for Bounding Boxes, Polygonal Segmentation
5	To Perform Image Annotation to Perform 3D Image data representation
6	To perform the Data Attributes operations using data annotation
7	To Perform the Versatility for Set of Text, Image, Audio, Video
8	To Perform the Open Source Data Annotation & Labeling Tools
9	To Perform Multi Model & Multi Domain Text Annotation Tools
10	To Perform Image Annotation Tools 3D Slicer, CATMAID, COCO Annotator


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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	NaturalLanguage Annotation for Machine Learning: A Guide to Corpus-Building for Applications	James Pustejovsky, Amber Stubbs	O'Reilly Media	1 st	2012
02	Provenance and Annotation of Data and Processes	Luc Moreau , Juliana Freire, David Koop	Springer		2008

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Image Processing and Analysis: Variational, PDE, Wavelet, and Stochastic Methods	Chan Tony F, Shen Jianhong	Bio Medical Engineering On Line	1 st	2006
2	Video Data Management and Information Retrieval	Sagarmay Deb	IGI Global	1 st	2005


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Course Details:

Class	TY B. Tech., Sem. V
Course Code and Course Title	1ADEL310 Inplant Training/Internship
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	0/0/0
Credits	01
Practical Evaluation Scheme: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADEL310_1	Explain the knowledge acquired in a given field during industrial training
1ADEL310_2	Understand the knowledge level skills ,attribute for the students
1ADEL310_3	Demonstrate competency in relevant engineering fields through case study
1ADEL310_4	Apply the fundamental knowledge of engineering to given industrial problems/task using appropriate techniques, resources and modern engineering tools
1ADEL310_5	Ccommunicate effectively, both orally and in writing report related to given field showing engineering & management principles.

The students Undergone for 15 Days Internship under Curriculum credits

Project Load

Maximum 10 students allocated for One Faculty 6:4 ratio

Mode of Assessment

This subject content of the internship emerging with thrust areas, the completion of work and the submission of report and assessment should be done at the end of part-I

Course Contents:

Industrial Training Requirement:

Duration: Minimum two weeks during the semester break after the fourth semester.

Completion: Within 15 calendar days before the start of the fifth semester.

Industry Preference: Students should seek internships in industries related to mechanical engineering to ensure the experience is relevant and beneficial

The report should demonstrate practical application of course-related knowledge and skills.


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After completion of training, each student has to submit following documents to training in charge:

Industry Evaluation Rubric filled by industry

Report of the training (Minimum 25 pages contents of the report with Case Study)

Completion original Certificate of Training by Industry.

Photocopy of Institute application letter to industry.

GPS Images and Photos: Each student must give a hard copy of the Internship Glimpse This template consists of two pages dedicated to showcasing the highlights of your internship through photographs, ensure that the template is separate from the internship report document

Attendance Sheet

Report Submission Guidelines

As part of the internship program, students are required to submit a detailed report documenting their experiences and learnings during the internship.

The following guidelines outline the requirements for the report submission:

Content Requirements:

The report should include an introduction that provides an overview of the internship, including the company name, duration, and objectives.

Students should describe the tasks and projects they were involved in, detailing the specific roles and responsibilities they undertook.

The report should highlight key observations and insights gained from the internship, focusing on industry practices, technologies, and methodologies encountered.

Students are encouraged to analyze and discuss any challenges faced during the internship and how they were addressed or overcome.

The conclusion should summarize the overall experience, emphasizing the practical skills and knowledge acquired, and reflecting on how the internship has contributed to their professional development.

Formatting and Structure:

The report should be well organized, clearly written, and free of grammatical errors.

It should include a title page, table of contents, and properly formatted sections and subsections.

Any diagrams, charts, or photographs included should be relevant and appropriately labeled.

Evaluation Process:

Individual student must undergo presentation of training content before the evaluation committee constituted by the department. An internal evaluation will be conducted for examining the quality and authenticity of contents of the report. Marks will be awarded after the end of the presentation and submission of report



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Course Details:

Class	TY B. Tech., Sem. V
Course Code and Course Title	1ADCC311 Aptitude and Reasoning Part-III
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	01
Evaluation Scheme: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADCC311_1	Solve problem based on basic and advance Permutation and Combination
1ADCC311_2	Solve problem based on Probability, Application of Probability, Cubes, Dices, cube painting and Syllogism
1ADCC311_3	Solve problem based on Mensuration 3D, Circle & Triangle
1ADCC311_4	Demonstrate on Resume writing skill, closed, advanced grammar, Synonyms and Antonyms
1ADCC311_5	

Course Contents:

Unit No.	Unit Name	Hours
Unit 1	<ul style="list-style-type: none"> Basic Permutation and Combination Advance Permutation and Combination 	4 hours
Unit 2	<ul style="list-style-type: none"> Probability Application of Probability 	4 Hours
Unit 3	<ul style="list-style-type: none"> Cubes, Dices & cube painting Syllogism 	4 Hours
Unit 4	<ul style="list-style-type: none"> Mensuration 3D Circle & Triangle 	4 hours
Unit 5	<ul style="list-style-type: none"> Resume writing & resume making Interview Techniques 	4 Hours
Unit 6	<ul style="list-style-type: none"> Closed Test & advanced Grammar Synonyms & Antonyms 	4 Hours

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Quantitative Aptitude for Competitive Examinations	R.S. Agarwal	S Chand		2022
02	Verbal and Non-verbal Reasoning	R.S. Agarwal	S Chand		2010
03	Verbal, Grammar	P.C.Wren	S Chand		2017


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Annasaheb Dange
College of Engineering and Technology
Ashta

An Autonomous Institute affiliated to Shivaji University
Kolhapur

Curriculum Structure

T.Y B.Tech.
ARTIFICIAL INTELLIGENCE AND
DATA SCIENCE

SEM V & SEM VI

(Academic Year 2024- 2025)

Artificial Intelligence and Data Science Department																		
Teaching and Evaluation Scheme																		
T. Y. B. Tech Semester V ^{NA}																		
Course Code	Course Name	Teaching Scheme						THEORY						PRACTICAL				
		L	T	P	Credits	Max	Min	ISE	MSE + ESE			Total	Min	Max	Min	Max	Min	Total
									MSE	ESE	Min							
11LOE3**	Open Elective - I	3	-	-	3	50	20		-	-	-	50	20	-	-	-	-	50
1ADPC301	Design and Analysis of Algorithms	3	-	2	4	40	16		30	30	24	100	40	50	20	50	40	200
1ADPC302	Data Exploration and Visualization	2	-	2	3	40	16		30	30	24	100	40	50	20	50	40	200
1ADPC303	Machine Learning	3	-	2	4	40	16		30	30	24	100	40	50	20	-	50	150
1ADHS304	Entrepreneurship	-	-	2	1	50	20		-	-	-	50	20	-	-	-	-	50
1ADAI305	Minor Course - 2 ^ Python Programming	3	-	-	3	40	16		30	30	24	100	40	-	-	-	-	100
1ADPE3**	Professional Elective - II	2	-	2	3	-	-		-	-	-	-	-	50	20	-	50	50
1ADEL310	Inplant Training / Internship	-	-	-	1	-	-		-	-	-	-	-	50	20	-	50	50
1ADCC311	Aptitude and Reasoning Part - III	-	-	2	1	-	-		-	-	-	-	-	50	20	-	50	50
		16	0	12	23													900
	Total Contact Hours	28																

* Industrial Inplant Training / Internship Assessment should to be carried out during this semester

^ Minor courses project work continuously assessed from Semester V. The final submission will at VIII semester

Professional Elective - II	
1ADPE306	Data science using R
1ADPE307	Software Engineering & Testing
1ADPE308	IoT Embedded systems for AI
1ADPE309	Data Annotations


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Annasaheb Dange College of Engineering and Technology
Artificial Intelligence and Data Science Department
Teaching and Evaluation Scheme


T. Y. B. Tech Semester VI																					
Course Code	Course Name	Teaching Scheme					THEORY						PRACTICAL								GRAND TOTAL
							ISE		MSE + ESE			Total	Min	ISE		ESE		Total	Min		
		L	T	P	Credits	Max	Min	MSE	ESE	Min	Max			Min	Max	Min	Max			Min	
		11LOE3**	Open Elective - II	3	-	-	3	50	20	-	-	-	50	20	-	-	-	-	-	50	
1ADPC312	Computer Vision	3	-	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200		
1ADVS313	Cloud Computing	2	-	2	3	40	16	30	30	24	100	40	50	20	50	20	100	40	200		
1ADPC314	Deep Learning	3	-	2	3	40	16	30	30	24	100	40	50	20	-	-	50	20	150		
1ADPE3**	Professional Elective - III	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100		
1ADAI319	Minor Course - 3 ^ Information Retrieval	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100		
1ADEL320	Mini Project	-	-	4	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50		
1ADCC321	Aptitude and Reasoning Part - IV	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50		
		17	0	12	22														900		
	Total Contact Hours	29																			

Professional Elective - III	
1ADPE315	Game Theory in AI
1ADPE316	Intelligent Precision Agriculture
1ADPE317	AI in Robotics
1ADPE318	Advanced Databases


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADPC312 Computer Vision
Prerequisite/s	1ADPC303
Teaching Scheme: Lecture/Tutorial /Practical	3/0/2
Total Contact Hours:	39
Credits	04
Evaluation Scheme: ISE/ MSE /ESE	40/30/30
Practical Evaluation Scheme: ISE/ESE	50/50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPC312_1	Understand fundamental concepts and techniques in computer vision
1ADPC312_2	Implement image processing algorithms for various applications
1ADPC312_3	Apply feature extraction methods for object detection and recognition
1ADPC312_4	Analyze the performance of computer vision system
1ADPC312_5	Design deep learning models for image classification and object detection tasks.

Course Contents

Unit No.	Unit Name	Hours
Unit 1	Color Image Processing Color Fundamentals, Color models, Color Transformations, Smoothing and Sharpening, Color Segmentation	06 Hrs.
Unit 2	Texture Analysis Definition, Types of texture, Texels, Texture analysis, Approaches to texture analysis, Statistics, Texture descriptors - statistical - Auto-correlation, co-occurrence matrices and features, local binary partition.	07 Hrs.


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Unit 3	Representation & Description Representation, Boundary Descriptors, Regional Descriptors, Use of Principal components for description, Relational Descriptors	06 Hrs.
Unit 4	Object Recognition & Restoration Object Recognition: Object Detection Vs recognition, Patterns and Pattern Classes, Statistical Pattern Recognition, Syntactic Pattern Recognition, Optimization Techniques in Recognition. Restoration: Image Restoration Model, Noise Models	07 Hrs.
Unit 5	Moving Object Detection and Tracking Introduction, Background Modeling, Connected Component Labeling, Shadow Detection, Discrete Kalman Filtering, Mean-shift tracking, Segmentation tracking via graph cuts.	07 Hrs.
Unit 6	3D Vision and applications Introduction to 3D imaging, 3D Face recognition, 3D shape analysis, 3D medical applications, 3D robotics	06 Hrs.

Experiment List:

Expt. No.	Title of Experiment
1.	To Implement various basic image processing operations in python/matlab/open-CV: Reading images, writing images, conversion of images, and complementing of an image
2.	To perform Histogram Equalization
3.	To perform Image Filtering (Smoothing, Sharpening)
4.	To perform Edge Detection (e.g., Canny Edge Detector)
5.	To perform image Rotation, Translation, Scaling
6.	To perform Image Segmentation using Thresholding Techniques
7.	To perform Image Feature Descriptor Matching
8.	To perform Convolution Neural Networks (CNNs) for Object Detection
9.	To Build a system that can extract text from images or documents and convert it into editable text.
10.	To perform Deep Learning-based Classification e.g., CNNs


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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Digital Image Processing	Gonzalez R. C., Woods R. E	PHI, Second Edition	2 nd	2002
2	Digital Image Processing	Sonka Milan, Vaclav Hlavac,	Cengage Learning	3 rd	2013

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Digital Image Processing	S. Jayaraman, S. Esakkiraj, T. Veerkumr	Tata McGraw Hill	-	2010
2	Computer Vision – A Modern approach	D. A. Forsyth, J. Ponce,	Pearson Education, Prentice Hall,		2005
3	Computer Vision	Linda Shapiro, George C. Stockman	Prentice Hall	-	2000


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADVS313 Cloud computing
Prerequisite/s	1ADPC210, 1ADPC113
Teaching Scheme: Lecture/Tutorial/Practical	2/0/2
Credits	03
Evaluation Scheme: ISE / MSE /ESE	40/30/30
Practical Evaluation Scheme: ISE /ESE	50/50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADVS313_1	Interpret the basic concepts of Cloud Computing and there evaluation.
1ADVS313_2	Determine the service oriented architecture. Identify the virtualization, Virtualization flexibility in disaster recovery.
1ADVS313_3	Examine the architecture of compute and storage cloud, service and delivery models.
1ADVS313_4	Analyze the concepts of inter cloud, Identify the cloud Security challenges.
1ADVS313_5	Apply the Hadoop and Map Reduce, identify the levels of federation, services, future of federation
1ADVS313_6	Evaluate Virtualization System in Cloud security.

Course Contents

Unit No.	Unit Name	Hours
Unit 1	Introduction Introduction to Cloud Computing, Evolution of Cloud Computing, Flynn taxonomy, Characteristics of Cloud Computing , Advantages and Disadvantages and Application of Cloud Computing	04 Hrs.
Unit 2	Cloud Enabling Technologies Service Oriented Architecture ,Web Services ,Basics of Virtualization ,Types of Virtualization, Implementation Levels of Virtualization, Virtualization of CPU – Memory – I/O Devices ,Virtualization Support and Disaster Recovery.	05 Hrs.
Unit 3	Cloud Architecture, Services and Storage Layered Cloud Architecture Design, NIST Cloud Computing Reference Architecture, Cloud Deployment Models, Cloud Service Models, Cloud Storage, Cloud Storage Providers.	04 Hrs.


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Unit- 4	Resource Management and Security in Cloud Inter Cloud Resource Management , Resource Provisioning and Resource Provisioning Methods ,Global Exchange of Cloud Resources , Federation in the Cloud, Security Overview and its Challenges , Security Standards	06 Hrs.
Unit- 5	Cloud Technologies and Advancements Hadoop-HDFS, MapReduce, Overview of Virtual Box, Google App Engine- Overview, architecture, OpenStack, Federation in the Cloud-Overview, types of federation in cloud	04 Hrs.
Unit-6	Cloud Security Virtualization System Specific Attacks: Guest hopping, VM migration attack, hyper jacking, Data Security and Storage, Identity and Access Management (IAM) - IAM Architecture and Practice, IAM Challenges.	03 Hrs

Experiment List:

Expt. No.	Title of Experiment
1	Introduction to cloud computing.
2	Install Virtual box /VMware Workstation with different flavors of Linux or windows OS on top of windows7 or 8.
3	Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
4	Install Google App Engine. Create hello world app and other simple web applications using python/java.
5	Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6	Find a procedure to transfer the files from virtual machine to Host machine
7	Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8	Install Hadoop single node cluster and run simple applications like word count.
9	Case Study: PAAS(Facebook, Google App Engine)
10	Case Study: Student can undertake any one case study on public or private cloud


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Text Books:					
Sr. No.	Title	Author	Publisher	Edition	Year of Edition
1	Cloud Computing	Dr.Anup W. Ingle, Kalpana A. Kumbhar, Dr.Aparna B. Barbadekar,Nitin N. Sakhare	Nirali Publication	1 st	2022
2	Cloud Computing: Implementation, Management and Security	John W James F. Ransome	CRC Press	3 rd	2017

Reference Books:					
Sr. No	Title	Author	Publisher	Editi on	Year of Edition
1	Mastering Cloud Computing	Buyya, Vecchiol a and Selvi	McGraw Hill Education	2 nd	2017
2	Cloud Computing: A Practical Approach", McGraw Hill Education	Toy Velte, Antony Velte	Tata Mcgraw Hill	2 nd	2009


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADPC314 Deep Learning
Prerequisite/s	1ADPC303
Teaching Scheme: Lecture/Tutorial/Practical	3/0/2
Credits	03
Evaluation Scheme Theory: ISE/ MSE /ESE	40/30/30
Evaluation Scheme Practical: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPC314_1	Describe the fundamentals of neural networks
1ADPC314_2	Apply feed forward networks with back propagation
1ADPC314_3	Analyze the correct parameters and hyper-parameters of developed model for getting improved performance
1ADPC314_4	Develop different deep learning models for given tasks
1ADPC314_5	Build real-world applications using deep learning mechanisms and demonstrate effectively with verbal and written skills

Course Contents

Unit No.	Unit Name	Hours
Unit 1	Introduction to neural networks - Neural Networks Basics - Functions in Neural networks – Activation function, Loss function - Function approximation - Classification and Clustering problems - Deep networks basics - Shallow neural networks – Activation Functions – Gradient Descent – Back Propagation	6 Hrs
Unit 2	Deep Neural Networks(DNNs) Introduction to Neural Networks :The Biological Neuron, The Perceptron, Multilayer Feed-Forward Networks , Training Neural Networks :Backpropagation and Forward propagation Activation Functions :Linear ,Sigmoid, Tanh, Hard Tanh, Softmax, Rectified Linear, Loss Functions :Loss Function Notation , Loss Functions for Regression , Loss Functions for Classification, Loss Functions for Reconstruction, Hyperparameters: Learning Rate, Regularization, Momentum, Sparsity.	7 Hrs
Unit 3	Convolution Neural Network(CNN) Introduction, CNN architecture overview, The Basic Structure of a Convolutional Network- Padding, Strides, Typical Settings, the ReLU layer, Pooling, Fully Connected Layers, The Interleaving between Layers, Local	7 Hrs


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	Response Normalization, Training a Convolutional Network	
Unit 4	Recurrent networks- Recurrent Neural Networks - Bidirectional RNNs, Encoder, Decoder, Sequence-to-Sequence Architectures, Deep Recurrent Networks, Auto encoders - Bidirectional Encoder Representations from Transformers (BERT).	6 Hrs
Unit 5	Deep Generative Models Introduction to deep generative model, Boltzmann Machine, Deep Belief Networks, Generative adversarial network (GAN), discriminator network, generator network, types of GAN, Applications of GAN networks	6 Hrs
Unit 6	Reinforcement Learning Introduction of deep reinforcement learning, Markov Decision Process, basic framework of reinforcement learning, challenges of reinforcement learning, Dynamic programming algorithms for reinforcement learning, Q Learning and Deep Q-Networks, Deep Q recurrent networks, Simple reinforcement learning for Tic-Tac-Toe.	7 Hrs

Experiment List:

List of Experiments	
Expt. No.	Title of Experiment
1	Designing and developing model for Autoencoder for Dimensionality reduction
2	Implement character and Digit Recognition using ANN.
3	Implement the analysis of X-ray image using autoencoders
4	Implement Speech Recognition using NLP ,For Home automation
5	Develop a code to design object detection and classification for traffic analysis using CNN
6	Designing and developing model for Text generation using LSTM
7	Implement image augmentation using deep RBM.
8	Designing and developing model for Autoencoder for classification
9	Micro Project: Number plate recognition of traffic video analysis.


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Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Deep Learning	Goodfellow, I., Bengio, Y. Courville	MIT Press	2 nd	2016
2.	Neural Networks and deep learning	Charu C. Aggarwal	Springer International Publishing	1 st	2018

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Fundamentals of Deep Learning	Nikhil Buduma	O'Reilly	1 st	2017
2.	Deep Learning: A Practitioner's Approach	Josh Patterson & Adam Gibson	O'Reilly (Greyscale Indian Edition)	1 st	2016
3.	Deep Learning with Python	Francois chollet	Manning	1 st	2017


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADPE315 Professional Elective III: Game Theory in AI
Prerequisite/s	1ADPC204
Teaching Scheme: Lecture/Tutorial /Practical	3/0/0
Credits	03
Evaluation Scheme: ISE / MSE /ESE	40/30/30


Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPE315_1	Understand the basics of Game theory to provide insights.
1ADPE315_2	Apply the basic concepts for Games with Perfect & Imperfect Information
1ADPE315_3	Analyze the various Platform and Games application
1ADPE315_4	Analyze the concept of Games, Machine Design and Solutions appropriation tools
1ADPE315_5	Evaluating the Theoretical Knowledge of Non-Cooperative Game Theory

Course Contents

Unit No.	Unit Name	Hours
Unit 1	Introduction Introduction Making rational choices: basics of Games strategy preferences payoffs Mathematical basics Game theory Rational Choice Basic solution concepts-non-cooperative versus cooperative games Basic computational issues finding equilibrium and learning in games- Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets)	07 Hrs.
Unit 2	Games with Impact Information Games with perfect Information- Bayesian Games Motivational Examples- General Definitions- Information aspects Illustrations- Extensive Games with Imperfect Information Strategies- Nash Equilibrium Repeated Games- the Prisoner's Dilemma Bargaining- Games with Perfect Information — Strategicgames — prisoner's dilemma, matching pennies - Nash equilibria —mixed strategy equilibrium — zero-sum games	06 Hrs.
Unit 3	Games With Imperfect Information Games with Imperfect Information- Bayesian Games -Motivational Examples- General Definitions - Information aspects - Illustrations - Extensive Games with Imperfect - Information - Strategies -Nash Equilibrium -Repeated Games -The Prisoner's Dilemma- Bargaining.	07 Hrs.


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Unit 4	Mechanism Design Aggregating Preferences Social Choice Formal Model -Voting Existence of social functions –Ranking systems Protocols for Strategic Agents: Mechanism Design Mechanism design with unrestricted preference.	06 Hrs.
Unit 5	Non-Cooperative Game Theory Self-interested agents - Games in normal Form-Analyzing games: from optimality to equilibrium - Computing Solution Concepts of Normal - Form Games- Computing Nash equilibria of two-player, zero-sum games -Computing Nash equilibria of two players, general- sum games - Identifying dominated strategies	07 Hrs.
Unit 6	AI Game Playing and CSP Game theory – optimal decisions in games – alpha-beta search – monte-carlo tree search – stochastic games – partially observable games. Constraint satisfaction problems – constraint propagation – backtracking search for CSP – local search for CSP – structure of CSP	06 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	An Introduction to Game Theory.	M. J. Osborne,	Oxford University Press,	1 st	2012
2	Game Theory	M. Machler, E. Solan, S. Zamir,	Cambridge University Press	-	2013

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Game Theory in Wireless And Communication	Zhu Han, DusitNiyato,	Cambridge University	-	2012
2	Algorithmic Game Theory	N. Nisan, T. Roughgarden, E. Tardos, and V. V. Vazirani,	Cambridge University Press	-	2017


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADPE316 Professional Elective III: Intelligent Precision Agriculture
Prerequisite/s	1ADPE308
Teaching Scheme: Lecture / Tutorial / Practical	3/0/0
Credits	3
Evaluation Scheme: ISE /MSE/ESE	40/30/30

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPE316_1	Understand the applications of AI in agriculture
1ADPE316_2	Implement AI tools, Sensors, and GPS in agriculture
1ADPE316_3	Customize a greenhouse as per the crop and weather conditions
1ADPE316_4	Analyze weather models, their inputs, and applications
1ADPE316_5	Select innovative processes, products, and technologies to meet the challenges in agriculture and farming practices

Course Contents:

Unit No.	Unit Name	Hours
Unit 1	Introduction to Precision Agriculture History of Mechanized Agriculture - Farming Operations and Related Machines - Tillage, Planting Cultivation, and Harvesting, Agricultural Automation, Monitoring the crop from plantation to harvesting	07 Hrs.
Unit 2	Precision Agriculture with sensors and GPS Sensors – types and agricultural applications, Global Positioning System (GPS) - GPS for civilian use, GIS and mapping software, Yield mapping systems, Crop production modeling, Indian Geo Systems, VRT technique for fertilizer recommendation, Agriculture survey by GPS and DGPS	07 Hrs.
Unit 3	Weather Prediction Model Importance of climate variability and seasonal forecasting, Understanding and predicting world's climate system, Global climatic models and their potential for seasonal climate forecasting, General systems approach to applying seasonal climate forecasts.	06 Hrs.
Unit 4	Environment Control System Artificial light systems, management of crop growth in greenhouses, simulation of CO ₂ consumption in greenhouses, online measurement of plant growth in the greenhouse, models of plant production	07 Hrs.


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Unit 5	AI Tools and Techniques Expert systems like IS, Crop Doctor(CD), Edge Computing Drone technology using AI for agriculture, Image Processing, e-commerce , e-governance, Artificial intelligence, and decision support systems, Multispectral remote sensing for soil mapping.	06 Hrs
Unit 6	Agriculture System Management and Public Policies Agricultural systems – managerial overview, Reliability of agricultural systems, Simulation of crop growth and field operations, Research & Development, Need for improved measurement methods, New approaches to research in agriculture	06 Hrs

Text Books:					
Sr .No	Title	Author	Publisher	Edition	Year of Edition
1	Precision Agriculture Technology for Crop Farming	Qin Zhang	1st Edition, Kindle Edition	1st	2006
2	A Textbook on Precision Agriculture Technology	Kishore Chandra Swain	New Delhi Publishers Paperback – 1 January 2020	1 st	2021

Reference Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Agricultural Systems Management	Peart R.M., and Shoup W. D.	Marce Dekker, New York	-	2004
2	Precision Agriculture in the 21st Century	National Research Council	National Academies Press, Canada	-	1997
3	Applications of Seasonal Climate	Hammer, G.L., Nicholls, N., and Mitchell, C.,	Springer, Germany	-	2000


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADPE317- Professional Elective - III : Artificial Intelligence in Robotics
Prerequisite/s	1ADPC204
Teaching Scheme: Lecture/Tutorial	3/0/0
Credits	03
Evaluation Scheme: ISE / MSE /ESE	40/30/30

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPE317_1	Understand the concept of Artificial Intelligence and methods of solving problems using Artificial Intelligence
1ADPE317_2	Summarize applications of AI in Robotics
1ADPE317_3	Apply appropriate AI methods to solve assembly problem
1ADPE317_4	Implement basic AI algorithms for Speech recognition and making decisions
1ADPE317_5	Identify appropriate AI planning methods to solve a given problem
1ADPE317_6	Develop learning algorithms for autonomous driving tasks

Course Contents:

Unit No.	Unit Name	Hours
Unit 1	Introduction Types of Robot, Technology: Robot classifications and specifications, controls, operations, Sensors : work cell ,Programming languages. History, state of the art, Need for AI in Robotics. Thinking and acting humanly, intelligent agents, and structure of agents.	07 Hrs.
Unit 2	Problem-Solving Solving problems by searching: Informed search and exploration, Constraint satisfaction problems, Adversarial search, knowledge and reasoning: knowledge representation, first order logic.	07 Hrs.
Unit 3	Planning Planning with forward and backward State space search: Partial order planning, Planning graphs, Planning with propositional logic, Planning and acting in real world.	06 Hrs.
Unit 4	Reasoning Uncertainty : Probabilistic reasoning, Filtering and prediction, Hidden Markov models: Kalman filters, Dynamic Bayesian Networks, Speech recognition, making decisions.	06 Hrs.


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Unit 5	Learning Forms of learning : Knowledge in learning , Statistical learning methods, reinforcement learning, communication, perceiving and acting, Probabilistic language processing, perception. Usage of learning algorithms in autonomous driving tasks	07 Hrs.
Unit 6	AI in Robotics Robotic perception, localization, mapping: configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.	06 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Artificial Intelligence: A modern approach	Stuart Russel	Pearson Education	3 rd	2009
2	Artificial Intelligence: A guide to Intelligent Systems	Negnevitsky , M,	Harlow: Addison-Wesley,	3 rd	2011

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Artificial Intelligence: Foundations of Computational Agents	David L. Poole and Alan K. Mack worth	Cambridge University Press	3 rd	2023
2	Artificial Intelligence: A Systems Approach	Tim Jones M,	Jones & Bartlett Learning.	1 st	2009
3	A first course in Artificial Intelligence	Deepak Khemani	McGraw Hill, India	6 th	2018


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADPE318- Advanced Databases
Prerequisite/s	1ADPC210
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits	03
Evaluation Scheme: ISE / MSE /ESE	40/30/30

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADPE318_1	Understand the key techniques and theory for SQL Queries
1ADPE318_2	Understand the basics of using Database and Engineering Basics
1ADPE318_3	Apply the Theoretical Knowledge of Data Science and SQL
1ADPE318_4	Apply the Data Interconnectivity between SQL and Python
1ADPE318_5	Analysis the various Platform and analyses the Python basics

Course Contents:

Unit No.	Unit Name	Hours
Unit 1	Distributed Databases Distributed Systems – Introduction – Architecture – Distributed Database Concepts – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing.	07 Hrs.
Unit 2	Spatial and Temporal Databases Active Databases Model – Design and Implementation Issues – Temporal Databases - Temporal Querying - Spatial Databases: Spatial Data Types, Spatial Operators and Queries – Spatial Indexing and Mining – Applications – Mobile Databases: Location and Handoff Management, Mobile Transaction Models – Deductive Databases - Multimedia Databases.	07 Hrs.
Unit 3	Nosql Databases NoSQL – CAP Theorem – Sharding - Document based – MongoDB Operation: Insert, Update, Delete, Query, Indexing, Application, Replication, Sharding–Cassandra: Data Model, Key Space, Table Operations, CRUD Operations, CQL Types – HIVE: Data types, Database Operations, Partitioning – HiveQL – Orient DB Graph database – Orient DB Features	06 Hrs.


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Unit 4	XML Databases Structured, Semi structured, and Unstructured Data – XML Hierarchical Data Model – XML Documents – Document Type Definition – XML Schema – XML Documents and Databases – XML Querying – XPath – XQuery	06 Hrs.
Unit 5	IR / WEB Databases IR concepts – Retrieval Models – Queries in IR system – Text Preprocessing – Inverted Indexing – Evaluation Measures – Web Search and Analytics – Current trends, WebDB.	06 Hrs.
Unit 6	SQLITE with Python Uses of SQLite-Insert Data-Types of Clauses (ORDER BY, LIMIT, JOIN, INSERT, WHERE)-Virtual machine-Code Generator-B-Tree, Page cache- Parser-Tokenizer.	07 Hrs.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Database Systems	Thomas M. Connolly, Carolyn E. Begg,	Pearson Education	6 th	2015.
2	Fundamentals of Database Systems,	Rich and Knight	The McGraw Hill	3 rd	2017

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Database Modeling And Design - Logical Design	Toby Teorey, Sam Lightstone, Tom Nadeau, H. V. Jagadish,	Morgan Kaufmann Publishers	5th	2011


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Course Details:

Class	B. Tech., Sem. VII
Course Code and Course Title	1ADAI319 Minor Course-2 Information Retrieval
Prerequisite/s	1ADVS206
Teaching Scheme: Lecture/Tutorial/Practical	3/0/0
Credits	03
Evaluation Scheme: ISE / MSE / ESE	40/30/30

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADAI319 _1	Understand the concept of Information retrieval and to apply clustering in information retrieval.
1ADAI319 _2	Use an indexing approach for retrieval of text and multimedia data.
1ADAI319 _3	Use appropriate tools in analyzing the web information.
1ADAI319 _4	Apply the concepts of multimedia and distributed information retrieval.
1ADAI319 _5	Evaluate performance of information retrieval systems.

Course Contents:

Unit No.	Unit Name	Hours
Unit 1	Introduction to Information Retrieval Basic Concepts of IR, Data Retrieval & Information Retrieval, Text mining and IR relation, IR system block diagram, Automatic Text Analysis: Luhn's ideas, Conflation Algorithm, Indexing and Index Term Weighting, Probabilistic Indexing, Automatic Classification. Measures of Association, Different Matching Coefficients, Cluster Hypothesis, Clustering Techniques: Rocchio's Algorithm, Single pass algorithm, Single Link algorithm.	07 Hrs
Unit 2	Indexing and Searching Techniques Indexing: Inverted file, Suffix trees & suffix arrays, Signature Files, Scatter storage or hash addressing. Searching Techniques: Boolean Search, sequential search, Serial search, cluster-based retrieval, Query languages, Types of queries, Patterns matching, structural queries	07 Hrs
Unit 3	Evaluation and Visualization of Information Retrieval System Performance evaluation: Precision and recall, MRR, F-Score, NDCG, user-oriented measures. . IR Models: Basic concepts, Boolean Model, Vector Model, Probabilistic Model.	06 Hrs


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Unit 4	Visualization in Information System: Starting points, Query Specification, document context, User relevance judgment, Interface support for search process.	06 Hrs
Unit 5	Distributed and Multimedia IR Distributed IR: Introduction, Collection Partitioning, Source Selection, Query Processing, And Multimedia IR: Introduction, Data Modeling, Query Language, Background-Spatial Access Method, A Generic Multimedia Indexing Approach, One Dimensional Time Series, Two-Dimensional color Images, Automatic Feature Extraction, Trends and Research Issue.	06 Hrs
Unit 6	Advanced Information Retrieval XML Retrieval: Basic XML concepts, Challenges in XML retrieval, Vector space model for XML retrieval, Evaluation of XML retrieval, Text-Centric vs. Data-Centric XML retrieval. Recommendation system: Collaborative Filtering and Content Based Recommendation of Documents and Products. Introduction to Semantic Web.	07 Hrs

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Modern Information Retrieval	Ricardo Baeza-Yates, Berthier Riberio-Neto	Springer	2 nd	2010
2.	Recommender Systems Handbook	Ricci F, Rokach L, Shapira B, Kantor P	Springer	1 st	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1.	Information retrieval	C. J. van RIJSBERGEN	C. J. van RIJSBERGEN	2 nd	2012
2.	Advances in XML Information Retrieval and Evaluation	Norbert Fuhr, MouniaLalmas, Saadia Malik, Gabriella Kazai	Springer New York	1 st	2005


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADEL320 Mini Project
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	0/0/4
Credits	2
Evaluation Scheme: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADEL320_1	Identify specific problem from selected domain.
1ADEL320_2	Analyze the hardware and/or software requirements of the proposed work.
1ADEL320_3	Identify and use relevant tools and technologies for documentation, designing, coding, testing and debugging software / hardware pertaining to their mini project.
1ADEL320_4	Design a software system, components, or process to meet desired needs.
1ADEL320_5	Appraise the result obtained during mini project work
1ADEL320_6	Develop summarizing, writing, documentation, and presentation skills to showcase their project work leading to effective communication.

Course Contents:

Platforms: Free and open source software

1	Three students (Maximum) in a group shall carry out a mini project. A batch of practical / shall be divided into mini project groups.
2	Mini project topics and the work for these groups in the batch shall be guided by a teacher for the batch, preferably on one of the topics which is selected by a students in his / her domain.
3	Alternatively, a group may select another topic of relevance in consultation with senior students and teachers.
4	A group shall undertake IBM TGMC (The Great Mind Challenge) projects, past Smart India Hackathon, KPIT Sparkle topic Or the topic related to courses the student have studied / studying.
5	The teacher shall periodically assess the performance of individual student in the mini project jointly with a teacher of another batch. This assessment will be used for determining ISE marks of the mini project.
6	Project group shall submit hardcopy of project report along with related code and documentation in soft form at the end of semester.


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Course Details:

Class	TY B. Tech., Sem. VI
Course Code and Course Title	1ADCC321 Aptitude and Reasoning Part-IV
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	0/0/2
Credits	01
Evaluation Scheme: ISE	50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1ADCC321 _ 1	Solve problem based on basic and advance probability, Permutation and Combination
1ADCC321 _ 2	Solve problem based on Syllogism, graphs, data interpretations, Arithmetic, Calendar
1ADCC321 _ 3	Solve problem based on gaming round
1ADCC321 _ 4	Demonstrate Verbal skills and Interview Skills

Course Contents:

Unit No.	Unit Name	Hours
Unit 1	Advance Probability: Advance Permutation Combination	4 Hrs
Unit 2	Statement Assumption, Syllogism	4 Hrs
Unit 3	Mixed Bar Graph, Pie Chart Data Interpretation(Avg & Ratio Proportion based)	4 Hrs
Unit 4	Gaming Round OR Capgemini Part 1 Gaming Round OR Capgemini Part 2	4 Hrs
Unit 5	Company Specific Revision for Arithmetic (S.T.D., Time RateWork) Revision of Calendar Reminder theorem Power Cycle	4 Hrs
Unit 6	Verbal Ability Revision Part 1 Verbal Ability Revision Part 2 Interview Etiquettes & Grooming	4 Hrs

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Quantitative Aptitude for Competitive Examinations	R.S. Agarwal	S Chand		2022
02	Verbal and Non-verbal Reasoning	R.S. Agarwal	S Chand		2010
03	Verbal, Grammar	P.C.Wren	S Chand		2017


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