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						GRAND TOTAL
						ISE		MSE + ESE					ISE		ESE				
		L	T	P	Credits	Max	Min	MSE	ESE	Min	Total	Min	Max	Min	Max	Min	Total	Min	
1ADPC201	Discrete Mathematics and Theory of Computation	3	1	-	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100
1ADPC202	Data Structures	3	-	2	4	40	16	30	30	24	100	40	50	20	50	20	100	40	200
1ADPC203	Operating Systems	3	-	2	4	40	16	30	30	24	100	40	50	20	-	-	50	20	150
1ADPC204	Foundations of Artificial Intelligence	3	-	2	4	40	16	30	30	24	100	40	50	20	-	-	50	20	150
1ADHS205	Psychology	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50
1ADHS207	Constitution of India	1	-	-	1	25	10	-	-	-	25	10	-	-	-	-	-	-	25
1ADVS206	Python for Data Science	2	-	2	3	-	-	-	-	-	-	-	50	20	50	20	100	40	100
1ADCC208	Aptitude and Reasoning Part - I	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
		17	1	10	23														825
	Total Contact Hours	28																	

Head of Department

Dean Academics

Director

Executive Director

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, normalforms	06Hrs.

Head of Department   Dean academic   Director   Executive Director

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**	**Yearof 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	4th	2013
3	Introduction to languages & theory of computations (Unit 4,5,6)	John C. Martin	Tata McGraw Hill Edition	3rd	2007
4	Introduction to Automata Theory, Languages and computation	John E. Hopcraft, Rajeev Motwani,Jeffrey D. Ullman	Pearson Edition	3rd	2006

Head of Department   Dean academic   Director   Executive Director

Reference Books:

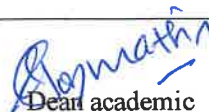| Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Discrete Mathematics and its Applications	Kenneth H. Rosen (AT&T Bell Labs) (mhhe.com/rosen)	Tata Mc Graw Hill	7th	2012
2	Discrete Mathematics, Schaum'soutlines.	SemyourLipschutz, MarcLipson	Tata Mc Graw Hill	3th	2012
3	Introduction to theory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

Head of Department   Dean academic   Director   Executive Director

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

Head of Department   Dean academic   Director   Executive Director

ADCET

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

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	2nd	2004
2	Data Structures with C Schaum's Outlines Series	S. Lipschutz	Tata McGraw-Hill	-	2017
3	Data Structure using C	Reema Thareja	Oxford	2nd	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	YashavantKanetkar	BPB Publication	1st	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	15th	2016

Head of Department   Dean academic   Director   Executive Director

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.

Head of Department   Dean academic   Director   Executive Director

	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 Dhamdhere	Tata McGraw Hill	2	2006
03	Operating Systems - A Concept Based approach	Dhananjay M Dhamdhere	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)	1st	2006
06	A practical Guide to Linux commands, Editors and shell programming	Mark G. Sobell	Pearson Education India	3rd	2013
07	Operating Systems concepts and design	Milan Milenkovic	TMGH	2nd	2001

Head of Department   Dean academic   Director   Executive Director

Reference Books:

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

Head of Department   Dean academic   Director   Executive Director

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.

Head of Department   Dean academic   Director   Executive Director

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

Head of Department   Dean academic   Director   Executive Director

nDCET

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

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

Head of Department   Dean academic   Director   Executive Director

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

Head of Department   Dean academic   Director   Executive Director

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

Head of Department   Dean academic   Director   Executive Director

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

Head of Department   Dean academic   Director   Executive Director

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.

Head of Department   Dean academic   Director   Executive Director

12	Micro Project / Case Study

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	4th	2009

Head of Department   Dean academic   Director   Executive Director

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, importantacts and history related toIndian
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, 42ndConstitutional 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, Loksabha - Structure, Rajyasabha – Structure, Governor of State, Chief Minister and Council of Ministers in a state.	02Hrs

Head of Department   Dean academic   Director   Executive Director

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

Head of Department   Dean academic   Director   Executive Director

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

Head of Department   Dean/academic   Director   Executive Director