

Department of Artificial Intelligence and Data Science

B.Tech. – II Year I Semester

S.No.	Category	Code	Title	L	T	P	Credits
1	BS	23AHS32T	Discrete Mathematics	3	0	0	3
2	HSSM	23AHS35T	Universal Human Values - Understanding Harmony & Ethical Human Conduct	2	1	0	3
3	ES	23A3031T	Database Management Systems	3	0	0	3
4	PC	23A0532T	Advanced Data Structures & Algorithms Analysis	3	0	0	3
5	PC	23A0533T	Object-Oriented Programming Through Java	3	0	0	3
6	PC	23A0532L	Advanced Data Structures & Algorithms Analysis Lab	0	0	3	1.5
7	PC	23A0533L	Object-Oriented Programming Through Java Lab	0	0	3	1.5
8	SEC	23A0534L	The Joy of Computing Using Python	0	1	2	2
9	MC	23AHS39T	Environmental Science	2	0	0	-
Total				15	2	10	20

B.Tech.– II Year II Semester

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Discrete Mathematics
Category:	BS
Course Code:	23AHS32T
Branch/es:	CSE, CSE(DS), CSE(AI), AI&DS and AI&ML
Semester:	II B Tech I Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
1. Formulate and analyze compound propositions using truth tables and logical equivalences. 2. Integrate knowledge from sets, functions, and algebraic structures to solve engineering problems 3. To study applications of combinatorial methods in cryptography, coding theory, and algorithm design. 4. Familiarize closed form solution of linear recurrence relations by various methods. 5. Bring awareness of basic concepts of graphs, trees and its applications.

Course Outcomes:
At the end of the course, the student will be able to
1. Describe the logical connectives in inference theory
2. Explain relations, functions and algebraic structures in computer science and engineering
3. Describe combinatorial mathematics in various fields, such as computer science, cryptography, and optimization.
4. Solve the various types of recurrence relations in engineering
5. Apply graph theory concepts in network analysis

Unit 1	Mathematical Logic	
Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.		

Unit 2	Set theory	
The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.		

Unit 3	Elementary Combinatorics	
Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.		

Unit 4	Recurrence Relations	
Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous, Recurrence Relations.		

Unit 5	Graphs	
Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs.		

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Prescribed Textbooks:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002.
2. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.

Reference Books:

1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PS01	PS02	PS03
23AHS32T.1	2	2	1	1	-	-	-	-	-	-	-	1	-	-	-
23AHS32T.2	2	2	1	1	-	-	-	-	-	-	-	1	-	-	-
23AHS32T.3	2	2	1	1	-	-	-	-	-	-	-	1	-	-	-
23AHS32T.4	3	2	1	2	-	-	-	-	-	-	-	1	-	-	-
23AHS32T.5	3	2	1	2	-	-	-	-	-	-	-	1	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Universal Human Values - Understanding Harmony and Ethical Human Conduct
Category:	HSSM
Couse Code:	23AHS35T
Branch/es:	CSE, CSE-AI, CSE-DS, AIDS, AIML
Semester:	II B Tech I Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	1	0	3

Course Objectives:

- 1.To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity.
- 2.To facilitate the development of a holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the human reality and the rest of existence ultimately towards value-based living in a natural way.
- 3.To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with nature.

Course Outcomes:

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

1. Comprehend the terms like Natural Acceptance, Happiness and Prosperity
2. Analyze one's self, and one's surroundings (family, society, nature)
3. Apply human values in enriching human relationships and human society.
4. Analyze the need for universal human values and harmonious existence.
5. Evaluate themselves as socially and ecologically responsible engineers.

Unit 1	Introduction to Value Education	9
Lecture1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Lecture2: Understanding Value Education Tutorial 1: Practice Session1: Sharing about Oneself Lecture 3: Self-Exploration as the Process for Value Education Lecture4: Continuous Happiness and Prosperity – The Basic Human Aspirations Tutorial 2: Practice Session2: Exploring Human Consciousness Lecture 5: Happiness and Prosperity – Current Scenario Lecture 6: Method to Fulfill the Basic Human Aspirations Tutorial 3: Practice Session3: Exploring Natural Acceptance		

Unit 2	Harmony in the Human Being	9
Lecture 7: Understanding Human being as the Co-existence of the self and the body. Lecture 8: Distinguishing between the needs of the self and the body Tutorial 4: Practice Session4: Exploring the difference of needs of self and body. Lecture 9: The body as an instrument of the self Lecture 10: Understanding harmony in the self Tutorial 5: Practice Session5: Exploring sources of imagination in the self Lecture 11: Harmony of the self with the body Lecture 12: Programme to ensure self-regulation and health Tutorial 6: Practice Session 6: Exploring harmony of self with the body		

Unit 3	Harmony in the Family and Society	9
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Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session7: Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session 8: Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session9: Exploring systems to fulfil human goal

Unit 4	Harmony in the Nature/Existence	6
Lecture 19: Understanding Harmony in the Nature Lecture 20: Interconnectedness, Self-Regulation and Mutual Fulfilment among the Four Orders of Nature Tutorial 10: Practice Session 10: Exploring the Four Orders of Nature Lecture 21: Realizing Existence as Co-existence at All Levels Lecture 22: The Holistic Perception of Harmony in Existence Tutorial 11: Practice Session11: Exploring Co-existence in Existence		

Unit 5	Implications of the Holistic Understanding – a Look at Professional Ethics	9
Lecture 23: Natural Acceptance of Human Values Lecture 24: Definitiveness of (Ethical) Human Conduct Tutorial 12: Practice Session 12: Exploring Ethical Human Conduct Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order Lecture 26: Competence in Professional Ethics Tutorial 13: Practice Session13: Exploring Humanistic Models in Education Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies Lecture 28: Strategies for Transition towards Value-based Life and Profession Tutorial 14: Practice Session14: Exploring Steps of Transition towards Universal Human Order		

Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the Difference of Needs of Self and Body
PS5 Exploring Sources of Imagination in the Self
PS6 Exploring Harmony of Self with the Body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

Prescribed Textbooks:

Textbook and Teachers Manual

1. The Textbook

R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

2. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria, Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A. Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

1. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

2. The Story of Stuff (Book).

3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

4. Small is Beautiful - E. F Schumacher.

5. Slow is Beautiful - Cecile Andrews

6. Economy of Permanence - J C Kumarappa

7. Bharat Mein Angreji Raj – Pandit Sunderlal

8. Rediscovering India - by Dharampal

9. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

10. India Wins Freedom - Maulana Abdul Kalam Azad

11. Vivekananda - Romain Rolland (English)

13. Gandhi - Romain Rolland (English)

Web Resources:

1. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201Introduction%20to%20Value%20Education.pdf>

2. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf>

3. <https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3S2%20Respect%20July%2023.pdf>

4. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf>

5. <https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%20325%20Ethics%20v1.pdf>

6. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-humanvalues/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

7. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf>

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CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PS01	PS02	PS03
23AHS35T.1	-	-	-	-	-	-	-	3	-	1	-	2	-	-	-
23AHS35T.2	-	-	-	-	-	-	-	3	-	1	-	2	-	-	-
23AHS35T.3	-	-	-	-	-	-	-	3	-	1	-	2	-	-	-
23AHS35T.4	-	-	-	-	-	-	2	3	-	1	-	2	-	-	-
23AHS35T.5	-	-	-	-	-	2	3	3	-	1	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Database Management Systems
Category:	ES
Couse Code:	23A3031T
Branch/es:	AI&DS
Semester:	II Year I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The main objectives of the course is to 1. Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra 2. Introduce the concepts of basic SQL as a universal Database language 3. Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization 4. Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques.

Course Outcomes: At the end of the course, the student will be able to 1. Understanding of database systems, including characteristics, user roles, advantages, data models, schema concepts, and entity-relationship modeling through ER diagrams. 2. Learn the relational model, covering domains, attributes, tuples, relations, null values, constraints (domain, key, integrity), relational algebra, relational calculus, and basic SQL operations on schemas and tables. 3. Master basic SQL querying, including WHERE clauses, arithmetic, logical operations, SQL functions, table creation with relationships, constraints, joins, views, and set operations. 4. Understand schema refinement through normalization, including functional dependency, normal forms (1NF, 2NF, 3NF, BCNF, 4NF, 5NF), surrogate keys, and multi-valued dependencies (MVD). 5. Grasp transaction management: ACID properties, concurrency control (locking, timestamping, optimistic), isolation levels, serializability, recovery methods, and indexing techniques (B+ trees, hash-based).

Unit 1	10
Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database. Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.	

Unit 2	8
Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their	

importance, Relational Algebra, Relational Calculus. BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

Unit 3		9
SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.		

Unit 4		8
Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).		

Unit 5		9
Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm. Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing		

Prescribed Textbooks:
1. Database Management Systems, 3 rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts, 5 th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

Reference Books:
1. Introduction to Database Systems, 8 th edition, C J Date, Pearson.
2. Database Management System, 6 th edition, RamezElmasri, Shamkant B. Navathe, Pearson.
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning

CO-PO Mapping:

[illegible]

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Advanced Data Structures & Algorithm Analysis
Category:	PC
Couse Code:	23A0532T
Branch/es:	CSE, CSE(DS), CSE(AI), AI&DS and AI&ML
Semester:	II B Tech I Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The main objectives of the course is to 1. Provide knowledge on advance data structures frequently used in Computer Science domain. 2. Develop skills in algorithm design techniques popularly used. 3. Understand the use of various data structures in the algorithm design.

Course Outcomes: At the end of the course, the student will be able to 1. Analyze the time and space complexity of algorithms and implement AVL and B-Trees for various operations. (L4) 2. Apply heap structures and graph algorithms for problem-solving and data representation. (L3) 3. Implement greedy and dynamic programming techniques to solve optimization problems effectively.(L4) 4. Utilize backtracking and branch-and-bound strategies to tackle combinatorial problems.(L5) 5. Understand NP-hard and NP-complete problems and apply relevant techniques for solving complex computational issues. (L4)

Unit 1	12
Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations. AVL Trees – Creation, Insertion, Deletion operations and Applications B-Trees – Creation, Insertion, Deletion operations and Applications.	

Unit 2	11
Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen’s matrix multiplication, Convex Hull.	

Unit 3	12
Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths – General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem.	

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Unit 4		11
Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem.		

Unit 5		10
NP Hard and NP Complete Problems: Basic Concepts, Cook's theorem, NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP), NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling		

Prescribed Textbooks:

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh 2nd Edition Universities Press.
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, SanguthevarRajasekaran 2nd Edition University Press.

Reference Books:

1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
4. Data Structures using C & C++: Langsam, Augenstein & Tanenbaum, Pearson, 1995
5. Algorithms + Data Structures & Programs:, N. Wirth, PHI
6. Fundamentals of Data Structures in C++: Horowitz Sahni & Mehta, Galgotia Pub.
7. Data structures in Java:, Thomas Standish, Pearson Education Asia

CO-PO Mapping:

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Object-Oriented Programming through JAVA
Category:	PC
Couse Code:	23A0533T
Branch/es:	CSE, CSE(DS), CSE(AI), AI&DS and AI&ML
Semester:	II B Tech I Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

The learning objectives of this course are to:

1. Identify Java language components and how they work together in applications
2. Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
3. Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
4. Understand how to design applications with threads in Java
5. Understand how to use Java APIs for program development

Course Outcomes:

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

1. Understand and implement basic concepts of Java programming, including data types, operators, and control statements. (L2)
2. Apply object-oriented programming principles by creating and using classes and methods effectively in Java. (L3)
3. Utilize arrays and inheritance in Java to design flexible data structures and implement polymorphism.(L4)
4. Demonstrate package creation, exception handling, and file I/O operations in Java applications. (L4)
5. Develop multi-threaded applications and implement Java Database Connectivity (JDBC) for data manipulation. (L5)

Unit 1	12
Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style. Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators. Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?., Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.	

Unit 2	10
Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this. Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.	

Unit 3	12
Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors. Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance. Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.	

Unit 4	11
Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class. Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions. Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)	

Unit 5	11
String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer. Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads. Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)	

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Prescribed Textbooks:

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

Reference Books:

1. The complete Reference Java, 11th edition, Herbert Schildt, TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PS01	PS02	PS03
23A0533T.1	3	3	2	2	2	-	-	-	-	1	-	2	3	3	-
23A0533T.2	3	3	3	3	3	-	-	-	-	1	-	2	3	3	2
23A0533T.3	3	3	3	3	3	-	-	-	2	1	-	2	3	3	3
23A0533T.4	3	3	3	3	3	-	-	-	2	1	-	2	3	3	3
23A0533T.5	3	3	3	3	3	2	-	-	2	1	2	2	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Advanced Data Structures & Algorithm Analysis Lab
Category:	PC
Course Code:	23A0532L
Branch/es:	CSE, CSE(DS), CSE(AI), AI&DS and AI&ML
Semester:	II Year I Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

The objectives of the course is to

1. acquire practical skills in constructing and managing Data structures
2. apply the popular algorithm design methods in problem-solving scenarios

Course Outcomes:

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

1. Analyze the time and space complexity of algorithms and implement AVL and B-Trees for various operations. (L4)
2. Apply heap structures and graph algorithms for problem-solving and data representation. (L3)
3. Implement greedy and dynamic programming techniques to solve optimization problems effectively.(L4)
4. Utilize backtracking and branch-and-bound strategies to tackle combinatorial problems.(L5)
5. Understand NP-hard and NP-complete problems and apply relevant techniques for solving complex computational issues. (L4)

Exercise:1	Operations on AVL trees	
Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.		

Exercise:2	B-Trees	3
Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.		

Exercise:3	Heap Trees	3
Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.		

Exercise:4	Graph Traversals	3
a. Implement BFT and DFT for given graph, when graph is represented by i) Adjacency Matrix ii) Adjacency Lists b. Write a program for finding the bi-connected components in a given graph.		

Exercise:5	Sorting techniques	3
Implement Quick sort and Merge sort and observe the execution time for various input sizes		

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(Average, Worst and Best cases).

Exercise:6	Greedy Algorithms	3
a. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists. b. Implement Job sequencing with deadlines using Greedy strategy.		

Exercise:7	Backtracking algorithms	3
a. Implement N-Queens Problem Using Backtracking. b. Use Backtracking strategy to solve 0/1 Knapsack problem.		

Exercise:8	Dynamic Programming	3
Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.		

Exercise:9	Travelling Salesperson problem	3
Implement Travelling Sales Person problem using Branch and Bound approach.		

Prescribed Textbooks:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, SahniSartaj, Mehta, Dinesh, 2ndEdition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, 2ndEdition, University Press

Reference Books:

1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill

CO-PO Mapping:

[illegible]

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Object-Oriented Programming through JAVA Lab
Category:	PC
Couse Code:	23A0533L
Branch/es:	CSE, CSE(DS), CSE(AI), AI&DS and AI&ML
Semester:	II B Tech I Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

The aim of this course is to

1. Practice object-oriented programming in the Java programming language
2. implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
3. Illustrate inheritance, Exception handling mechanism, JDBC connectivity
4. Construct Threads, Event Handling, implement packages, Java FX GUI

Course Outcomes:

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

1. Understand and apply Java's primitive data types, control structures, and basic I/O operations.(L2)
2. Implement algorithms using searching and sorting techniques in Java.(L3)
3. Utilize object-oriented programming concepts, including classes, methods, and inheritance in Java.(L4)
4. Demonstrate exception handling mechanisms and create user-defined exceptions in Java applications.(L4)
5. Develop multi-threaded applications and connect to databases using JDBC for data manipulation.(L5)

Exercise:1

- a) Write a JAVA program to display default value of all primitive data type of JAVA
- b) Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise:2

- a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- b) Write a JAVA program to sort for an element in a given list of elements using bubble sort
- c) Write a JAVA program using StringBuffer to delete, remove character.

Exercise:3

- a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.
- b) Write a JAVA program implements method overloading.
- c) Write a JAVA program to implement constructor.
- d) Write a JAVA program to implement constructor overloading.

Exercise:4

- a) Write a JAVA program to implement Single Inheritance
- b) Write a JAVA program to implement multi-level Inheritance
- c) Write a JAVA program for abstract class to find areas of different shapes

Exercise:5	
a) Write a JAVA program give example for “super” keyword. b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved? c) Write a JAVA program that implements Runtime polymorphism	

Exercise:6	
a) Write a JAVA program that describes exception handling mechanism b) Write a JAVA program Illustrating Multiple catch clauses c) Write a JAVA program for creation of Java Built-in Exceptions d) Write a JAVA program for creation of User Defined Exception	

Exercise:7	
a) Write a JAVA program that creates threads by extending Thread class. First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds, (Repeat the same by implementing Runnable) b) Write a program illustrating is Alive and join () c) Write a Program illustrating Daemon Threads. d) Write a JAVA program Producer Consumer Problem	

Exercise:8	
a) Write a JAVA program that import and use the user defined packages b) Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX) c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI	

Exercise:9	
a) Write a java program that connects to a database using JDBC b) Write a java program to connect to a database using JDBC and insert values into it. c) Write a java program to connect to a database using JDBC and delete values from it.	

Prescribed Textbooks:

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.

Reference Books:

1. The complete Reference Java, 11th edition, Herbert Schildt, TMH

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PS01	PS02	PS03
23A0533L.1	3	3	2	1	2	-	-	-	1	1	1	2	2	1	-
23A0533L.2	3	3	3	2	3	-	-	-	1	1	1	2	2	2	-
23A0533L.3	3	3	3	3	3	-	-	-	2	1	2	3	3	3	-
23A0533L.4	3	3	3	3	3	2	-	-	2	1	2	3	3	3	2
23A0533L.5	3	3	3	3	3	2	2	-	2	2	2	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	The Joy of Computing Using Python
Category:	SEC
Course Code:	23A0534L
Branch/es:	CSE, CSE(DS), CSE(AI), AI&DS and AI&ML
Semester:	II B Tech I Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	1	2	2

Course Objectives: The main objectives of the course are to 1. To learn basics of computational problem solving, python programming and basic control structures. 2. To understand python programming basic constructs like lists, dictionaries, sets and functions 3. To apply module design and usage of text files in python programming
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Course Outcomes: At the end of the course, the student will be able to 1. Understand computational problem solving and basic elements of python programming.(L2) 2. Construct python programming basic constructs like lists, tuple, dictionaries, and sets. (L3) 3. Implement string processing and exception handling in programming (L5) 4. Analyze string processing and exception handling in programming.(L4) 5. Reframe programs using class and object in python programming.(L5)
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Unit 1	Introduction to python programming language	
Introduction to python programming language, literals, variables and identifiers, operators, expressions and data types. Control Structures: Boolean expressions, selection control, and iterative control.		

Unit 2	Lists	
Lists: List structures, lists in python, iterating over lists in python, more on python lists. Dictionaries and sets, tuple.		

Unit 3	Functions	
Functions: Program routines, more on functions, Module Design: Modules, Top-Down design, python modules		

Unit 4	Text Files	
Text Files: Text File, Using Text files, string processing, exception handling		

Unit 5	Introduction to Object oriented programming	
Introduction to Object oriented programming: class, three fundamental features of object oriented programming, encapsulation-what is encapsulation, defining classes in python.		

Inheritance: subtypes, defining subclasses in python, Polymorphism: use of polymorphism.

Prescribed Textbooks:

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach.

Reference Books:

1. Python Programming using problem solving approach, ReemaThareja, Oxford University press
2. Python Programming: An Introduction to Computer Science, John Zelle, Franklin,Beedle & Associates Inc.,3rd Edition
3. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O'Reilly Publications.

Online Learning Resources/Virtual Labs:

1. <https://www.coursera.org/learn/python-for-applied-data-science-ai>
2. <https://www.coursera.org/learn/python?specialization=python#syllabus>

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PS01	PS02	PS03
23A0534L.1	3	3	3	3	2	-	-	-	-	-	-	2	2	2	-
23A0534L.2	3	3	3	3	2	-	-	-	-	-	-	2	2	2	-
23A0534L.3	2	2	3	3	2	-	-	-	-	-	-	-	2	2	-
23A0534L.4	2	3	3	3	2	-	-	-	-	-	-	-	2	2	-
23A0534L.5	2	2	3	3	2	-	-	-	-	-	-	2	2	2	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Environmental science
Category:	MC
Couse Code:	23AHS39T
Branch/es:	CE,ME,ECE, CSE (DS), AIDS
Semester:	II B Tech I Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	0	-

Course Objectives:

1. To make the students to get awareness on environment.
2. To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life.
3. To save earth from the inventions by the engineers.

Course Outcomes:

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

1. Explain how natural resources should be utilised with a focus on sustainability.
2. Describe the need to protect ecosystems and biodiversity for future generations.
3. Comprehend major pollution problems related to ecosystems.
4. Apply quantitative reasoning skills in the proper utilization of goods and services.
5. Explain the interconnectedness of human dependence on the earth's ecosystems.

Unit 1	Natural Resources	7
Multidisciplinary nature of environmental studies: Definition, Scope and Importance – Need for public awareness. Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and their effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, case studies – Energy resources.		

Unit 2	Ecosystems, Biodiversity and its conservation	7
Ecosystems: Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity and its conservation: Introduction - Definition: Genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.		

Unit 3	Environmental Pollution	6
Definition, causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.		

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Solid waste management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: Floods, earthquake, cyclone and landslides.

Unit 4	Social Issues and the Environment	5
From unsustainable to sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people: Its problems and concerns, case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act– Issues involved in enforcement of environmental legislation – Public awareness.		

Unit 5	Human Population and the Environment	5
Population growth, variation among nations, Population explosion – Family welfare programmes – Environment and human health – Human rights – Value education – HIV/AIDS – Women and child welfare – Role of information technology in environment and human health – Case studies. Field Work: Visit to a local area to document environmental assets – River/forest/grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural, Study of common plants, insects and birds –Study of simple ecosystems - river, hill slopes etc..		

Prescribed Text books:

1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson Education.
3. S. Azeem Unnisa, “Environmental Studies” Academic Publishing Company.
4. K. Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India) Pvt. Ltd.

Reference Books:

1. Deeksha Dave and E. Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M. Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.
3. J.P. Sharma, “Comprehensive Environmental Studies”, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice Hall of India Private Limited.
5. G.R. Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PS01	PS02	PS03
23AHS39T.1	2	2	-	-	-	-	3	-	-	-	-	2	-	-	-
23AHS39T.2	2	2	-	-	-	-	3	-	-	-	-	2	-	-	-
23AHS39T.3	2	2	-	-	-	-	3	-	-	-	-	2	-	-	-
23AHS39T.4	3	2	-	-	-	-	3	-	-	-	-	3	-	-	-
23AHS39T.5	2	2	-	-	-	-	3	-	-	-	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Managerial Economics and Financial Analysis
Category:	HSSM
Couse Code:	23AHS46T
Branch/es:	ME, CE, CSE(DS), AI&DS
Semester:	II B Tech II Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	0	2

Course Objectives:

1. To inculcate the basic knowledge of microeconomics and financial accounting
2. To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
3. To Know the Various types of market structure and pricing methods and strategy
4. To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
5. To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

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

1. Define the concepts related to Managerial Economics, financial accounting and management(L2)
2. Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
3. Apply the Concept of Production cost and revenues for effective Business decision (L3)
4. Analyze how to invest their capital and maximize returns (L4)
5. Evaluate the capital budgeting techniques. (L5)
6. Develop the accounting statements and evaluate the financial performance of business entity (L5)

Unit 1	Managerial Economics	12
Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.		

Unit 2	Production and Cost Analysis	8
Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).		

Unit 3	Business Organizations and Markets	8
Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies		

Unit 4	Capital Budgeting	10
Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting–		

Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

Unit 5	Financial Accounting and Analysis	10
Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.		

Prescribed Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja HI Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PS01	PS02	PS03
23AHS46T.1	2	-	-	-	2	-	2	-	2	-	-	-	-	2	2
23AHS46T.2	-	3	2	3	-	-	-	-	-	1	2	-	2	-	-
23AHS46T.3	2	-	2	-	2	-	2	2	-	1	3	2	-	2	2
23AHS46T.4	-	2	-	2	-	-	-	-	2	-	-	-	1	-	-
23AHS46T.5	2	2	-	2	-	-	2	-	-	-	-	1	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Statistical methods for Data science
Category:	BS
Course Code:	23AHS43T
Branch/es:	CSE(DS), AI&DS
Semester:	II B Tech II Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Gain knowledge and skills to analyze data, make decisions based on statistical evidence.
2. Introduce the Maximum Likelihood method as a powerful technique for estimating parameters.
3. Interpret the results of interval estimation for drawing conclusions about population parameters based on sample data.
4. Define the concept of uniformly most powerful tests and its significance in hypothesis testing.
5. Gain proficiency in selecting and applying appropriate small sample tests for different types of data.

Course Outcomes:

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

1. Apply probability theorems and probability distributions in real life problems.
2. Analyze the data and draw conclusions about collection of data under study using Point estimation.
3. Analyze data and draw conclusions about collection of data under study using Interval estimation.
4. Estimate population parameters and make inferences about them based on sample data.
5. Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real-life problems.

Unit 1	Basic Concepts	10
Introduction to probability, random variables (discrete and continuous), probability density functions, properties, mathematical expectation. Probability distributions: Binomial, Poisson and Normal-their properties. Population, sample, parameter and statistic; characteristics of a good estimator; Consistency – Invariance property of Consistent estimator, Sufficient condition for consistency; Unbiasedness; Sufficiency.		

Unit 2	Point Estimation	8
Point Estimation- Estimator, Estimate, Methods of point estimation – Maximum likelihood method (the asymptotic properties of ML estimators are not included), Large sample properties of ML estimator (without proof)- applications, Method of moments, method of least squares, method of minimum chi-square and modified minimum chi-square-Asymptotic Maximum Likelihood Estimation and applications.		

Unit 3	Interval Estimation	8
Confidence limits and confidence coefficient; Duality between acceptance region of a test and a confidence interval; Construction of confidence intervals for population proportion (small and large samples) and between two population proportions (large samples); Confidence intervals for mean and variance of a normal population; Difference between the mean and ratio of two normal populations.		

Unit 4	Testing of hypotheses	8
Types of errors, power of a test, most powerful tests; Neyman-Pearson Fundamental Lemma and its applications; Notion of Uniformly most powerful tests; Likelihood Ratio tests: Description and property of LR tests - Application to standard distributions.		

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Unit 5	Small sample tests	8
Student's t-test, test for a population mean, equality of two population means, paired t-test, F-test for equality of two population variances, Chi-square test for goodness of fit and test for independence of attributes, χ^2 test for testing variance of a normal distribution.		

Prescribed Textbooks:

1. Miller and Friends, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. Manoj Kumar Srivastava and Namita Srivastava, Statistical Inference – Testing of Hypotheses, Prentice Hall of India, 2014

Reference Books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
2. S. Ross, a First Course in Probability, Pearson Education India, 2002.
3. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
4. Robert V Hogg, Elliot A Tannis and Dale L. Zimmerman, Probability and Statistical Inference, 9th edition, Pearson publishers, 2013.

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2. https://onlinecourses.nptel.ac.in/noc22_mg31/preview

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PS01	PS02	PS03
23AHS43T.1	3	2	1	2	-	-	-	-	-	-	-	1	-	-	-
23AHS43T.2	3	3	2	2	-	-	-	-	-	-	-	1	-	-	-
23AHS43T.3	3	3	2	2	-	-	-	-	-	-	-	1	-	-	-
23AHS43T.4	3	3	2	3	-	-	-	-	-	-	-	1	-	-	-
23AHS43T.5	3	2	1	2	-	-	-	-	-	-	-	1	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Principles of Artificial Intelligence
Category:	PC
Couse Code:	23A3041T
Branch/es:	AI&DS
Semester:	II Year II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. The student should be made to study the concepts of Artificial Intelligence.
2. The student should be made to learn the methods of solving problems using Artificial Intelligence.
3. The student should be made to introduce the concepts of Expert Systems.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.
5. To learn different knowledge representation techniques

Course Outcomes:

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

1. Understand AI problems, the foundation and history of AI, and the functioning of intelligent agents in various environments
2. Understand and analyze various search strategies, heuristic methods, and algorithms for game playing and problem reduction.
3. Gain skills in knowledge representation, logic programming, and reasoning under uncertainty using various probabilistic and rule-based methods.
4. Understand and apply logic concepts, inference methods, and various learning techniques including decision trees and reinforcement learning.
5. Understand expert systems' architecture, roles, and typical examples like MYCIN and XCON, including knowledge acquisition and heuristics.

Unit 1		9
Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.		

Unit 2		10
Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.		

Unit 3		9
Representation of Knowledge: Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of		

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probability, Bayes' probabilistic interferences and Dempster-Shafer theory.

Unit 4		10
Logic concepts: First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.		

Unit 5		10
Expert Systems: Architecture of expert systems, Roles of expert systems – Knowledge Acquisition Meta knowledge Heuristics. Typical expert systems – MYCIN, DART, XCON: Expert systems shells.		

Prescribed Textbooks:

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education.
2. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill

Reference Books:

1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problemsolving", Fourth Edition, Pearson Education.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.
4. Artificial Intelligence, Saroj Kaushik, CENGAGE Learning.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
23A3041T.1	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
23A3041T.2	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
23A3041T.3	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
23A3041T.4	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
23A3041T.5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Introduction to Data Science
Category:	PC
Couse Code:	23A3042T
Branch/es:	AI&DS
Semester:	II Year II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

From the course the student will learn

1. Knowledge and expertise to become a data scientist.
2. Essential concepts of statistics and machine learning that are vital for data science;
3. Significance of exploratory data analysis (EDA) in data science.
4. Critically evaluate data visualizations presented on the dashboards
5. Suitability and limitations of tools and techniques related to data science process

Course Outcomes:

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

1. Understand the data science process and its components, including data cleansing and exploratory analysis. (L2)
2. Apply machine learning techniques for feature engineering and model selection using Python tools.(L3)
3. Analyze the NoSQL movement and the principles guiding NoSQL databases in handling big data.(L4)
4. Utilize graph databases and Python libraries for text mining and analytics in data science applications. (L3)
5. Develop data visualizations and interactive dashboards to present findings from data science projects.(L5)

Unit 1	9
Introduction to Data science, benefits and uses, facets of data, data science process in brief, big data ecosystem and data science Data Science process: Overview, defining goals and creating project charter, retrieving data, cleansing, integrating and transforming data, exploratory analysis, model building, presenting findings and building applications on top of them.	

Unit 2	10
Applications of machine learning in Data science, role of ML in DS, Python tools like sklearn, modelling process for feature engineering, model selection, validation and prediction, types of ML, semi-supervised learning Handling large data: problems and general techniques for handling large data, programming tips for dealing large data, case studies on DS projects for predicting malicious URLs, for building recommender systems.	

Unit 3	9
NoSQL movement for handling Bigdata: Distributing data storage and processing with Hadoop framework, case study on risk assessment for loan sanctioning, ACID principle of relational databases,	

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CAP theorem, base principle of NoSQL databases, types of NoSQL databases, case study on disease diagnosis and profiling.

Unit 4		9
Tools and Applications of Data Science: Introducing Neo4j for dealing with graph databases, graph query language Cypher , Applications graph databases, Python libraries like nltk and SQLite for handling Text mining and analytics, case study on classifying Reddit posts .		

Unit 5		10
Data Visualization and Prototype Application Development: Data Visualization options, Crossfilter, the JavaScript MapReduce library, Creating an interactive dashboard with dc.js, Dashboard development tools. Applying the Data Science process for real world problem solving scenarios as a detailed case study.		

Prescribed Textbooks:

1. Davy Cielen, Arno D.B.Meysman, and Mohamed Ali, “Introducing to Data Science using Python tools”, Manning Publications Co, Dreamtech press, 2016
2. Prateek Gupta, “Data Science with Jupyter” BPB publishers, 2019 for basics.

Reference Books:

8. Joel Grus, “Data Science From Scratch”, OReilly, 2019
9. Doing Data Science: Straight Talk From The Frontline, 1 st Edition, Cathy O’Neil and Rachel Schutt, O’Reilly, 2013

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
23A3042T.1	3	3	3	3	2	-	-	-	-	-	2	2	3	3	2
23A3042T.2	3	3	3	3	3	-	-	-	-	-	2	2	3	3	2
23A3042T.3	3	3	3	3	2	-	-	-	-	-	2	2	3	3	2
23A3042T.4	3	3	3	3	2	-	-	-	-	-	2	2	3	3	2
23A3042T.5	3	3	3	3	2	2	-	-	-	-	3	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Digital Logic & Computer Organization
Category:	PC
Couse Code:	23A3043T
Branch/es:	AI&DS
Semester:	II Year II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

The main objectives of the course is to

1. provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals
2. Describe memory hierarchy concepts
3. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

Course Outcomes:

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

1. Understand data representation methods and number systems, including error detection and correction (L2)
2. Design and implement combinatorial and sequential circuits using logic gates (L3)
3. Apply arithmetic algorithms for addition, subtraction, and multiplication in digital computers (L3)
4. Analyze the architecture and operation of micro programmed control units and CPUs (L4)
5. Evaluate memory organization and input-output systems in computer architecture (L5)

Unit 1		10
Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers.		

Unit 2		9
Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture.		

Unit 3		8
Computer Arithmetic : Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control.		

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Unit 4		10
The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.		

Unit 5		8
Input/Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.		

Prescribed Textbooks:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6th edition, McGraw Hill, 2023.
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education, 2018.

Reference Books:

1. Computer Systems Architecture, M. Morris Mano, 3rd Edition, Pearson, 2017.
2. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier, 2004.
3. Fundamentals of Logic Design, Roth, 5th Edition, Thomson, 2003.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
23A3043T.1	3	2	2	1	1	-	-	-	1	1	1	2	3	2	-
23A3043T.2	3	3	3	2	2	-	-	-	2	1	2	3	3	3	1
23A3043T.3	3	3	3	2	3	-	-	-	2	2	2	3	3	2	3
23A3043T.4	3	3	3	3	3	-	-	-	2	2	2	3	3	3	2
23A3043T.5	3	3	3	3	3	2	2	-	2	2	2	3	3	2	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Artificial Intelligence Lab
Category:	PC
Couse Code:	23A3042L
Branch/es:	AI&DS
Semester:	II Year II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. The student should be made to study the concepts of Artificial Intelligence.
2. The student should be made to learn the methods of solving problems using Artificial Intelligence.
3. The student should be made to introduce the concepts of Expert Systems and machine learning.

Course Outcomes:

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

1. Understand AI problems, the foundation and history of AI, and the functioning of intelligent agents in various environments
2. Understand and analyze various search strategies, heuristic methods, and algorithms for game playing and problem reduction.
3. Gain skills in knowledge representation, logic programming, and reasoning under uncertainty using various probabilistic and rule-based methods.
4. Understand and apply logic concepts, inference methods, and various learning techniques including decision trees and reinforcement learning.
5. Understand expert systems' architecture, roles, and typical examples like MYCIN and XCON, including knowledge acquisition and heuristics.

Exercise-1	3
Pandas Library a) Write a python program to implement Pandas Series with labels. b) Create a Pandas Series from a dictionary. c) Creating a Pandas Data Frame. d) Write a program which makes use of the following Pandas methods i) describe () ii) head () iii) tail () iv) info ()	

Exercise-2	3
Pandas Library: Visualization e) Write a program which use pandas inbuilt visualization to plot following graphs: i) Bar plots ii) Histograms iii) Line plots iv) Scatter plots	

Exercise- 3	3
Write a Program to Implement Breadth First Search using Python.	

Exercise- 4	3
Write a program to implement Best First Searching Algorithm	

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Exercise-5		3
Write a Program to Implement Depth First Search using Python.		
Exercise-6		3
Write a program to implement the Heuristic Search .		
Exercise-7		3
Write a python program to implement A* and AO* algorithm. (Ex: find the shortest path)		
Exercise-8		3
Write a Program to Implement Water-Jug problem using Python.		
Exercise-9		3
Write a Program to Implement Alpha-Beta Pruning using Python.		
Exercise-10		3
Write a Program to implement 8-Queens Problem using Python.		
Exercise-11		3
Write a program to schedule a meeting among a 5 busy people using Default Reasoning the output should give the time, place and day of the meeting.		
Exercise-12		3
Write a program to implement the Unification algorithm		
Exercise-13		3
Develop a knowledge base system consisting of facts and rules about some specialized knowledge domain		
Exercise-14		3
Write a program to implement 8 puzzle programs using different heuristics. Using it play the game Tic-Tac-Toe at the end the game the program should display the no. of nodes generated, cutoff values at each stage in the form of a table.		

Prescribed Textbooks:

3. Prateek Joshi, Artificial Intelligence with Python, Packt Publishing, 2017.
4. Xiao, Perry. Artificial intelligence programming with Python: from zero to hero. John Wiley & Sons, 2022.

Reference Books:

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach, Fourth Edition, Pearson, 2020
2. Martin C. Brown (Author), "Python: The Complete Reference" McGraw Hill Education, Fourth edition, 2018
3. R. NageswaraRao , "Core Python Programming" Dreamtech Press India Pvt Ltd 2018.

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CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
23A3042L-1	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3
23A3042L-2	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3
23A3042L-3	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3
23A3042L-4	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3
23A3042L-5	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	DATA SCIENCE USING PYTHON LAB
Category:	PC
Couse Code:	23A3042L
Branch/es:	AI&DS
Semester:	II Year II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:
1. The main objective of the course is to inculcate the basic understanding of Data Science and its practical implementation using Python.

Course Outcomes:
At the end of the course, the student will be able to
1. Understand and create various types of NumPy arrays and perform basic operations on them. (L2)
2. Manipulate the shape and structure of NumPy arrays through reshaping, flattening, and transposing.(L3)
3. Utilize Pandas for data manipulation, including creating DataFrames and handling missing values. (L3)
4. Implement data preprocessing techniques for machine learning using Python libraries. (L4)
5. Apply data visualization techniques using Matplotlib and develop insights from visualized data. (L5)

Exercise-1		6
Creating a NumPy Array a. Basic ndarray b. Array of zeros c. Array of ones d. Random numbers in ndarray e. An array of your choice f. Imatrix in NumPy g. Evenly spaced ndarray		

Exercise-2		3
The Shape and Reshaping of NumPy Array a. Dimensions of NumPy array b. Shape of NumPy array c. Size of NumPy array d. Reshaping a NumPy array e. Flattening a NumPy array f. Transpose of a NumPy array		

Exercise-3		3
1. Expanding and Squeezing a NumPy Array a. Expanding a NumPy array b. Squeezing a NumPy array c. Sorting in NumPy Arrays		

Exercise- 4		3
2. Indexing and Slicing of NumPy Array		

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- a. Slicing 1-D NumPy arrays
- b. Slicing 2-D NumPy arrays
- c. Slicing 3-D NumPy arrays
- d. Negative slicing of NumPy arrays

Exercise-5		3
3. Stacking and Concatenating Numpy Arrays a. Stacking ndarrays b. Concatenating ndarrays c. Broadcasting in Numpy Arrays		

Exercise-6		3
4. Perform following operations using pandas a. Creating dataframe b. concat() c. Setting conditions d. Adding a new column		

Exercise-7		3
5. Perform following operations using pandas a. Filling NaN with string b. Sorting based on column values c. groupby()		

Exercise-8		3
1. Read the following file formats using pandas a. Text files b. CSV files c. Excel files d. JSON files		

Exercise-9		3
6. Read the following file formats a. Pickle files b. Image files using PIL c. Multiple files using Glob d. Importing data from database		

Exercise-10		3
1. Demonstrate web scraping using python		

Exercise-11		3
7. Perform following preprocessing techniques on loan prediction dataset a. Feature Scaling b. Feature Standardization c. Label Encoding d. One Hot Encoding		

Exercise-12		3
8. Perform following visualizations using matplotlib a. Bar Graph b. Pie Chart c. Box Plot d. Histogram e. Line Chart and Subplots		

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f. Scatter Plot		
Exercise-13		3
Getting started with NLTK, install NLTK using PIP		
Exercise-14		3
Python program to implement with Python Sci Kit-Learn & NLTK		
Exercise-15		3
Python program to implement with Python NLTK/Spicy/Py NLPI.		

Reference Books:

1. "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython" by Wes McKinney
2. "Python Data Science Handbook: Essential Tools for Working with Data" by Jake VanderPlas
3. "Hands-On Data Science with Anaconda: Utilize the right mix of tools to create high-performance data science applications" by Dr. Yuxing Yan

Web References:

1. <https://www.analyticsvidhya.com/blog/2020/04/the-ultimate-numpy-tutorial-for-data-science-beginners/>
2. <https://www.analyticsvidhya.com/blog/2021/07/data-science-with-pandas-2-minutes-guide-to-key-concepts/>
3. <https://www.analyticsvidhya.com/blog/2020/04/how-to-read-common-file-formats-python/>
4. <https://www.analyticsvidhya.com/blog/2016/07/practical-guide-data-preprocessing-python-scikit-learn/>
5. <https://www.analyticsvidhya.com/blog/2020/02/beginner-guide-matplotlib-data-visualization-exploration-python/6>.
6. <https://www.nltk.org/book/ch01.html>

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
23A3042L.1	3	3	3	2	3	-	-	-	1	1	-	2	3	3	2
23A3042L.2	3	3	3	3	3	-	-	-	2	1	1	2	3	3	3
23A3042L.3	3	3	3	3	3	-	-	-	2	1	1	2	3	3	3
23A3042L.4	3	3	3	2	3	-	-	-	2	1	1	2	3	3	3
23A3042L.5	3	3	3	3	3	2	-	-	2	2	1	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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title of the Course:	Full Stack Development-I
Category:	SC
Couse Code:	23A0544L
Branch/es:	AI&DS
Semester:	II Year II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	1	2	2

Course Objectives:

The main objectives of the course are to

1. Make use of HTML elements and their attributes for designing static web pages
2. Build a web page by applying appropriate CSS styles to HTML elements
3. Experiment with JavaScript to develop dynamic web pages and validate forms

Course Outcomes:

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

1. Understand HTML tags to design basic web pages.
2. Apply CSS properties to enrich web pages.
3. Understand the basic concepts of Java Script.
4. Apply java script built-in objects in dynamic web pages
5. Understand and Apply conditional statements, loops, Functions and Events to build logic in design of web pages.

Exercise-1	Lists, Links and Images	6
a. Write a HTML program, to explain the working of lists. Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists. b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target attributes. c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles. d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique		

Exercise-2	HTML Tables, Forms and Frames	6
• Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan) • Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.). • Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view). • Write a HTML program, to explain the working of frames, such that page is to be divided into		

3 parts on either direction. (Note: first frame image, second frame paragraph, third frame ☐ hyperlink. And also make sure of using “no frame” attribute such that frames to be fixed).

Exercise-3	HTML 5 and Cascading Style Sheets, Types of CSS	6
a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, <div>, tags. b. Write a HTML program, to embed audio and video into HTML web page. c. Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).		

Exercise- 4	Selector forms	3
a. Write a program to apply different types of selector forms ● Simple selector (element, id, class, group, universal) ● Combinator selector (descendant, child, adjacent sibling, general sibling) ● Pseudo-class selector ● Pseudo-element selector ● Attribute selector		

Exercise-5	CSS with Color, Background, Font, Text and CSS Box Model	6
a. Write a program to demonstrate the various ways you can reference a color in CSS. b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down. c. Write a program using the following terms related to CSS font and text: i. font-size ii. font-weight iii. font-style iv. text-decoration v. text-transformation vi. text-alignment d. Write a program, to explain the importance of CSS Box model using i. Content ii. Border iii. Margin iv. Padding		

Exercise-6	Applying JavaScript - internal and external, I/O, Type Conversion	3
a. Write a program to embed internal and external JavaScript in a web page. b. Write a program to explain the different ways for displaying output. c. Write a program to explain the different ways for taking input. d. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not		

Exercise-7	JavaScript Pre-defined and User-defined Objects	3
a. Write a program using document object properties and methods. b. Write a program using window object properties and methods. c. Write a program using array object properties and methods. d. Write a program using math object properties and methods. e. Write a program using string object properties and methods. f. Write a program using regex object properties and methods. g. Write a program using date object properties and methods. h. Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.		

Exercise-8	JavaScript Conditional Statements and Loops	6
a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words “LARGER NUMBER” in an information message dialog. If the numbers are equal, output HTML text as “EQUAL NUMBERS”. b. Write a program to display week days using switch case. c. Write a program to print 1 to 10 numbers using for, while and do-while loops.		

- Write a program to print data in object using for-in, for-each and for-of loops
- Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e., $1^3 + 5^3 + 3^3 = 153$]
- Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1- 10's, 1-2's & 1-1's)

Exercise-9 JavaScript Functions and Events

6

- a. Design a appropriate function should be called to display
 - Factorial of that number
 - Fibonacci series up to that number
 - Prime numbers up to that number
 - Is it palindrome or not
- b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display
 1. Factorial of that number
 2. Fibonacci series up to that number
 3. Prime numbers up to that number
 4. Is it palindrome or not
- c. Write a program to validate the following fields in a registration page
 - i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
 - ii. Mobile (only numbers and length 10 digits)
 - iii. E-mail (should contain format like xxxxxxxx@xxxxxxx.xxx)

Prescribed Textbooks:

1. Programming the World Wide Web, 7th Edition, Robert W Sebesta, Pearson, 2013.
2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, 2019 (Chapters 1-11).
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.

CO-PO Mapping:

[illegible]

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	Design Thinking & Innovation
Category:	ES
Couse Code:	23AHS4AT
Branch/es:	CE, EEE, ME, ECE, CSE, CSE(DS), CSE(AI), AI&DS, and AI&ML
Semester:	II B Tech II Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes:

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

1. Comprehend the fundamentals of Design Thinking and innovation
2. Apply the design thinking techniques for solving problems in various sectors.
3. Analyse to work in a multidisciplinary environment
4. Evaluate the value of creativity
5. Formulate specific problem statements of real time issues

Unit 1	Introduction to Design Thinking	
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.		

Unit 2	Design Thinking Process	
Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.		

Unit 3	Innovation	
Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity. Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.		

Unit 4	Product Design	
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies Activity: Importance of modelling, how to set specifications, Explaining their own product design.		

Unit 5	Design Thinking in Business Processes	
Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes. Activity: How to market our own product, About maintenance, Reliability and plan for startup.		

Prescribed Textbooks:

1. Tim Brown, Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shruti N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough. H, The Era of Open Innovation – 2013

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PS01	PS02	PS03
23AHS4AT.1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
23AHS4AT.2	-	2	2	-	1	1	-	-	-	-	1	1	-	-	-
23AHS4AT.3	-	1	2	-	-	-	-	-	1	1	-	1	-	-	-
23AHS4AT.4	-	3	-	-	-	-	-	-	1	1	-	1	-	-	-
23AHS4AT.5	-	3	3	3	-	-	-	-	-	-	1	1	-	-	-