ANNAMACHRAYA INSTITUTE OF TECNOLOGY AND SCIENCES :: RAJAMPET

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Regulation 23 - II Year Course Structure with syllabus

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	23AHS36T	Managerial Economics & Financial Analysis	2	0	0	2
3	ES	23A3331T	Principles of Artificial Intelligence	3	0	0	3
4	PC	23A532T	Advanced Data Structures & Algorithms Analysis	3	0	0	3
5	PC	23A533T	Object Oriented Programming Through Java	3	0	0	3
6	PC	23A532L	Advanced Data Structures and Algorithms Analysis Lab	0	0	3	1.5
7	PC	23A533L	Object Oriented Programming Through Java Lab	0	0	3	1.5
8	SEC	23A534L	Python programming	0	1	2	2
Total				**14**	**1**	**8**	**19**

B. Tech– II Year II Semester

S.No.	Category	Code	Title	L	T	P	Credits
1	HSMC	23AHS45T	Universal Human Values 2	2	1	0	3
2	BS	23AHS42T	Probability & Statistics	3	0	0	3
3	PC	23A3341T	Machine Learning	3	0	0	3
4	PC	23A542T	Database Management Systems	3	0	0	3
5	ES	23A3043T	Digital Logic & Computer Organization	3	0	0	3
6	PC	23A3341L	AI &ML Lab	0	0	3	1.5
7	PC	23A542L	Database Management Systems Lab	0	0	3	1.5
8	SEC	23A544L	Full Stack Development -1	0	1	2	2
9	ES	23AHS4AT	Design Thinking & Innovation	1	0	2	2
10	MC	23AHS47T	Environmental Science	2	0	0	-
Total				**17**	**2**	**10**	**22**
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation							

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Discrete Mathematics
Category:	BS
Couse 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 **s**tudy 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.		

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.

Online Learning Resources:
http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	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
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:	Managerial Economics & Financial Analysis
Category:	HSSM
Couse Code:	23AHS36T
Branch/es:	CSE(AI), AIML
Semester:	II B Tech I Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	0	2

Course Objectives:

6. To inculcate the basic knowledge of microeconomics and financial accounting
7. To make the students learn how demand is estimated for different products, input output relationship for optimizing production and cost
8. To Know the Various types of market structure and pricing methods and strategy
9. To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
10. 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. List features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI and IRR methods of Capital Budgeting and compute rank of the projects. L3
5. 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 behavior- 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 B.Tech. Civil Engineering JNTUA R23 Regulations 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:

3. Gupta: Managerial Economics, TMH, 2009
4. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003
5. Mehta P.L., Managerial Economics-Analysis, Problems, Cases, S Chand and Sons,New Delhi, 2001.
6. M.E.Thukaram Rao., Accounting for Managers, New Age International Publishers.
7. T.S, Reddy and Y. Hari Prasad Reddy, Accounting and Financial Management, Margham Publications.

Reference Books:

3. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
4. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Edition.
5. Suma Damodaran, Managerial Economics, Oxford University Press.
6. Lipsey & Chrystel, Economics, Oxford University Press.
7. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition,Thomson.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Investigations of complex	Modern tool usage	The engineer and society	t and sustainability	Ethics	Individual and team work	Communication	management and finance	Life-long learning	PSO1	PSO2	PSO3
23AC301AT.1	2	-	-	-	2	-	2	-	2	-	-	-	-	2	-
23AC301AT.2	-	3	2	3	-	-	-	-	-	1	2	-	2	-	-
23AC301AT.3	2	-	2	-	2	-	2	2	-	1	3	2	-	2	-
23AC301AT.4	-	2	-	2	-	-	-	-	2	-	-	-	1	-	2
23AC301AT.5	2	2	-	2	-	-	2	-	-	-	-	1	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Principles of Artificial Intelligence
Category:	Engineering Science
Couse Code:	23A3331T
Branch/es:	CSE(AI), AIML
Semester:	II B Tech I Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	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 the importance of artificial Intelligence in real world environment
2. Apply the artificial intelligence algorithms for problem solving
3 Analyze the various reasoning and knowledge representation techniques
4 Solve the problems using classification and planning techniques
5 Learn about Expert system techniques in uncertain environment for obtaining solution

Unit 1	**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	**Searching**	8
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	**Representation of Knowledge**	8
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 probability, Bayes' probabilistic interferences and dempster shafer theory.		

Unit 4	**Logic concepts**	10
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	Expert Systems	10
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", SecondEdition, Pearson Education.

2 Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", McGraw 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 problem solving", Fourth Edition, Pearson Education.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.
4. Artificial Intelligence, SarojKaushik, CENGAGE Learning

Online Learning Resources:

1. https://ai.google/
2. https://swayam.gov.in/nd1_noc19_me71/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	PSO1	PSO2	PSO3
23A3331T-1	3	3				3			3	2		2	3		
23A3331T-2	3	3	3	3		3	2		3			2			
23A3331T-3	3	3	3	3		3			3	2			3		
23A3331T-4	3	3	3	3	1	3	2		3				3	2	2
23A3331T-5	3	3	3	3		3			3				3	2	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Advanced Data Structures & Algorithm Analysis
Category:	Professional Core
Couse Code:	23A532T
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.

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, Galgottia Pub.
7. Data structures in Java:, Thomas Standish, Pearson Education Asia

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	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
23A532T.1	3	3	2	2	1	-	-	-	-	-	-	-	-	-	2
23A532T.2	3	3	3	3	2	-	-	-	-	-	-	-	-	-	2
23A532T.3	3	3	3	3	2	-	-	-	-	-	-	-	-	-	2
23A532T.4	3	3	3	3	2	-	-	-	-	-	-	-	-	-	2
23A532T.5	3	3	3	3	1	-	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Object-Oriented Programming through JAVA
Category:	Professional Core
Couse Code:	23A533T
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)

Prescribed Textbooks:

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

Reference Books:

1. The complete Reference Java, 11thedition, 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	PSO1	PSO2	PSO3
23A533T.1	3	3	2	2	2	-	-	-	-	1	-	2	3	3	-
23A533T.2	3	3	3	3	3	-	-	-	-	1	-	2	3	3	2
23A533T.3	3	3	3	3	3	-	-	-	2	1	-	2	3	3	3
23A533T.4	3	3	3	3	3	-	-	-	2	1	-	2	3	3	3
23A533T.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 and Algorithms Analysis Lab
Category:	Professional Core
Couse Code:	23A532L
Branch/es:	CSE, 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. 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.Design and develop programs to solve real world problems with the popular algorithm design methods. (L5)
2.Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs. (L2)
3.Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications. (L5)
4.Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems. (L3)
5.Compare the performance of different of algorithm design strategies (L4)

Experiments covering the Topics:

- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Finding Biconnected components in a graph
- Shortest path algorithms using greedy Method
- 0/1 Knapsack Problem using Dynamic Programming and Backtracking
- Travelling Salesperson problem using Branch and Bound
- N-Queens Problem using Backtracking
- Job Sequencing using Branch and Bound

Sample Programs:

1.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.
2.Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3.Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4.Implement BFT and DFT for given graph, when graph is represented by
a) Adjacency Matrix b) Adjacency Lists
5.Write a program for finding the biconnected components in a given graph.
6.Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7.Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
8.Implement Job Sequencing with deadlines using Greedy strategy.
9.Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10.Implement N-Queens Problem Using Backtracking.
11.Use Backtracking strategy to solve 0/1 Knapsack problem.
12.Implement Travelling Sales Person problem using Branch and Bound approach.

Reference Books:

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, Sanguthevar Rajasekaran, 2nd Edition, University Press
3.Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4.An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill

Online Learning Resources:

1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Investigations of complex	Modern tool usage	The engineer and society	nt and sustainability	Ethics	Individual and team work	Communication	management and finance	Life-long learning	PSO1	PSO2	PSO3
23A532L.1	3	3	2	1	2	-	-	-	1	1	1	2	2	1	-
23A532L.2	3	3	3	2	3	-	-	-	1	1	1	2	2	2	-
23A532L.3	3	3	3	3	3	-	-	-	2	1	2	3	3	3	-
23A532L.4	3	3	3	3	3	2	-	-	2	1	2	3	3	3	2
23A532L.5	3	3	3	3	3	2	2	-	2	2	2	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Object-Oriented Programming through JAVA Lab
Category:	Professional Core
Couse Code:	23A533L
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

3. Practice object-oriented programming in the Java programming language
4. implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
5. Illustrate inheritance, Exception handling mechanism, JDBC connectivity
6. 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	investigations of complex	Modern tool usage	The engineer and society	t and sustainability	Ethics	Individual and team work	Communication	management and finance	Life-long learning	**PSO1**	**PSO2**	**PSO3**
23A533L.1	3	3	2	1	2	-	-	-	1	1	1	2	2	1	-
23A533L.2	3	3	3	2	3	-	-	-	1	1	1	2	2	2	-
23A533L.3	3	3	3	3	3	-	-	-	2	1	2	3	3	3	-
23A533L.4	3	3	3	3	3	2	-	-	2	1	2	3	3	3	2
23A533L.5	3	3	3	3	3	2	2	-	2	2	2	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Python programming
Category:	Skill Enhancement course
Couse Code:	23A534L
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. Introduce core programming concepts of Python programming language.
2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

Course Outcomes:
At the end of the course, the student will be able to
1. Understand the basic concepts of Python, including data types, control flow statements, and basic operations. (L2)
2. Apply functions and manipulate strings and lists in Python through defined operations and built-in methods. (L3)
3. Utilize dictionaries, tuples, and sets for data storage and manipulation in Python programs. (L3)
4. Implement file handling techniques and object-oriented programming concepts in Python applications. (L4)
5. Analyze and manipulate data using NumPy and Pandas, integrating functional programming concepts in Python. (L5)

Unit 1

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.

i) Arithmetic Operators ii) Relational Operators iii) Assignment Operatorsiv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators

5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

Unit 2		

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

7. Write a program to define a function with multiple return values.
8. Write a program to define a function using default arguments.
9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:
    i. Addition ii. Insertion iii. slicing
12. Write a program to perform any 5 built-in functions by taking any list.

Unit 3		

Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:

13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
14. Write a program to count the number of vowels in a string (No control flow allowed).
15. Write a program to check if a given key exists in a dictionary or not.
16. Write a program to add a new key-value pair to an existing dictionary.
17. Write a program to sum all the items in a given dictionary.

Unit 4		

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
19. Python program to print each line of a file in reverse order.
20. Python program to compute the number of characters, words and lines in a file.
21. Write a program to create, display, append, insert and reverse the order of the items in the array.
22. Write a program to add, transpose and multiply two matrices.
23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square

Unit 5		

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

24. Python program to check whether a JSON string contains complex object or not.
25. Python Program to demonstrate NumPy arrays creation using array () function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
    a) Apply head () function to the pandas data frame
    b) Perform various data selection operations on Data Frame
30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

Reference Books:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

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	PSO1	PSO2	PSO3
23A534L.1	3	3	2	1	2	-	-	-	1	1	1	2	2	-	-
23A534L.2	3	3	3	2	3	-	-	-	1	1	1	2	3	-	-
23A534L.3	3	3	3	3	3	-	-	-	2	1	2	3	2	-	-
23A534L.4	3	3	3	3	3	2	-	-	2	1	2	3	3	-	-
23A534L.5	3	3	3	3	3	2	2	-	2	2	2	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Universal Human Values 2
Category:	HSMC
Couse Code:	23AHS45T
Branch/es:	CSE, CSE-AI, CSE-DS, AIDS, AIML
Semester:	II B Tech II 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
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%202325%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

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	investigations of complex	Modern tool usage	The engineer and society	nt and sustainability	Ethics	Individual and team work	Communication	management and finance	Life-long learning	PSO1	PSO2	PSO3
23AHS35T/45T.1	-	-	-	-	-	-	-	3	-	1	-	2	-	-	-
23AHS35T/45T.2	-	-	-	-	-	-	-	3	-	1	-	2	-	-	-
23AHS35T/45T.3	-	-	-	-	-	-	-	3	-	1	-	2	-	-	-
23AHS35T/45T.4	-	-	-	-	-	-	2	3	-	1	-	2	-	-	-
23AHS35T/45T.5	-	-	-	-	-	2	3	3	-	1	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Probability & Statistics
Category:	BS
Couse Code:	23AHS42T
Branch/es:	CSE, CSE(AI) & AI &ML
Semester:	II B Tech II Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:

1. To introduce the basic concepts of probability theory.
2. To elucidate probability distribution for solving problems in engineering.
3. To describe the measures of central tendency.
4. To introduce test of Hypothesis and confidence interval for a population parameter of large samples
5. To explain the steps of testing of hypothesis for small samples

Course Outcomes:
At the end of the course, the student will be able to
1. apply the concepts of probability theorems in stochastic process
2. apply the probability distribution in real life problems
3. calculate the correlation between two variables
4. evaluate the hypotheses of large samples
5. evaluate the hypotheses of small samples

UNIT I	**Probability**	10
Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.		

UNIT II	**Probability distributions**	10
Probability distributions: Binomial, Poisson and Normal-their properties (Chebyshev's inequality). Approximation of the binomial distribution to normal distribution.		

UNIT III	**Descriptive statistics**	8
Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines.		

UNIT IV	**Estimation and Testing of hypothesis, large sample tests**	10
Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems		

UNIT V	Small sample tests	8
Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.		

Prescribed Textbooks:
5. Miller and Freund, Probability and Statistics for Engineers,7/e, Pearson, 2008.
6. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:
12. S. Ross, a First Course in Probability, Pearson Education India, 2002.
13. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
14. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
Online Learning Resources:
15. https://onlinecourses.nptel.ac.in/noc21_ma74/preview
16. 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	PSO1	PSO2	PSO3
23AHS42T.1	3	2	1	2	-	-	-	-	-	-	-	1			
23AHS42T.2	3	2	1	2	-	-	-	-	-	-	-	1			
23AHS42T.3	3	2	1	2	-	-	-	-	-	-	-	1			
23AHS42T.4	3	3	2	3	-	-	-	-	-	-	-	1			
23AHS42T.5	3	3	2	3	-	-	-	-	-	-	-	1			

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Machine Learning
Category:	PC
Couse Code:	23A3341T
Branch/es:	CSE(AI) & AIML
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. Define machine learning and its different types (supervised and unsupervised) and understand their applications.
2. Apply supervised learning algorithms including decision trees and k-nearest neighbours (k-NN).
3. Implement unsupervised learning techniques, such as K-means clustering.

Course Outcomes:
At the end of the course, the student will be able to
At the end of the course, the student will be able to
1. Understand the basic knowledge about the key algorithms of machine learning
2. Learn and use different machine learning algorithms
3. Apply various machine learning algorithms Bayesian learning and genetic approaches
4. Design the classification, pattern recognition, optimization and decision problems using machine learning algorithms
5. Analyze different types of learning approaches

Unit 1	**Introduction to Machine Learning:**	10
Evolution of Machine Learning, Paradigms for ML, Learning by Rote, Learning by Induction, Reinforcement Learning, Types of Data, Matching, Stages in Machine Learning, Data Acquisition, Feature Engineering, Data Representation, Model Selection, Model Learning, Model Evaluation, Model Prediction, Search and Learning, Data Sets.		

Unit 2	**Nearest Neighbor-Based Models**	9
Introduction to Proximity Measures, Distance Measures, Non-Metric Similarity Functions, Proximity Between Binary Patterns, Different Classification Algorithms Based on the Distance Measures ,K-Nearest Neighbor Classifier, Radius Distance Nearest Neighbor Algorithm, KNN Regression, Performance of Classifiers, Performance of Regression Algorithms		

Unit 3	**Models Based on Decision Trees**	8
Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression. **The Bayes Classifier**: Introduction to the Bayes Classifier, Bayes' Rule and Inference, The Bayes Classifier and its Optimality, Multi-Class Classification | Class Conditional Independence and Naive Bayes Classifier (NBC)		

Unit 4	Linear Discriminants for Machine Learning	10
Introduction to Linear Discriminants, Linear Discriminants for Classification, Perceptron Classifier, Perceptron Learning Algorithm, Support Vector Machines, Linearly Non-Separable Case, Non-linear SVM, Kernel Trick, Logistic Regression, Linear Regression, Multi-Layer Perceptrons (MLPs), Backpropagation for Training an MLP..		

Unit 5	Clustering	8
Introduction to Clustering, Partitioning of Data, Matrix Factorization | Clustering of Patterns, Divisive Clustering, Agglomerative Clustering, Partitional Clustering, K-Means Clustering, Soft Partitioning, Soft Clustering, Fuzzy C-Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm, Expectation Maximization-Based Clustering, Spectral Clustering.		

Prescribed Textbooks:

1."Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana, Universities Press (India), 2024

Reference Books:

1."Machine Learning", Tom M. Mitchell, McGraw-Hill Publication, 2017

2."Machine Learning in Action",Peter Harrington, DreamTech

3."Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
23A3341T-1	3	3	3	1	-	1	-	-	1	-	-	3	3	3	-
23A3341T-2	3	-	3	-	3	-	-	-	-	-	-	3	3	3	-
23A3341T-3	3	3	3	-	3	-	-	-	-	-	-	-	3	-	-
23A3341T-4	3	3	3	-	-	-	-	-	-	-	-	3	3	-	-
23A3341T-5	3	-	3	-	3	-	-	-	-	-	-	3	3	3	-

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

Title of the Course:	Database Management Systems
Category:	PC
Couse Code:	23A542T
Branch/es:	CSE, CSE(DS), CSE(AI), AI&ML
Semester:	II B Tech II Sem

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. Understand the characteristics and advantages of database systems compared to file systems (L2)
2. Apply basic SQL commands to create and manipulate database schemas (L3)
3. Construct complex SQL queries using joins and aggregate functions (L3)
4. Explain the purpose of normalization and apply it to design relational schemas (L3)
5. Analyze transaction states and ACID properties in database systems (L4)

Unit 1	**Introduction**	12

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	**Relational Model**	10

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	SQL	10
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	Schema Refinement (Normalization)	11
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	Transaction Concept	10
Transaction Concept: 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, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH (For Chapter 1 and Chapter 5)

Reference Books:

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

Web-Resources:

1. https://nptel.ac.in/courses/106/105/106105175/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0127580666728202245 6_shared/overview

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
23A542T.1	3	2	2	1	1	-	-	-	1	1	1	2	3	-	-
23A542T.2	3	3	3	2	2	-	-	-	2	1	2	3	3	2	-
23A542T.3	3	3	3	2	3	2	-	-	2	2	2	3	3	3	2
23A542T.4	3	3	3	3	3	-	-	-	2	2	2	3	3	3	3
23A542T.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:	Digital logic and computer organisation
Category:	PC
Couse Code:	23A3043T
Branch/es:	CSE(AI), AIML
Semester:	II B Tech II Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

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. Differentiate between combinational and sequential circuits based on their characteristics and functionalities. (L2)
2. Demonstrate an understanding of computer functional units. (L2)
3. Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems. (L3)
4. Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability. (L3)
5. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques. (L3)

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		10
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		10
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		

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		10
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
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.

Reference Books:

1. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.
2. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson
3. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier
4. Fundamentals of Logic Design, Roth, 5thEdition, Thomson

Online Learning Resources:

1. https://nptel.ac.in/courses/106/103/106103068/

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Investigations of complex	Modern tool usage	The engineer and society	t and sustainability	Ethics	Individual and team work	Communication	management and finance	Life-long learning	PSO1	PSO2	PSO3
23A0231T.1	3	2	1	2	-	-	-	-	-	-	-	-	-	3	-
23A0231T.2	2	1	1	1	-	-	-	-	-	-	-	-	-	2	-
23A0231T.3	3	2	1	2	-	-	-	-	-	-	-	-	-	2	-
23A0231T.4	2	1	1	1	-	-	-	-	-	-	-	-	-	3	-
23A0231T.5	3	2	1	2	-	-	-	-	-	-	-	-	-	3	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Artificial Intelligence & Machine Learning Lab
Category:	PC
Couse Code:	23A3341L
Branch/es:	AIML
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.
4. To learn about computing central tendency measures and Data preprocessing techniques
5. To learn about classification and regression algorithms
6. To apply different clustering algorithms for a problem.

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.

Software Required for ML: Python/R/Weka

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		8
Write a Program to Implement Breadth First Search using Python.		

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

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
Apply the following Pre-processing techniques for a given dataset. a. Attribute selection b. Handling Missing Values c. Discretization d. Elimination of Outliers		

Exercise-9		3
Apply KNN algorithm for classification and regression		

Exercise-10		3
Demonstrate decision tree algorithm for a classification problem and perform parameter tuning for better results		

Exercise-11		3
Apply Random Forest algorithm for classification and regression		

Exercise-12		3
Demonstrate Naïve Bayes Classification algorithm.		

Exercise-13		3
Apply Support Vector algorithm for classification		

Exercise-14		3
14. Implement the K-means algorithm and apply it to the data you selected. Evaluate performance by measuring the sum of the Euclidean distance of each example from its class center. Test the performance of the algorithm as a function of the parameters K. .		

Prescribed Textbooks:

1. Prateek Joshi,Artificial Intelligence with Python,Packt Publishing, 2017.
2. 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.

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**
23A3341L -1	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3
23A3341L -1	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3
23A3341L -1	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3
23A3341L -1	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3
23A3341L -1	3	3	3	3	3	3	-	-	3	-	-	-	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Database Management Systems Lab
Category:	PC
Couse Code:	23A542L
Branch/es:	CSE, CSE(DS), CSE(AI), AIML
Semester:	II B Tech II Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

This Course will enable students to

1. Populate and query a database using SQL DDL/DML Commands
2. Declare and enforce integrity constraints on a database
3. Writing Queries using advanced concepts of SQL
4. Programming PL/SQL including procedures, functions, cursors and triggers

Course Outcomes:
At the end of the course, the student will be able to
1. Understand and apply SQL commands for creating, altering, and managing database tables and constraints. (L3)
2. Construct complex SQL queries using various conditions, aggregate functions, and subqueries. (L4)
3. Develop PL/SQL programs utilizing control structures, exception handling, and transaction management. (L4)
4. Implement stored procedures, functions, and triggers to enhance database operations and integrity. (L5)
5. Create Java applications that connect to databases using JDBC for data manipulation and retrieval.(L3)

Experiment 1	
Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.	

Experiment 2	
Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.	

Experiment 3	
Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.	

Experiment 4	
Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)	

Experiment 5	
a) Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found) b) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.	

Experiment 6	
Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.	

Experiment 7	
Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.	

Experiment 8	
Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.	

Experiment 9	
Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.	

Experiment 10	
Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.	

Experiment 11	
Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers	

Experiment 12	
Create a table and perform the search operation on table using indexing and non-indexing techniques.	

Experiment 13	
Write a Java program that connects to a database using JDBC	

Experiment 14	
Write a Java program to connect to a database using JDBC and insert values into it	

Experiment 15	
Write a Java program to connect to a database using JDBC and delete values from it	

Text Books/Suggested Reading:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007
3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	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
23A542L.1	2	3	3	2	3	-	-	-	2	2	2	1	3	2	1
23A542L.2	2	3	3	2	3	-	-	-	2	2	2	1	3	2	2
23A542L.3	2	3	3	3	3	-	-	-	2	2	2	2	3	2	2
23A542L.4	2	3	3	3	3	-	-	-	2	2	2	3	3	3	2
23A542L.5	2	2	2	1	2	-	-	-	2	1	2	1	1	2	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Full Stack Development -1
Category:	SEC
Couse Code:	23A544L
Branch/es:	CSE, CSE(AI), AIML
Semester:	II B Tech II Sem

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	1	2	2

Course Objectives:

This Course will enable students 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. Design Websites. (L6)
2. Apply Styling to web pages. (L3)
3. Make Web pages interactive. (L3)
4. Design Forms for applications. (L6)
5. Choose Control Structure based on the logic to be implemented. (L4)

Experiments covering the Topics:

- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML 5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript - internal and external, I/O, Type Conversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
- JavaScript Functions and Events

Sample Experiments:

1. Lists, Links and Images

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

2. HTML Tables, Forms and Frames

a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)
b. 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.).
c. 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).
d. 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).

3. HTML 5 and Cascading Style Sheets, Types of CSS

a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, , 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).

4. Selector forms

a. Write a program to apply different types of selector forms
    i. Simple selector (element, id, class, group, universal)
    ii. Combinator selector (descendant, child, adjacent sibling, general sibling)
    iii. Pseudo-class selector
    iv. Pseudo-element selector
    v. Attribute selector

5. CSS with Color, Background, Font, Text and CSS Box Model

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

6. Applying JavaScript - internal and external, I/O, Type Conversion

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

7. JavaScript Pre-defined and User-defined Objects

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.

8. JavaScript Conditional Statements and Loops

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.
d. Write a program to print data in object using for-in, for-each and for-of loops
e. 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.,13 + 53+ 33 = 153]
f. 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)

9. JavaScript Functions and Events

a. Design a appropriate function should be called to display
    i. Factorial of that number
    ii. Fibonacci series up to that number
    iii. Prime numbers up to that number
    iv. 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
    i. Factorial of that number
    ii. Fibonacci series up to that number
    iii. Prime numbers up to that number
    iv. 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 xxxxxxx@xxxxxx.xxx)

Text Books:

1. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & Bartlett Learning, 2019.

Reference Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.

Online Learning Resources:

1. https://www.w3schools.com/html
2. https://www.w3schools.com/css
3. https://www.w3schools.com/js/
4. https://www.w3schools.com/nodejs
5. https://www.w3schools.com/typescript

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	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**
23A544L.1	2	3	3	2	3	-	-	-	2	2	2	1	3	2	1
23A544L.2	2	3	3	2	-	-	-	-	2	2	-	1	3	2	2
23A544L.3	2	3	3	3	3	-	-	-	2	2	2	2	3	2	2
23A544L.4	2	3	3	-	3	-	-	-	2	2	2	3	3	3	2
23A544L.5	2	2	2	1	2	-	-	-	2	1	2	1	1	2	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course:	Design Thinking & Innovation
Category:	ES
Couse Code:	23AHS4AT
Branch/es:	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. Define the concepts related to design thinking. (L1, L2)
2. Explain the fundamentals of Design Thinking and innovation (L1, L2)
3. Apply the design thinking techniques for solving problems in various sectors. (L3)
4. Analyse to work in a multidisciplinary environment (L4)
5. Evaluate the value of creativity (L5)
6. Formulate specific problem statements of real time issues (L3, L6)

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. Shrutin 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

Online Learning Resources:

https://nptel.ac.in/courses/110/106/110106124/
https://nptel.ac.in/courses/109/104/109104109/
https://swayam.gov.in/nd1_noc19_mg60/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	PSO1	PSO2	PSO3
23A545T.1	2	2	2	1	1	-	-	-	1	1	2	1	2	1	1
23A545T.2	2	3	3	2	2	-	-	-	2	2	2	2	2	2	1
23A545T.3	1	2	2	2	1	-	-	-	1	1	2	1	2	1	2
23A545T.4	2	2	3	2	2	-	-	-	2	2	2	2	2	3	1
23A545T.5	2	2	3	2	2	-	-	-	2	2	2	2	2	2	3

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

Title of the Course:	Environmental science
Category:	MC
Couse Code:	23AHS47T
Branch/es:	ME, CE, ECE, CSE(AI), CSE (DS), AIDS, AIML
Semester:	II B Tech II 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. 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	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
23AHS49T.1	2	2	-	-	-	-	3	-	-	-	-	2	-	-	-
23AHS49T.2	2	2	-	-	-	-	3	-	-	-	-	2	-	-	-
23AHS49T.3	2	2	-	-	-	-	3	-	-	-	-	2	-	-	-
23AHS49T.4	3	2	-	-	-	-	3	-	-	-	-	3	-	-	-
23AHS49T.5	2	2	-	-	-	-	3	-	-	-	-	2	-	-	-