BONAM VENKATA CHALAMAYYA ENGINERING COLLEGE
ODALAREVU – 533 210, Andhra Pradesh, India
Autonomous

DEPARTMENT OF CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)
COURSE STRUCTURE – BR23 REGULATIONS
For UG - B.Tech: CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)
II Year Course Structure

Semester–I							
S.No.	Course Category	Course Code	Course Name	L	T	P	Credits
1.	BSC	23BS3T09	Discrete Mathematics & Graph Theory	3	0	0	3
2.	HSMC	23HM3T02	Universal human values – understanding harmony andEthical human conduct	2	1	0	3
3.	ESC	23ES3T11	Artificial Intelligence	3	0	0	3
4.	PCC	23CS3T02	Advanced Data Structures and Algorithm Analysis	3	0	0	3
5.	PCC	23CS3T03	Object Oriented Programming Through Java	3	0	0	3
6.	PCC	23CS3L02	Advanced Data Structures and Algorithm Analysis Lab	0	0	3	1.5
7.	PCC	23CS3L03	Object Oriented Programming Through Java Lab	0	0	3	1.5
5	SEC	23CS3S03	Python programming	0	1	2	2
9.	Audit Course	23AC3T01	Environmental Science	2	0	0	-
Total				**16**	**2**	**8**	**20**

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Semester–II							
S.No.	**Course Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	HSMC	23HM4T05	Optimization Techniques	2	0	0	2
2.	BSC	23BS4T11	Probability & Statistics	3	0	0	3
3.	PCC	23AM4T01	Machine Learning	3	0	0	3
4.	PCC	23CS4T05	Database Management Systems	3	0	0	3
5.	PCC	23AM4T02	Digital Logic & Computer Organization	3	0	0	3
6.	PCC	23AM4L01	Machine Learning Lab	0	0	3	1.5
7.	PCC	23CS4L05	Database Management Systems Lab	0	0	3	1.5
8.	PCC	23CS4S05	Full Stack Development - I	0	1	2	2
9.	ESC	23ES4L06	Design Thinking & Innovation	1	0	2	2
Total				**15**	**1**	**10**	**21**
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation							

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II Year - I Semester	Code: 23ES3T11	L	T	P	C
		3	0	0	3

ARTIFICIAL INTELLIGENCE

Course Objectives:

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

Course Outcomes:

CO Number	Course Outcome	Blooms Level
CO1	The student should be made to study the concepts of Artificial Intelligence.	BL1
CO2	The student should be made to learn the methods of solving problems using Artificial Intelligence.	BL2
CO3	The student should be made to introduce the concepts of Expert Systems.	BL3
CO4	Students will be able to understand the applications of AI, namely game playing, theorem proving, and machine learning.	BL2
CO5	Students will be able to learn different knowledge representation techniques	BL3

UNIT – I

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 – II

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

UNIT – III

Representation of Knowledge: Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules-based deduction systems. Reasoning under uncertainty, review of probability, Bayes' probabilistic interferences and dempster Shafer theory.

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UNIT – IV Logic concepts: First order logic. Inference in first order logic, propositional vs. first order inference, unification& forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees Explanation based learning, Statistical Learning methods, Reinforcement Learning.
UNIT – V Expert Systems: Architecture of expert systems, Roles of expert systems – Knowledge Acquisition Meta knowledge Heuristics. Typical expert systems – MYCIN, DART, XCON: Expert systems shells.
Textbooks 1.S.Russel and P. Norvig, "Artificial Intelligence – A Modern Approach",Second Edition, Pearson Education. 2.Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill
Reference Books: 1.David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: a logicalapproach", Oxford University Press. 2.G.Luger,"Artificial Intelligence:Structures and Strategies for complexproblem solving", Fourth Edition, Pearson Education. 3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers. ArtificialIntelligence, SarojKaushik, CENGAGE Learning.
Online Learning Resources: 1.https://ai.google/ 2.https://swayam.gov.in/nd1_noc19_me71/preview

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II Year - I Semester	Code: 23CS3T02	L	T	P	C
		3	0	0	3

ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS
(Common to CSE/IT/CSE(AI&DS)/CSE(AI&ML)/AIML)

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

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Analyze the time and space complexities of algorithms and perform the tree operations.	BL4
CO2	Understand the concepts of graphs and bi connected components.	BL2
CO3	Apply Greedy algorithm and Dynamic programming to schedule jobs efficiently	BL3
CO4	Solve 0/1 Knapsack problem using back tracking and graph coloring problems.	BL3
CO5	Formulate the problem of scheduling identical processors and NP hardness	BL6

UNITI **10Hrs**
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 II **8Hrs**
Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications, Graphs – Terminology, Representations, Basic Search and Traversals, Connected, Components and Biconnected Components, applications,

UNIT III **15Hrs**
Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull.
Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Path.

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UNIT IV **12Hrs** **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. **Backtracking:** General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem.
UNIT V **15Hrs** **Branch and Bound:** The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem **NP Hard and NP Complete Problems:** Basic Concepts, Cook's theorem NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Travelling Salesperson Decision Problem (TSP) NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling
Text Books: 1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2ndEdition Universities Press 2. Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press 3. Data Structers and alogrthims in C++: Adan,drozdek 4. Design and Anlysis of Computer Algorthims:AHO/ULLMAN 5. Fundamentals of Computer Algorthims: ELLIS HOROWITZ,SARTAJ SAHNI, RAJASEKHARAN
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 8. Design and Analysis of Computer Algorithms, Aho Ullman. 9. Data Structures and Algorithms in C++, Adan, Drozedek
Online Learning Resources: 1. https://www.tutorialspoint.com/advanced_data_structures/index.asp 2. http://peterindia.net/Algorithms.html 3. Abdul Bari,Introduction to Algorithms (youtube.com)

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II Year - I Semester	Code: 23CS3T03	L	T	P	C
		3	0	0	3

OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to CSE/IT/CSE(AI&DS)/CSE(AI&ML)/AIML)

Course Objectives:
The learning objectives of this course are to:
- Identify Java language components and how they work together in applications
- Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
  Llearn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
- Understand how to design applications with threads in Java
- Understand how to use Java APIs for program development

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Illustrate a primitive data types , operators and flow of control and how they work together in applications	BL3
CO2	Apply the concepts of object-oriented programming and class concepts.	BL3
CO3	Apply the concept of inheritance and Interfaces	BL3
CO4	Create a packages, files and Exception handling	BL6
CO5	Able to apply the concept of multithreading and JDBC	BL3

UNIT I

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, 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 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.

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UNIT II **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 III **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**: 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 IV **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, Autoboxing 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. **Exception Handling:** Introduction, Hierarchy of Standard Exception Classes, Unchecked Exceptions, Checked Exceptions, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable. **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)

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UNIT V **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, Result Set 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)
Text Books: 1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford. 2) Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023. 3) JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson. 4) Programming with JAVA E Balaguru Samy
Reference Books: 1) The complete Reference Java, 11thedition, Herbert Schildt, TMH 2) Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson
Online Learning Resources: 1. https://nptel.ac.in/courses/106/105/106105191/ 2.https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview 3. https://myacademy.oracle.com/

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II Year - I Semester	Code: 23CS3L02	L	T	P	C
		0	0	3	1.5

ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS LAB
(Common to CSE/IT/CSE(AI&DS)/CSE(AI&ML)/AIML)

Course Objectives:
The objectives of the course is to
- acquire practical skills in constructing and managing Data structures
- apply the popular algorithm design methods in problem-solving scenarios

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Analyse AVL Trees and B-Tree	BL4
CO2	Apply algorithms of advance data structures used in heap tree, graph and divide and conquer	BL3
CO3	Apply greedy method techniques and shortest path algorithm	BL3
CO4	Implement to queens and 0/1 knapsack problems	BL3
CO5	Describe various branch and bound approaches	BL2

Experiments covering the Topics:
- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Minimum cost spanning trees
- Shortest path algorithms
- 0/1 Knapsack Problem
- Travelling Salesperson problem
- Optimal Binary Search Trees
- N-Queens Problem
- Job Sequencing

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.

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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, SahniSartaj, Mehta, Dinesh, 2ndEdition, Universities Press 2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2ndEdition, 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 3. https://myacademy.oracle.com/ 4. https://gradwise.in/

Note: At the end of Lab course students have to complete a Mini Project/Case Study for evaluation of Internal Marks.

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II Year - I Semester	Code: 23CS3L03	L	T	P	C
		0	0	3	1.5

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB
(Common to CSE/IT/CSE(AI&DS)/CSE(AI&ML)/AIML)

Course Objectives:

The aim of this course is to

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

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Illustrate a primitive data types , operators and flow of control and how they work together in applications	BL3
CO2	Apply the concepts of object-oriented programming and class concepts.	BL3
CO3	Apply the concept of inheritance and Interfaces	BL3
CO4	Create a packages, files and Exception handling	BL6
CO5	Able to apply the concept of multithreading and JDBC	**BL3**

Experiments covering the Topics:

- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, Java FX GUI

Sample Experiments:

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 ax2+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 String Buffer to delete, remove character.

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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 implement 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 Image View (use Java FX) c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

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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
Text Books: 1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford. 2) Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023. 3) JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.
Reference Books: 1) The complete Reference Java, 11thedition, Herbert Schildt, TMH 2) Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson
1) https://nptel.ac.in/courses/106/105/106105191/ 2)https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview 3. https://myacademy.oracle.com/ 4. https://gradwise.in/

Note: At the end of Lab course students have to complete a Mini Project/Case Study for evaluation of Internal Marks.

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II Year - I Semester	Code: 23CS3S03	L	T	P	C
		0	1	2	2

PYTHON PROGRAMMING
(Common to CSE/IT/CSE(AI&DS)/CSE(AI&ML)/AIML)

Course Objectives:

The main objectives of the course are to

- Introduce core programming concepts of Python programming language.
- Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
- Implement Functions, Modules and Regular Expressions in Python Programming

and to create practical and contemporary applications using these

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Apply python programming concepts and the basic operations like operators and data types and control flow	BL3
CO2	Apply concepts of functions, string and create list and List Methods	BL3
CO3	Apply Python data structures like Lists, Tuples, Sets and dictionaries	BL3
CO4	Apply file Functions, array and matrices concepts	BL3
CO5	Apply concept of data science , functional programming and XML in python	BL3

UNIT I **9Hrs**

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 Operators iv) 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.

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UNIT II **9Hrs**

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:

1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.
3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
i. addition ii. Insertion iii. slicing
6. Write a program to perform any 5 built-in functions by taking any list.

UNIT III **10Hrs**

Dictionaries: 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:

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

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UNIT IV **10Hrs**
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: 1. 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. 2. Python program to print each line of a file in reverse order. 3. Python program to compute the number of characters, words and lines in a file. 4. Write a program to create, display, append, insert and reverse the order of the items in the array. 5. Write a program to add, transpose and multiply two matrices. 6. 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

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UNIT V **10Hrs**

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

Sample Experiments:

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, dtype.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Python program to find min, max, sum, cumulative sum of array
6. 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

7. 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, 2ndEdition, Pearson,2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.
4. Python programming :Vamsikurama
5. Python programming using Problem solving Approach:Reema Thareja
6. Python programming :Ch.satyanarayana,M.Radhika mani,B N Jagadesh

Online Learning Resources:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus
3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013843081809149952303 08_shared/overview
4. https://myacademy.oracle.com/
5. https://gradwise.in

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II Year – II Semester	Code: 23AM4T01	L	T	P	C
		3	0	0	3

MACHINE LEARNING

Course Objectives:The objectives of the course is to

- Define machine learning and its different types (supervised and unsupervised) andunderstand their applications.
- Apply supervised learning algorithms including decision trees and k-nearestneighbours (k-NN).
- Implement unsupervised learning techniques, such as K-means clustering.

Course Outcomes:

CO Number	Course Outcome	Blooms Level
CO1	Students will be able to Define machine learning and its different types (supervised and unsupervised) and understand their applications.	BL3
CO2	Students will be able to Apply supervised learning algorithms including decision trees and k-nearest neighbours (k-NN).	BL3
CO3	Students will be able to Implement unsupervised learning techniques, such as K-means clustering and Explain how decision trees can be used for classification tasks.	BL4
CO4	Students will be able to Evaluate the performance of logistic regression and an MLP trained with backpropagation on different datasets.	BL5
CO5	Students will be able to Evaluate the performance of K-means clustering.	BL5

UNIT-I:

Introduction to Machine Learning: 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-II:

Nearest Neighbor-Based Models: 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-III:

Models Based on Decision Trees: Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression.

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UNIT-IV: **Linear Discriminants for Machine Learning**: 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-V: **Clustering** : 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-BasedClustering, Spectral Clustering.
Text Books: 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, 7thEdition,2019.

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II Year - II Semester	Code: 23CS4T05	L	T	P	C
		3	0	0	3

DATABASE MANAGEMENT SYSTEMS
(Common to CSE/IT/CSE(AI&ML)/AIML)

Course Objectives:

The main objectives of the course is to

- Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra
- Introduce the concepts of basic SQL as a universal Database language
- Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
- Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Explain the fundamental concepts of database systems and their characteristics, distinguishing them from file systems.	BL 1
CO2	Apply basic DML operations such as insert, delete, and update on tables in SQL.	BL 3
CO3	Create tables with relationships and implement primary key, foreign key, and integrity constraints.	BL 3
CO4	Analyze and apply the concepts of lossless join and dependency preserving decomposition during normalization.	BL 4
CO5	Implement operations on B+ Trees, including insertion, deletion, and search.	BL 3

UNIT I **10Hrs**

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 II **8Hrs**

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).

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UNIT III **8Hrs** 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.
UNITIV **10Hrs** 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 V **10Hrs** 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/
Text Books: 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 3) Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning. 4) Database Management Systems,Battacharya,Pritimoy 5) Database Management Systems,POST,Gerald V 6) Database Management System,Pujari,Arun k.
Reference Books: 1) Introduction to Database Systems, 8thedition, C J Date, Pearson. 2) Database Management System, 6th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson 3) Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.
Online Learning Resources: 1) https://nptel.ac.in/courses/106/105/106105175/ 2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012758066672820 22456_shared/overview

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II Year – II Semester	Code: 23AM4T02	L	T	P	C
		3	0	0	3

DIGITAL LOGIC & COMPUTER ORGANIZATION

Course Objectives:

The main objectives of the course is to

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

Course Outcomes:

CO Number	Course Outcome	Blooms Level
CO1	Students should be able to design, implement, and troubleshoot digital systems and the use of decoders and multiplexers.	BL3
CO2	Students should be able to design, implement and analyze various sequential circuits, including binary counters, registers, and shift registers,	BL4
CO3	Students should be able to Understand, and apply arithmetic circuits and algorithms, understanding processor organization	BL3
CO4	Students will be able to understand and apply efficient memory systems and memory organization techniques	BL3
CO5	Design an efficient I/O system integrating DMA and various bus architectures to optimize system performance	BL6

UNIT I

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 II

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 III

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

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UNIT IV 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 V Input/Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces
Text Books: 1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6th edition, McGraw Hill 2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education. 3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.
Reference Books: 1. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson 2. Computer Organization and Design, David A. Paterson, John L.Hennessy, Elsevier 3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson
Online Learning Resources: 1. https://nptel.ac.in/courses/106/103/106103068/

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II Year – II Semester	Code: 23AM4L01	L	T	P	C
		0	0	3	1.5

MACHILNE LEARNING LAB

Course Objectives:

1.To learn about computing central tendency measures and Data preprocessing Techniques

2.To learn about classification and regression algorithms

3.To apply different clustering algorithms for a problem.

Course Outcomes:

CO Number	Course Outcome	Blooms Level
CO1	Students will be able To learn about computing central tendency measures and Data preprocessing techniques	BL1
CO2	Students will be able to learn about classification and regression algorithms	BL1
CO3	Students will be able To apply different clustering algorithms for a problem.	BL3
CO4	Students will be able to Adjust and refine the parameters of the K-means algorithm to optimize clustering results.	BL4
CO5	Students will be able to Modify the EM algorithm parameters to optimize clustering performance for specific datasets.	BL5

Software Required for ML: Python/R/Weka

Lab should cover the concepts studied in the course work, sample list of Experiments:

1. Compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation.
2. Apply the following Pre-processing techniques for a given dataset.
   a. Attribute selection **b.** Handling Missing Values
   c. Discretization **d.** Elimination of Outliers
3. Apply KNN algorithm for classification and regression
4. Demonstrate decision tree algorithm for a classification problem and perform parameter tuning for better results

Note: At the end of Lab course students have to complete a Mini Project/Case Study for evaluation on Internal Marks.

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5. Demonstrate decision tree algorithm for a regression problem.
6. Apply Random Forest algorithm for classification and regression.
7. Demonstrate Naïve Bayes Classification algorithm.
8. Apply Support Vector algorithm for classification.
9. Demonstrate simple linear regression algorithm for a regression problem.
10. Apply Logistic regression algorithm for a classification problem.
11. Demonstrate Multi-layer Perceptron algorithm for a classification problem.
12. 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.
13. Demonstrate the use of Fuzzy C-Means Clustering.
14. Demonstrate the use of Expectation Maximization based clustering algorithm.

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II Year - II Semester	Code: 23CS4L05	L	T	P	C
		0	0	3	1.5

DATABASE MANAGEMENT SYSTEMS LAB
(Common to CSE/IT/CSE(AI&ML)/AIML)

Course Objectives:
This Course will enable students to
- Populate and query a database using SQL DDL/DML Commands
- Declare and enforce integrity constraints on a database
- Writing Queries using advanced concepts of SQL
- Programming PL/SQL including procedures, functions, cursors and triggers

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Populate and query a database using SQL DDL/DML Commands	BL 3
CO2	Declare and enforce integrity constraints on a database	BL 3
CO3	Writing Queries using advanced concepts of SQL	BL 4
CO4	Programming PL/SQL including procedures, functions, cursors and triggers	BL 3

Experiments covering the topics:
- DDL, DML, DCL commands
- Queries, nested queries, built-in functions,
- PL/SQL programming- control structures
- Procedures, Functions, Cursors, Triggers,
- Database connectivity- ODBC/JDBC

Sample Experiments:

1. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
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.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
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)

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5.
i. 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)
ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
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.
7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISEAPPLICATION ERROR.
8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers
12. Create a table and perform the search operation on table using indexing and non indexing techniques.

Text Books:

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

Online Learning Resources:

1.https://gradwise.in/
2.https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384167253376204874 8_shared/overview
3. https://myacademy.oracle.com/

Note: At the end of Lab course students have to complete a Mini Project/Case Study for evaluation on Internal Marks.

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II Year - II Semester	Code: 23CS4S05	L	T	P	C
		0	1	2	2

FULL STACK DEVELOPMENT – I
(Common to CSE/CSE(AI&DS)/CSE(AI&ML)/AIML)

Course Objectives:
The main objectives of the course are to
- Make use of HTML elements and their attributes for designing static web pages
- Build a web page by applying appropriate CSS styles to HTML elements
- Experiment with JavaScript to develop dynamic web pages and validate forms

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Apply HTML5 and CSS, differentiate types of CSS, with a focus on modern web design principles.	BL3
CO2	Apply understanding of HTML for developing basic web pages incorporating lists, links, images, tables, forms and frames	BL3
CO3	Creating and manipulating HTML tables, forms and frames	BL3
CO4	Effectively applying JavaScript with a focus on I/O, type conversion, and handling of both internal and external scripts	BL3
CO5	Developing proficiency in the use of JavaScript Functions, Events, and application of Node.js	BL3

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
- Node.js

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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

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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

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7. Java Script 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. Java Script 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 aprogram 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)

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

Note: At the end of Lab course students have to complete a Mini Project/Case Study for evaluation on Internal Marks.

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II Year - II Semester	CODE: 23ES4L06	L	T	P	C
		1	0	2	2

DESIGN THINKING & INNOVATION

Course Objectives:

This Course will enable students to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

Course Outcomes: Students are able to

COs	Statement	Blooms Level
CO1	Define the concepts related to design thinking.	L1
CO2	Explain the fundamentals of Design Thinking and innovation.	L2
CO3	Apply the design thinking techniques for solving problems in various sectors.	L3
CO4	Analyse to work in a multidisciplinary environment.	L4
CO5	Evaluate the value of creativity.	L5

UNIT – I **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 - II **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 - III **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.

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UNIT - IV 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 modeling, how to set specifications, Explaining their own product design.
UNIT – V 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.
Textbooks: 1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009. 2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.
Reference Books: 1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018. 2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018. 3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010. 4. Chesbrough.H, The era of open innovation, 2003.
Online Learning Resources: 1. https://nptel.ac.in/courses/110/106/110106124/ 2. https://nptel.ac.in/courses/109/104/109104109/ 3. https://swayam.gov.in/nd1_noc19_mg60/preview 4. https://onlinecourses.nptel.ac.in/noc22_de16/preview

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BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE ODALAREVU – 533210
Andhra Pradesh, India

II Year – I Semester	Subject code: 23BS3T09	L	T	P	C
		3	0	0	3

DISCRETE MATHEMATICS AND GRAPH THEORY

(CSE, CSE-AIML, AIML, CSE-AI&DS and IT)

Course Objectives:

1. To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
2. To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this Discipline and the area of computer science.

Course Outcomes:

Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Identify programming errors efficiently through enhanced logical capabilities.	BL2
CO2	Discover set theory, graph of the relations which are used in data structures.	BL2
CO3	Demonstrate knowledge of mathematical modeling and a general solution of recurrence equation.	BL4
CO4	Summarize the concepts in graph theory.	BL3
CO5	Develop graph theory concepts in core subjects such as data structures and network theory effectively.	BL3

A.D. Madhuri
(Chairman-BOS)

Dr. G.V.S.R. Deekshitulu
(University Nominee)

Dr. T.S.R. Murthy
(SubjectExpert)

U. Venugopalam

Dr. U. VenuGopalam
(Subject Expert)

Mrs. M.B. Rajeswari
(Member, BOS)

UNIT–I:
Mathematical Logic:

Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers.

UNIT-II:
Set Theory:

Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams,

Functions: Bijective, Composite, Inverse and Recursive Functions.

UNIT-III:
Combinatorics and Recurrence Relations:

Basics of Counting, Binomial and Multinomial Coefficients and Theorems (without proof)- Pigeonhole principle (without proof).

Recurrence Relations: Generating Functions, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT-IV:
Graph Theory:

Basic Concepts, Graph Theory and its Applications, Sub graphs,
Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs.

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(Subject Expert)

Mrs. M. B. Rajeswari
(Member, BOS)

Unit-V:
Multi Graphs:

Multi graphs, Bipartite and Planar Graphs, Euler's Theorem (without proof), Graph Coloring and Covering, Chromatic Number, Spanning Trees, Prim's and Kruskal's Algorithms, BFS and DFS Spanning Trees.

Textbooks:

1. Discrete Mathematical Structures with Applications to Computer Science, **J. P.Tremblay** and **P. Manohar**, **Tata McGraw Hill**.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, **C. L.Liu** and **D.P. Mohapatra, 3rd Edition, Tata McGraw Hill.**
3. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, **SeymourLipschutz** and **Marc Lars Lipson**, **3rd Edition, McGraw Hill**.

Reference Books:

1. Elements of Discrete Mathematics-A Computer Oriented Approach, **C. L.Liu and D.P. Mohapatra, 3rd Edition, Tata McGraw Hill.**
2. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, **Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, McGraw Hill.**
3. Discrete Mathematical Structures, **Bernand Kolman, Robert C. Busby and Sharon Cutler Ross, PHI.**
4. Discrete Mathematics, **S.K. Chakraborthy and B.K. Sarkar, Oxford,2011.**

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BONAMVENKATACHALAMAYYAENGINEERINGCOLLEGE,
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Autonomous

Regulation	**BR23**				
II Year I Semester	**Course Code: 23AC3T01**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**--**
Course Title:	**ENVIRONMENTAL SCIENCE**				

Course Objectives:

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

Course Outcomes:

COs	Statements	Blooms Level
CO1	Graspmulti-disciplinarynatureofenvironmentalstudiesandvarious renewableandnon-renewableresources.	L2
CO2	Understandflow and bio-geo- chemical cycles and ecological pyramids.	L2
CO3	Understandvariouscausesofpollutionandsolidwastemanagement andrelatedpreventivemeasures.	L2
CO4	Understandtherainwaterharvesting,watershedmanagement,ozone layerdepletionandwastelandreclamation.	L2
CO5	Illustratethecausesofpopulationexplosion,valueeducationand welfareprogrammes.	L3

UNIT – I

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 other 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 – II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers,

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				P. Rajesh	

Regulation	BR23				
II Year I Semester	Course Code: 23AC3T01	L	T	P	C
		2	0	0	--
Course Title:	ENVIRONMENTAL SCIENCE				

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 ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation: Introduction and 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.

UNIT – III

Environmental Pollution: Definition, Cause, effects and control measures of: Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards

UNIT – IV

Social Issues and the Environment: 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 – V

Human Population And The Environment: 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.

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				P. Rajesh	

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ODALAREVU-533 210, Andhra Pradesh, India
Autonomous

Regulation	BR23				
II Year I Semester	Course Code: 23AC3T01	L	T	P	C
		2	0	0	--
Course Title:	ENVIRONMENTAL SCIENCE				

Textbooks:

1. ErachBharucha,Text book of Environmental Studies for Undergraduate Courses,Universities Press (India) Private Limited, 2019.
2. Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.
3. S.AzeemUnnisa, Environmental Studies, Academic Publishing Company, 2021.
4. K.RaghavanNambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.
2. M.Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, 2014.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.
4. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.
5. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.
6. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc23_hs155/preview
- https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmentalscience part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2-d84c-4773-8388-1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science++Part+3%3A+Pollution+and+Resources&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmental-science
- http://ecoursesonline.iasri.res.in/Courses/Environmental%20Science-I/Data%20Files/pdf/lec07.pdfhttps://www.youtube.com/watch?v=5QxxaVfgQ3k

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				P.Rajesh	

BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE ODALAREVU – 533210 210, Andhra Pradesh, India

II Year - II Semester	Subject Code: 23HM4T05	L	T	P	C
		3	0	0	3

OPTIMIZATION TECHNIQUES

(CSE-AIDS,AIML,CSE-AIML,IT)

Course Objectives:

- To define an objective function and constraint function in terms of design variables,
- And then state the optimization Problem.
- To state single variable and multi variable optimization problem, without and with constraints.
- To explain linear programming technique to an optimization problem, define slack and surplus variables by using Simplex method.
- To state transportation problem and assignment problem as a linear programming problem to determine Simplex method.

To study and explain nonlinear programming techniques, unconstrained or constrained and define exterior and interior penalty functions for optimization problems.

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	State and formulate the optimization problem, without and with constraints by using design variables from an engineering design problem	BL1
CO2	Apply classical optimization techniques to minimize or maximize a multi-variable objective function without or with constraints and arrive at an optimal solution	BL3
CO3	Apply and solve transportation and assignment problem by using Linear programming simplex method	BL3
CO4	Apply Gradient and Non Gradient Methods to Non Linear Optimization problems and use interior or exterior penality functions for the constraints to derive the optimal solution.	BL3
CO5	Formulate and Apply Dyanamic programming technique to inventory control production planning,engineering design problems etc to reach a final optimal solution from the current optimal solution.	BL2

UNIT-1 : Introduction and Classical Optimization Techniques

Statement of an Optimization problem, design vector, design constraints, constraint surface, objective function , objective function surfaces, classification if optimization problems.

Classical optimization techniques: Single variable optimization, multi variable optimization without constraints, necessary and sufficient conditions for minimum/maximum multi variable optimization with equality constraints. Solution by method Lagrange's multipliers, multi variable optimization with inequality constraints, Kuhn-Tucker conditions.

UNIT II: Linear Programming

Standard form of a linear programming problem, geometry of linear programming problems, definitions and theorems, solution of a system of linear simultaneous equations, pivotal reduction of a general system of equations, motivation to the simplex method, simplex algorithm.

UNIT III: Transportation Problem

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method, testing for optimality of balanced transportation problems, Special cases in transportation problem

UNIT IV: Nonlinear Programming

Unconstrained cases, One – dimensional minimization methods: Classification, Fibonacci method, Univariate method, steepest descent method. Constrained cases– Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method, Basic approaches of Interior and Exterior penalty function methods,

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Dr. M.Sree Raju)
(Subject Expert)

Dr.B Charwak
(Subject Expert)

P V Sandhya
(Member, BOS)

UNIT V: Dynamic Programming Dynamic programming multistage decision processes, types, concept of sub optimization and the principle of optimality, computational procedure in dynamic programming, examples illustrating the calculus method of solution, examples illustrating the tabular method of solution.
Textbooks: 1. "Engineering optimization: Theory and practice", S. S.Rao, New Age International (P) Limited, 3rd edition, 1998. 2. "Introductory Operations Research", H.S. Kasene& K.D. Kumar, Springer (India), Pvt.LTd.
Reference Books: 1. "Optimization Methods in Operations Research and systems Analysis", by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996. 2. Operations Research, Dr.S.D.Sharma, Kedarnath, Ramnath& Co.

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II Year - II Semester	Code: 23BS4T11	L	T	P	C
		3	0	0	3

PROBABILITY AND STATISTICS

(CSE, AIML, CSE-AIML, IT)

Course Objectives:

The learning objectives of this course are to:

- To familiarize the students with the foundations of probability and statistical methods.
- To impart probability concepts and statistical methods in various applications Engineering.

Course Outcomes:

Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Classify the concepts of data science and its importance.	BL2
CO2	Interpret the association of characteristics and through correlation and regression tools.	BL4
CO3	Apply discrete and continuous probability distributions.	BL3
CO4	Design the components of a classical hypothesis test.	BL6
CO5	Infer the statistical inferential methods based on small and large sampling tests.	BL4

Unit – I:

Descriptive statistics and methods for data science:

Data science – Statistics Introduction – Population vs Sample –Collection of data – primary andsecondary data – Type of variable: dependent and independent Categorical and Continuous variables– Data visualization – Measures of Central tendency – Measures of Variability – Skewness – Kurtosis

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(Subject Expert)

Mr. P. Ganga Raju
(Member, BOS)

UNIT – II:
Probability and Distributions:

Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution functions – Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Gaussian distributions

UNIT – III:
Small and Large samples:

Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only) – Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof) .

UNIT – IV:
Tests of Hypothesis:

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Test of significance for large samples and Small Samples: Single and difference means – Single and two proportions – Student's t- test, F-test, χ^2-test

UNIT – V:
Correlation and Regression:

Correlation – Correlation coefficient – Rank correlation. Linear Regression: Straight line – Multiple Linear Regression - Regression coefficients and properties – Curvilinear Regression: Parabola – Exponential – Power curves.

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Mr. P. Ganga Raju
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Text Books:

1. **Miller and Freund's**, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. **S. C. Gupta and V.K. Kapoor**, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012. Reference

Reference Books:

1. **Shron L. Myers, Keying Ye, Ronald E Walpole**, Probability and Statistics Engineers and the Scientists,8th Edition, Pearson 2007.
2. **Jay l. Devore**, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M. Ross**, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. **Johannes Ledolter and Robert V. Hogg**, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

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II Year - I Semester	Code: 23HM3T02	L	T	P	C
		2	1	0	3

UNIVERSAL HUMAN VALUES-UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT
(Common to all)

Course Objectives:

The learning objectives of this course are to:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards lifeand profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holisticperspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	BL1,2
CO2	Identify one's self, and one's surroundings (family, society nature).	BL1,2
CO3	Apply what they have learnt to their own self in different day-to-day settings inreal life	BL3
CO4	Relate human values with human relationship and human society.	BL4
CO5	Justify the need for universal human values and harmonious existence	BL5
CO6	Develop as socially and ecologically responsible engineers	BL3,6

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Mr. M.Raja
(Member)

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue

UNIT I Introduction to Value Education (6 lectures and 3 tutorials for practicesession)

Lecture 1: Right Understanding, Relationship and Physical Facility (HolisticDevelopment and the Role of Education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 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 Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and thebody.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self andbody.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the selfLecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

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UNIT I11

Harmony in the Family and Society (6 lectures and 3 tutorials for practicesession)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 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 Session PS9 Exploring Systems to fulfil Human Goal

UNIT I V Harmony in the Nature/Existence (4 lectures and 2 tutorials for practicesession)

Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment amongthe Four Orders of Nature
Tutorial 10: Practice Session PS10 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 Session PS11 Exploring Co-existence in Existence.

UNIT V Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education Humanistic Constitution andUniversal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 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 Session PS14 Exploring Steps of Transition towards Universal Human Order

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Practice Sessions for UNIT I – Introduction to Value EducationPS1 Sharing about Oneself

PS2 Exploring Human ConsciousnessPS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human BeingPS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the selfPS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and SocietyPS7 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 ProfessionalEthics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

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Mr. M.Raja
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Text Books:

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

The Teacher's Manual

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

Reference Books:

1. *JeevanVidya: EkParichaya,* A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi
5. *Small is Beautiful* - E. F Schumacher.
6. *Slow is Beautiful* - Cecile Andrews
7. *Economy of Permanence* - J C Kumarappa
8. *Bharat Mein Angreji Raj* – PanditSunderlal
9. *Rediscovering India* - by Dharampal
10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi
11. *India Wins Freedom* - Maulana Abdul Kalam Azad
12. *Vivekananda* - Romain Rolland (English)
13. *Gandhi* - Romain Rolland (English)

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Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elementsto help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the studentto connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based onbasic human values.It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essentia

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Online Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%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-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203- Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3- S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023- 25%20Ethics%20v1.pdf

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