GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY::NELLORE
(AUTONOMOUS)
Accredited by NAAC with "A" Grade, Accredited by NBA (B.Tech., - ECE, EEE & Mech: 2021-2024)
TRAINING PLACEMENTS & CAREER GUIDANCE CELL

DSA with PYTHON For II-II-AI&ML,AI&DS

Lecture	Topic	Description	Time	Trainer Explination problems	Student Practice Problems
Programming Constructs	python Basic Constructs	Comments,Operators,Input and Output,Wrapper classes, Type conversion in python	WEEK-1	1) Write a program to Convert Fahrenheit to Celsius and vice-versa. 2) Finding the square root of a given number 3) Finding compound interest 4) Area of a triangle using heron's formulae 5) Write a program to find the max and min of four numbers using if-	1)greatest number among 3 numbers 2)swap with out temporary variable 3)area of rectangle , circle 4)Fizz buzz 5)Check the numbr is power of 2 6)Happy Birthday 7)Weather humid or not 8)Milkman 9)Divisible By Six
	python Flow Control	if…else,nested-if,else-if laddur,Switch-Case ,Example programs			
	Loops	while loop,for loops,for-else,break,continue statement,Math Problems using loops			
	Patterns ,Series	Introduction to patterns & Series,Series Programs,Basic Patterns, Square Patterns, Triangular Patterns, Character Patterns, Reverse Triangle, Inverted patterns,Isosceles triangles	WEEK-2	1) Write a Program to check whether given number is a Armstrong or not 2) Write a Program to compute sine and cosin series 3) Write a program to print first n terms of a fibonacci series 4)print natural number series upto N 5) Write a program to check whether given number is prime number or	1)factors of a number 2)print even number series upto N 3) sum of digits up to single digit 4) find GCD ,LCM 18)count set bits 5)reverse a number 6)strong number 7) convert binary to decimal 8)convert decimal to octal 9)Inverted Right-Angled Triangle '*'
	Function	Inroduction to Function,Scope and Life of Variable,Function Arguments,Return types			
Problem Solving Techniques	Recursion	Introduction to recursion, Principle of mathematical induction, Fibonacci numbers	WEEK-3	1)Convert Decimal to Binary 2)Convert Binary to Hexadecimal 3)Write a c program to calculate factorial of a given number using recursive function. 4)Check the number is power of 3 5)Write a recursive function to	1))print odd number series upto N 2)check harshad number 3)cyclic sum of digits 4)Find sum of digits using recursion 5)Find GCD using recursion
	Time and space complexity	Theoretical Time and Space complexity analysis, Time and Space complexity analysis of non-recursive and recursive algorithms			

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	Effient Approach ,TLE	Choosing Efficien Approach to solve problem ,what is TLE,how to avoid TLE,soving more coding problems on hackerrank,codechef,work@teck		generate Fibonacci series. 6)Write a recursive function to find the lcm of two numbers	
Python Data Structures	LIST	What is List in Python,Methods in List,predefined Mthods on collection	WEEK-4	1)Write a program to find the min and max of a 1D integer array 2)Write a program to reverse of a 1D integer array. 3)find second smallest of 1D array 4)find second largest of 1D array 5) find missing number in array 6)finding frequency of characters of string using dictionay	1)Find pair whoes sum is target in array 2)Max in Matrix 3)sum of all odd numbers in array 4)Adjacent Zeros 5)Rotate Array K elements to Right 6)check High Fever employees in COVID 7)Cumulative Sum of elements of array
	TUPLE	What is Tuple in Python,Methods in Tuple			
	SET	What is Set in Python,Methods in Set			
	DICTIONARY	What Dict in Python,Methods in Dict,application of Dict			
ARRAYS	Introduction to 1D arrays	Introduction to arrays, How arrays are stored in memory, Passing arrays to functions,Problems on 1D array			
	Searching	Understanding & Analysis of Linear Search, Binary Search,Probalems on Searching	WEEK-5	1)Write a program to perform Linear search on 1D array. 2)Write a program to perform Binary search on 1D array. 3)Search Insert Position 4)Sqrt(x) 5)Missing Number	1)Find Smallest Letter Greater Than Target 2)Find First and Last Position of Element in Sorted Array 3)Kth Missing Positive Number 4)Count Negative Numbers in a Sorted Matrix 5)Intersection of Two Arrays
	Sorting	Understanding & Analysis of Selection sort, Bubble sort, Insertion sort,Quick sort,Merging two sorted arrays,Merge sort,Problems on Sorting	WEEK-6	1)implement bubble sort 2)implement selection sort 3)implement QuickSort 4)implement MergeSort 5)implement frequency sort(using Lambda expession)	1)How Many Numbers Are Smaller Than the Current Number 2)Sort the People 3)Sort Characters By Frequency 4)Merge Sorted Array 5)Remove Duplicates from Sorted Array
Strings & 2DArrays	Strings	Introduction to strings, storage of strings and their inbuilt functions,Problems on Strings , Recurion using in string problems	WEEK-7	1)Implementation of string manipulation operations without library function. a) Copy b) Concatenate c) Length 2)check string is palindrome 3)count vowels and consonents 4)print ascii value of char	1)Words in Sentence 2)Remove Special Characters from a String 3)upper case and lower case convertion 4)Replace Each Vowel with the Next Character 5)Find the First Repeating Character

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	2D Arrays	2D arrays, Storage of 2D arrays, Example problems using 2D Arrays,Recursion using in 2D array problems	WEEK-8	1)Write a program for Addition of two square Matrices. 2)Write a program for Multiplication of two square Matrices 3)Print Sum of Both Diagonals of a Matrix 4) Print Row wise Sum of Matrix	1) Print Column wise Sum of Matrix 2) Set Matrix Zeroes 3) Lucky Numbers in a Matrix 4)Find Winner on a Tic Tac Toe Game
Object-oriented programming	Basics of OOP	Introduction to oops, Creating objects, Access Specifiers, Getters, and setters, Constructors and related concepts, Inbuilt constructor and destructor, Example classes	WEEK-9	1)Create a Course class and instantiate courses like Python 101. 2)Add private attributes (e.g., __course_id) to Course and expose them using get_course_id() / set_course_id(). 3)Define constructor in Course to initialize title, instructor, etc. 4)Add @staticmethod in Course to track total number of courses created.	
	Advance concepts OOP	Static members, final members,Method overloading and related concepts, Abstraction, Encapsulation, Inheritance, Method overriding,super, Polymorphism, Abstract classes,interface			
	Exception handling	Introduction Python Exception Handling, try, catch, finally,Types of Exceptions,StackTrace	WEEK-10	1)Simulate ValueError, KeyError when parsing user submissions. Display custom error messages. 2)Create CourseLimitExceededError and raise it when student exceeds max course enrollments. 3)Discuss using threads for chat systems (I/O-bound) and	
	Multi Threading	What is a Process,What is a Thread,Thread Cycle,What is Multithreading,Multithreading vs Multiprocessing, Synchronizing Threads,Advantages of Multithreading			
Linear Data Structures	Linked lists	Introduction to linked list,LisnkedList STL, Inserting node in linked list, Deleting node from linked list, Midpoint of linked list, Merge two sorted linked lists, merge sort of a linked list, Reversing a linked list	WEEK-11	1)Implement a basic SinglyLinkedList,DoubleLinkedList and traverse it to print values 2)Insert into SinglyLinkedList, DoubleLinkedList(First,Last,Middle) 3)Delete from SinglyLinkedList, DoubleLinkedList(First,Last,Middle) 4) Midpoint of linked list	1)Merge two sorted linked lists, merge sort of a linked list, 2)Reversing a linked list 3)Delete duplicate-value nodes from a sorted linked list 4)Print the LinkedList in Reverse

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	Stacks and Queues	Introduction to stacks, Stack STL,Stack using arrays, Dynamic Stack class,Stack using linked list, Inbuilt stack, Queue STL,Queue using arrays, Dynamic queue class, Queue using linked list, Inbuilt queue	WEEK-12	1)Implementation of stack operations using STL,LinkedList 2)Implementation of queue operations using STL,LinkedList 3)Valid Parentheses Problem 4)Sliding Window Problem	1)Next Greater Element(gfg practice) 2)Next Greater Element I 3)Implement Stack using Queue 4)Implement Queue using Stack 5)Reverse 1st K Elements of Queue