



Logic Building Through PYTHON For II-II-ME,CIVIL

| Lecture | Topic | Description | Time | Trainer Explanation 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-else. 6) Write a program to generate electricity bill. 7) Find the roots of the quadratic equation. 8)Write a program to simulate a calculator using switch case. 9) Write a program to find the given year is a leap year or not. 10) Write a program to find grades of a student using else – if -ladder. Percentage Grade >= 90 Outstanding >=80 to <90 Excellent | 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 | | | |
| Programming Constructs | 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 not. 6)sum of digits 7) Write a program to check whether given number is Perfect or not. 8) Write a program to print rightTriangle stars 9)print square rectangle ' * 'square pattern 10)print primes in range | 1)factors of a number 2)print even number series upto N 3) sum of digits up to single digit 4) find GCD ,LCM 5)reverse a number 6)strong number 7) convert binary to decimal 8)convert decimal to octal 9)Inverted Right-Angled Triangle '*' |

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| | Function | Introduction to function, Scope of Variable in Python, Function Arguments, *args and **kwargs in Python, Packing and Unpacking Arguments in Python, Lambda Expression | WEEK-3 | 1) Convert Decimal to Binary 2) Convert Binary to Hexadecimal 3) Write a 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 generate Fibonacci series. 6) Write a recursive function to find the LCM of | 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 |
| | Recursion | Introduction to recursion, Principle of mathematical induction, Fibonacci numbers | | | |
| Problem Solving Techniques | Time and space complexity | Theoretical Time and Space complexity analysis, Time and Space complexity analysis of non-recursive and recursive algorithms | WEEK -4 | 1) Explain Prime number logic with different approaches 2) Finding Time complexity for Different Coding snippets | |
| | Efficient Approach, TLE | Choosing Efficient Approach to solve problem, what is TLE, how to avoid TLE, solving more coding problems on hackerrank, codechef, work@teck | | | |
| Python Data Structures | LIST | What is List in Python, Methods in List, predefined Methods on collection | WEEK-5 | 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) finding frequency of characters of string using | 1) Find pair whose sum is target in array 2) sum of all odd numbers in array 3) Adjacent Zeros |
| | 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 | WEEK-6 | 1) find missing number in array 2) finding frequency of elements of array using dictionary | 1) Rotate Array K elements to Right 2) check High Fever employees in COVID 3) Cumulative Sum of elements of array |
| | Searching | Understanding & Analysis of Linear Search, Binary Search, Problems on Searching | WEEK-7 | 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) 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 |
| | Sorting | Understanding & Analysis of Selection sort, Bubble sort, Insertion sort, Quick sort, Merging two sorted arrays, Merge sort, Problems on Sorting | WEEK-8 & WEEK-9 | 1) implement bubble sort 2) implement selection sort 3) implement QuickSort 4) implement MergeSort 5) implement frequency sort (using Lambda expression) | 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 |

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| Strings & 2D Arrays | Strings | Introduction to strings, storage of strings and their inbuilt functions, Problems on Strings , Recursion using in string problems | WEEK-10 & WEEK-11 | 1) Implementation of string manipulation operations without library function. a) Copy b) Concatenate c) Length 2) check string is palindrome 3) count vowels and consonants 4) print ascii value of char | 1) Words in Sentence 2) Remove Special Characters from a String 3) upper case and lower case conversion 4) Replace Each Vowel with the Next Character 5) Find the First Repeating Character |
| | 2D Arrays | 2D arrays, Storage of 2D arrays, Example problems using 2D Arrays, Recursion using in 2D array problems | WEEK-12 | 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 |
| NOTE: Problems will be discussed limited as per their IQ | | | | | |