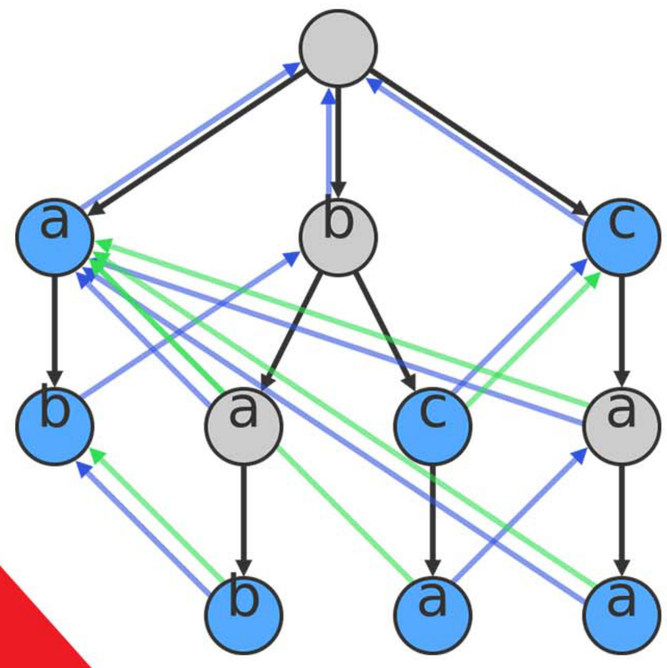
DESTINATION codegnan®



C & Data Structures and Algorithms

Duration: 3 Months

C Programming Curriculum

C Language

- ☑ Introduction to C
- ☑ History of C
- ☑ Features of C
- ☑ Application Areas of C
- ☑ Execution flow of c program
- ☑ Other translators
- ☑ Structure of C Program with Example
- ☑ Keywords

Hands-On - Installations of compilers,IDES.

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Basic Concepts

- ☑ Tokens
- ☑ identifiers
- ☑ constants
- ☑ variables
- ☑ Data Types
- ☑ input and output functions
- ☑ Qualifiers
- ☑ Modifiers
- ☑ Escape sequences

Hands-On -Execution of Basic Programs with different data types ,i/o functions and other concepts.

Operators and Expressions

- ☑ Arithmetic operators
- ☑ Relational operators
- ☑ Logical operators
- ☑ Assignment operators
- ☑ Increment & decrement operators
- ☑ Conditional/ternary operator
- ☑ Bitwise operator
- ☑ Sizeof operator
- ☑ Comma operator
- ☑ Operators Precedence and Associativity
- ☑ Expressions
- ☑ Evaluation of Expressions

Hands-On Execution of all types operators and explain how expressions are simplified .

Control Structures

- ☑ While
- ☑ For
- ☑ Do..While
- ☑ Goto Statement
- ☑ Break and Continue Statement

Hands-On - usage of Control Structures with different scenarios.

Control /Decision Making Statements

- ☑ Simple if
- ☑ if..else
- ☑ Nested if
- ☑ if..else ladder
- ☑ Switch..Case statement
- ☑ find out given number is even or odd
- ☑ find out given character is uppercase or lowercase or digit
- ☑ find the biggest of 3 numbers
- ☑ find out given char is vowel or consonant
- ☑ find out given number is divisible by 2 or 3 or not
- ☑ find out day from a week
- ☑ find out given year is leap year or not
- ☑ develop a calculator based on user input ,if input is + do add,- is sub,* is mul and / is div.
- ☑ read ssc marks of students based on marks scores give grades A,B,C,D & Fail.

Hands-On -Observation of above control flow statements with following suitable Examples.

Assignments

- ☑ program to find the sum of first n natural numbers
- ☑ program to find the sum of digits of the number
- ☑ program to find the reverse of the number
- ☑ given number is palindrome or not
- ☑ print the fibonacci series
- ☑ armstrong number(3 digit and n digit armstrong no also)
- ☑ perfect number
- ☑ strong number
- ☑ root digit of a number
- ☑ prime no r not
- ☑ print 1 to n prime numbers
- ☑ print first n prime numbers
- ☑ lcm and hcf of 2 numbers
- ☑ 1+1/2+1/3+.....+1/n=find sum of the series and print the series

Hands-On - Performing set operations in a program

Math.h Library

- ☑ abs(int x)
- ☑ floor()
- ☑ ceil()
- ☑ sqrt()
- ☑ pow()
- ☑ exp()
- ☑ log() and etc.....

Hands-On - practice various built in functions of Math Library.

Arrays

- ☑ Introduction to arrays
- ☑ Types of arrays
- ☑ 1d array
- ☑ 2d array (matrix)

Assignments

- ☑ find max element from array
- ☑ find 2 max element from array
- ☑ sort and search
- ☑ trace & difference of sum of 2 opposite diagonals.
- ☑ Decimal to Binary conversion
- ☑ Repeated element and count
- ☑ Rotate the array elements k times(left & right)
- ☑ String declaration and initialization

Hands-On - Observation of sorting,searching and rotating array.

Strings

string.h library

- ☑ strlen(str)
- ☑ strcpy(des_str,src_st r)
- ☑ strcat(desc_str,src_str)
- ☑ strrev(str)
- ☑ strcmp(str1,str2)
- ☑ strlwr()
- ☑ strupr()

Assignments

- ☑ find the sum of numericals from the given Alphanumeric Input.
- ☑ find the frequency of each character in a given string.
- ☑ write the output code for the following inputs.

  Input:codegnan it solutions

  Output:nangedoc ti snoitulos
- ☑ write the output code for the following inputs.

  Input:codegnan it solutions

  Output:solutions it codegnan
- ☑ Find out strings are anagrams or not
- ☑ Find out string is palindrome or not without using string functions
- ☑ write the output code for the following inputs.

  Input:venu java

  Output:afov obab

Hands-On - EXECUTION of above mentioned programs.and use cases of String functions.

Functions

- ☑ function types
- ☑ built in functions
- ☑ user defined functions
- ☑ Recursive functions
- ☑ call by value and call by reference

Assignments

- ☑ find out the sum of 2 nos with above 4 ways based on function signature.
- ☑ find the factorial of given no by using function
- ☑ find the sum of first n natural nos using function
- ☑ find the square & cube of a given no by using function
- ☑ find the area and perimeter of a given circle by using function
- ☑ find the area of triangle using function
- ☑ find the ncr value
- ☑ program to print the pascal triangle by using function
- ☑ swapping of 2 nos using call by value and call by reference
- ☑ passing array as an argument calculates sum and average of given array elements.

Recursions

- ☑ find the factorial of given no by using recursive function
- ☑ find the sum of first n natural nos by using recursion
- ☑ find the gcd of 2 nos by using recursion
- ☑ find the root digit of the no by using recursion
- ☑ Program to calculate power using recursion

Hands-On - practice recursive and non-recursive functions.

Storage Classes

- ☑ auto
- ☑ static
- ☑ extern
- ☑ register

Others

- ☑ Command Line Arguments
- ☑ const
- ☑ preprocessor directive statements

Hands-On -Observes the storage classes Behaviour.

USER DEFINED DATATYPES

- ☑ Structure
- ☑ Union
- ☑ enum
- ☑ typedef

Hands-On - Observe the differences of Struct and Union with different examples.

Pointers

- ☑ Pointer types
- ☑ Void Pointer
- ☑ Null Pointer
- ☑ Wild Pointer
- ☑ Dangling Pointer
- ☑ Array of Pointers
- ☑ Pointer to Pointer
- ☑ Pointer Arithmetic

Hands-On -practice various pointer types.

Dynamic memory allocation

- ☑ malloc()
- ☑ calloc()
- ☑ realloc()
- ☑ free()

Hands-On - usage of above functions.

Files

- ☑ Concept of a file
- ☑ Streams
- ☑ Text File and Binary Files
- ☑ Opening and Closing Files
- ☑ File Input / Output Functions
- ☑ Formatted Input-Output Functions
- ☑ Character Input-Output Functions

Hands-On -Working with different file modes and file related functions.

Hands-on : Project Implementation from scratch.

Name: Project - Banking Management System uses following functionalities

- ☑ **menu()** – This function shows a menu or welcome screen that allows you to execute the various banking tasks listed below.
- ☑ **new acc()** – Creates a new customer account using this function. It requests the customer's name, date of birth, citizenship number, address, and phone number, among other personal and financial information.
- ☑ **view list()** – Displays a list of items. This feature allows you to access the customer's
- ☑ banking information, including the account number, name, address, and phone number supplied when the account was created.
- ☑ **edit()** – This method has been used to update the address and phone number associated with a specific customer account.
- ☑ **transact()** — This method allows you to deposit and withdraw funds from a specific client account.

Data Structures and Algorithms

Module I

Stacks, Queues, Linked Lists, Trees, Heaps, Tries

Stack

- ☑ Implementation of Stack using Arrays
- ☑ Implementation of Stack using Linked List

Queue

- ☑ Implementation of Queue using Arrays
- ☑ Implementation of Queue using Linked List
- ☑ Implementation of Queue using Stack

Circular Queue

- ☑ Implementation of Circular Queue
- ☑ Double Ended Queue

Priority Queues

- ☑ Min Heap
- ☑ Max Heap
- ☑ Basics Of Linked Lists

Types of Linked List

- ☑ Insertion Operation
- ☑ Deletion Operation
- ☑ Search Operation
- ☑ Sorting Operation
- ☑ Reverse Operation
- ☑ Cloning a Linked List

Basic of Trees

- ☑ Tree Traversals
- ☑ Height and Depth of Tree
- ☑ CBT and FBT

Binary Search Trees (BST)

- ☑ Insertion Operation
- ☑ Deletion Operation
- ☑ Search Operation
- ☑ Problems on BST

Hands-On -Observes the storage classes Behaviour.

Trie Data Structure

- ☑ Dictionary
- ☑ Prefix matching
- ☑ Bit manipulation with Trie

Hands-on Implementation for every concept

Module II
Sorting, Searching, Hashing ,Arrays, Strings

Sorting Techniques

- ☑ Bubble Sort
- ☑ Insertion Sort
- ☑ Selection Sort
- ☑ Shell Sort
- ☑ Merge Sort
- ☑ Quick Sort
- ☑ Radix Sort

Searching Techniques

- ☑ Linear Search
- ☑ Binanry Search

Applications of Binary Search

- ☑ Lower Bound and Upper Bound
- ☑ Finding Frequency
- ☑ Optimization Problems

Hashing

- ☑ Why Hashing
- ☑ Hashing Techniques
- ☑ Collision Resolution Techniques
- ☑ Linear Probing
- ☑ Quadratic Probing
- ☑ Double Hashing
- ☑ Rehashing
- ☑ Two Pointer Techniques
- ☑ Master's Theorem

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- ☑ strlen(str)
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- ☑ strrev(str)
- ☑ strcmp(str1,str2)
- ☑ strlwr()
- ☑ strupr()

Maps

- ☑ Syntax of Maps
- ☑ Usages of Maps
- ☑ Time Complexities

Sets

- ☑ Syntax of Sets
- ☑ Usages of Sets
- ☑ Time Complexities

Hands-on Implementation for every concept

Module III
Dynamic Programming and Graph Theory

Basics of Dynamic Programming

- ☑ Memoization
- ☑ Tabulation
- ☑ Applications of Fibonacci

Hands-On -practice various pointer types.

Subarrays and subsequences

- ☑ Maximum Sub array sum
- ☑ Non Adjacent Subsequence
- ☑ Longest Increasing Subsequence

Graph Theory

- ☑ Definition of Graph
- ☑ Graph Representation

Stacks, Queues, Linked Lists, Trees, Heaps, Tries Stack

- ☑ Implementation of Stack using Arrays
- ☑ Implementation of Stack using Linked List

Graph Traversals

- ☑ Depth First Search
- ☑ Breadth First Search

Important Graph Algorithms

- ☑ Dijkstra's Algorithm
- ☑ Topological Sorting
- ☑ Kruskal Algorithm

Hands-on Implementation for every concept