**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

**PROGRAMMING FOR PROBLEM SOLVING**

**Course Code:** UI21ES120CS **Faculty Name**: T. Jalaja **Class:** B.E 1/4 CSE-A **Semester:** I

**Academic Year:** 2021-22

**INTRODUCTION TO THE COURSE**

This course aims to provide the students with a foundation in computer programming. The goals of the course are to develop the basic programming skills in students, and to improve their proficiency in applying the basic knowledge of programming to solve problems related to their field of engineering. This course introduces structured programming concepts using C language along with problem solving skills.

C Language is used for development of operating systems like Windows or Linux, several popular compilers, embedded softwares. It is relatively faster than Java or Python, as it is compiler-based. Some of the simplest games are coded in C such as Tic-Tac-Toe, the Dino game, the Snake game. It is helpful for learning the new programming platforms as well.

**UNIT-I**

**Significance**: This unit introduces the basics of Computer systems, Number systems and computer languages. It focuses on designing flowcharts and algorithms for solving a given problem using the fundamentals of programming. An algorithm is a step-by-step analysis of the process, while a flowchart explains the steps of a program in a graphical way. Algorithm and flowcharts helps to clarify all the steps for solving the problem.

This unit helps in understanding the concept of input and output devices of Computers, how it works and recognize the basic terminology used in computer programming.  Algorithm and flowchart are the powerful tools for learning programming. Flowchart can be helpful for both writing programs and explaining the program to others. Students will be able to design the flowchart and algorithmic solution for the given problem. They can develop and improve the critical and logical thinking skills.

**Applications:**

* Algorithm- Dijkstra’s algorithm is very powerful algorithm used by Google maps to find the shortest path.
* Flowchart- Representation of the business processes and the flow of a custom-order process through various departments within an organization.

**UNIT-II**

**Significance**: This unit explains the different control structures used to build the logic and develop the programs- selection control statements, Loop control statements and Jump statements. Functions are discussed to develop modular programs.

Control statements enable to specify the flow of program control; ie, the order in which the instructions in a program must be executed. They make it possible to make decisions, to perform tasks repeatedly or to jump from one section of code to another.

Students will be able to apply decision making, looping constructs and functions to develop programs for a given problem. They will have the ability to convert algorithms to C programs utilizing interactive input and output, arithmetic expressions, repetition and decision making.

**Applications:**

* The printf() is a standard library function to send formatted output to the screen in C language
* Calculate the total marks scored by each student in a class.

**UNIT-III**

**Significance**: This unit introduces how to write recursive functions, which help to solve certain problems very easily with few lines of code. Arrays are also discussed which are used to work with the similar type of data. Different searching and sorting techniques are discussed that enable to process the given data in proper manner.

Arrays are used to implement mathematical vectors and matrices. They can store data using arrays and perform searching and sorting operations on the data (Eg: To search for an element in the array, find and remove the duplicate elements, sort the rnos/ marks of the students in ascending /descending order). Students will be able to store related data of same type in arrays and write recursive functions (Eg: Towers of Hanoi) for the problems which can be divided into similar sub problems.

**Applications:**

* Student management system - to store the details of the students.
* Online shopping system - to search whether an item is available or not.

**UNIT-IV**

**Significance**: This unit focuses on the pointers and string concepts in detail – basic pointer, pointer to pointer, Arrays and pointers, Pointer arithmetic, Array of pointer and pointer to functions which is used for dynamic memory allocation and string handling in certain applications.

Most of the applications deal with the strings (example names in any application). Strings are very frequently used by programmers according to their project requirement. Pointers are used to store the address of any data or memory location.

Students can design programs on string handling and operations on arrays using dynamic memory management techniques. They can understand the dynamic behaviour of memory by the use of pointers

**Applications:**

* Most web output on any page of a Java web application will be made up of lots of little Strings of data.
* Operating system- to allocate the memory dynamically
* Super market – to store the names of the items

**UNIT-V**

**Significance**: This unit discusses about the structure datatype which is used for storing records / logically related data together. It also shows how data - input or output can be permanently stored in the files for further processing or reference.

Structures allow storing different data types information inside it at contiguous memory location. Structures and files are used to create and manipulate the data files while developing applications for real world problems (Eg: Store student records, display the list of the students who scored more than 9 CGPA, delete the student details who are transferred to other college..). Students will be able to develop programs to store data and perform operations using structures and files.

**Applications:**

* Define a ‘student’ structure having the attributes (properties) of a student like name, roll, cgpa, dob etc.
* To store and manage Employee records

**Expected Outcomes**

On completion of the course, students will be able to

1. Design flowcharts and algorithms for solving a given problem using the fundamentals of programming.
2. Apply decision making, looping constructs and functions to develop programs for a given problem.
3. Store data using arrays and perform searching and sorting operations on the data.
4. Design programs on string handling and operations on arrays using dynamic memory management techniques.
5. Develop programs to store data and perform operations using structures and files.