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PROGRAMMING IN 'C'

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Chapter 1: Introduction to Algorithms and Programming Languages

① What is Algorithm? Explain the features of Algorithm?

Definition:

An algorithm is a step by step method of solving a problem. It is commonly used for data processing, calculation and other related computer and mathematical operations.

An algorithm is also used to manipulate data in various ways, such as inserting a new data item, searching for a particular item or sorting an item.

Features:

An algorithm should have the below mentioned characteristics / features:

- **Unambiguous** – Algorithm should be clear and unambiguous. Each of its steps (or phases), and their input/outputs should be clear and must lead to only one meaning.
- **Input** – An algorithm should have 0 or more well defined inputs.
- **Output** – An algorithm should have 1 or more well defined outputs, and should match the desired output.
- **Finiteness** – Algorithms must terminate after a finite number of steps.
- **Feasibility** – Should be feasible with the available resources.
- **Independent** – An algorithm should have step-by-step directions which should be independent of any programming code.

2) Explain the Types of Algorithms?

Algorithms can be classified into 3 types based on their structures:

1. **Sequence:** this type of algorithm is characterized with a series of steps, and each step will be executed one after another.

Ex: Write an algorithm to add two numbers entered by user.

Step 1: Start

Step 2: Declare variables num1, num2 and sum.

Step 3: Read values num1 and num2.

Step 4: Add num1 and num2 and assign the result to sum.

sum ← num1 + num2

Step 5: Display sum

Step 6: Stop

2. **Branching:** this type of algorithm is represented by the "if-then" problems. If a condition is true, the output will be A, if the condition is false, the output will be B. This algorithm type is also known as "selection type".

Ex: Write an algorithm to find the largest among three different numbers entered by user.

Step 1: Start

Step 2: Declare variables a,b and c.

Step 3: Read variables a,b and c.

Step 4: If $a > b$ & $a > c$

Display a is the largest number.

Else If $b > a$ & $b > c$

Display b is the largest number.

Else

Display c is the greatest number.

Step 5: Stop

3. **Loop:** for this type, the process might be repeatedly executed under a certain condition. It is represented by "while" and "for" problems. But make sure the process

will end after a number of loops under the condition. This algorithm type is also known as "repetition type".

Ex: Write an algorithm to find the factorial of a number entered by user.

Step 1: Start

Step 2: Declare variables n, factorial and i.

Step 3: Initialize variables

factorial ← 1

i ← 1

Step 4: Read value of n

Step 5: Repeat the steps until i=n

5.1: factorial ← factorial * i

5.2: i ← i + 1

Step 6: Display factorial

Step 7: Stop

3) What is flow chart? What are the symbols used to draw flow charts?

Definition:

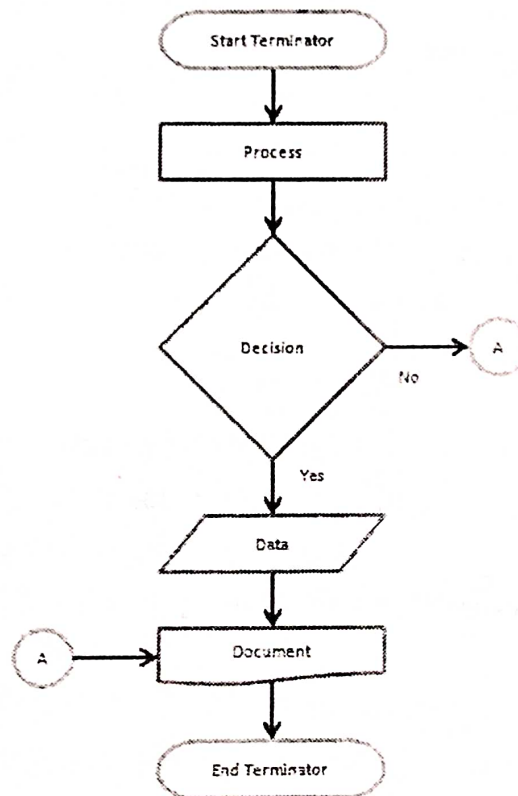
A flow chart is a graphical or symbolic representation of a process. Each step in the process is represented by a different symbol and contains a short description of the process step. The flow chart symbols are linked together with arrows showing the process flow direction.

Symbols used to draw flow chart:

Different flow chart symbols have different meanings. The most common flow chart symbols are:

- **Terminator:** An oval flow chart shape indicating the start or end of the process.
- **Process:** A rectangular flow chart shape indicating a normal process flow step.
- **Decision:** A diamond flow chart shape indicating a branch in the process flow.

- **Connector:** A small, labelled, circular flow chart shape used to indicate a jump in the process flow. (Shown as the circle with the letter "A", below.)
- **Data:** A parallelogram that indicates data input or output (I/O) for a process.
- **Document:** Used to indicate a document or report (see image in sample flow chart below).



4) Explain Pseudo code?

Pseudo code is an informal program description that does not contain code syntax or underlying technology considerations. Pseudo code summarizes a program's steps (or flow) but excludes underlying details.

Example:

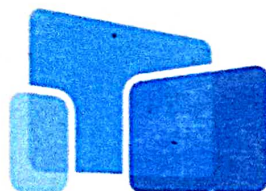
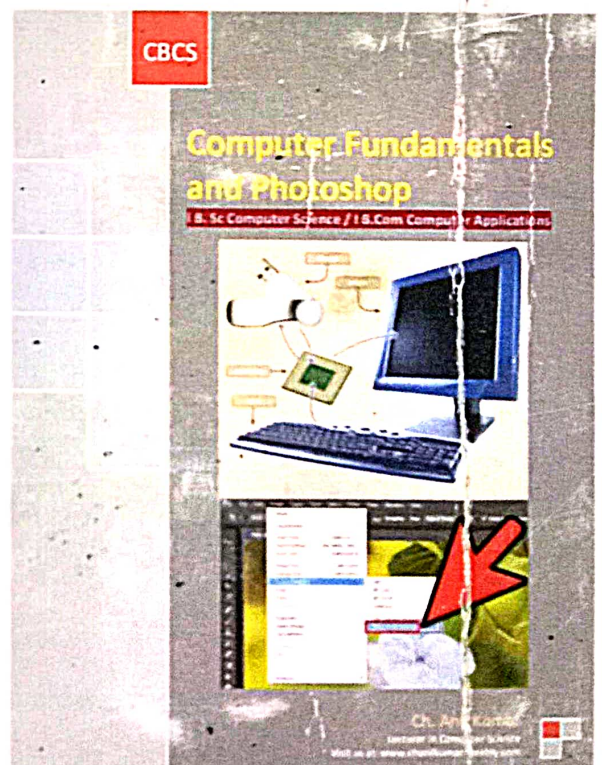
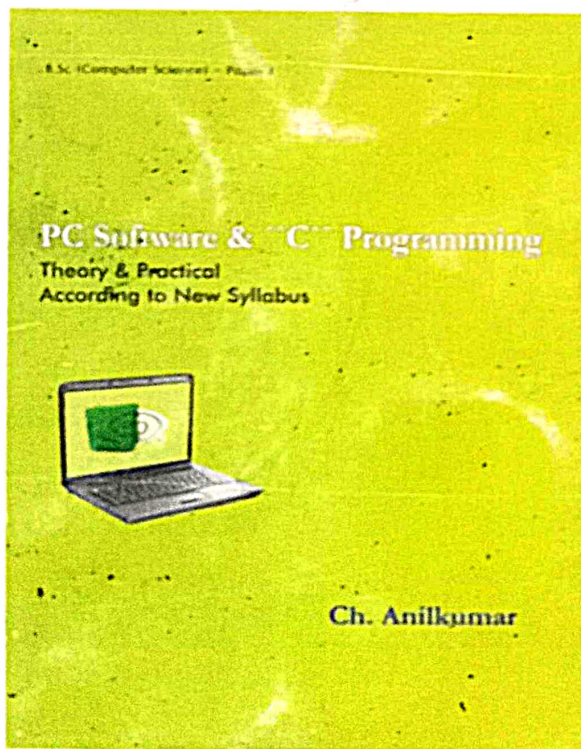
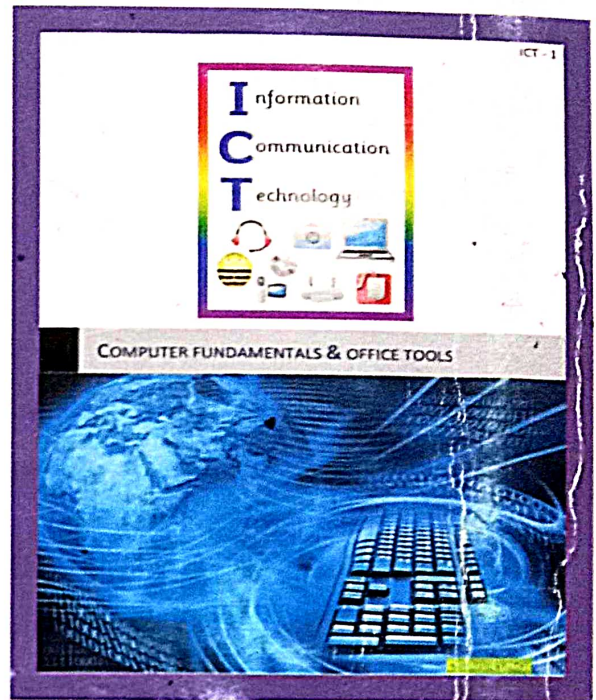
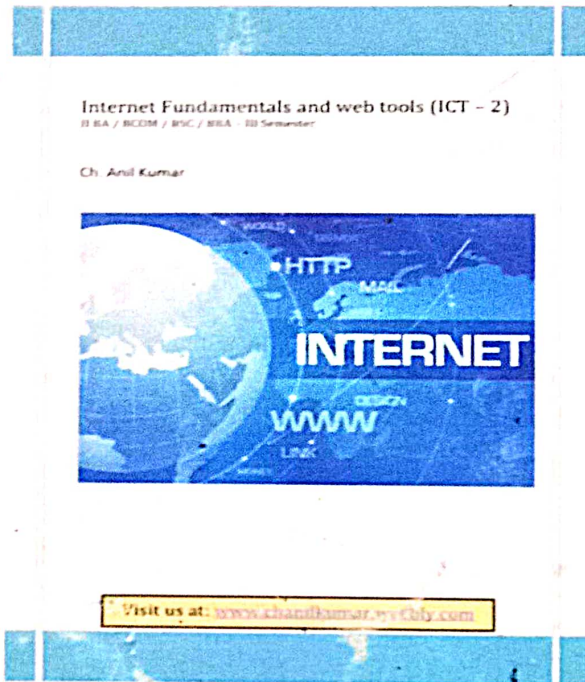
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