Chapter No. 9
PROBLEM SOLVING

Q.9.01 Complete the following statements.

(i) BASIC executes in both the ____________ and ____________ mode.
(ii) Commands are executable in ____________ mode.
(iii) A ____________ symbol is used for the start of the flow chart.
(iv) ____________ shows the direction of flow of control in the flowchart.
(v) The process of finding and removing errors from a computer program is called ____________.

Ans: i) Direct, indirect    ii) direct       iii) Terminal      iv) flow lines        v) debugging

Q.9.02 Which of the following statements is True or False?

(i) Computer programming can be best described as problem solving.
(ii) A parallelogram represents a processing symbol in a flow chart.
(iii) The statement “IS A=A+1” is placed in a processing symbol.
(iv) Debugging is an important part of planning stage.
(v) BASIC operates both in interpreter and compiler mode.
(vi) Key to good programming is testing/debugging
(vii) A computer cannot detect logical errors.

Ans: i) True    ii) False    iii) False    iv) False    v) True    vi) False    vii) True

Q.9.03 Encircle one Choice A, B, C or D I each case

(i) First generation language use
   (A) Pseudo code    (B) Binary code
   (C) Mnemonic code  (D) Decimal code

(ii) In which of the flowchart symbol, the statement “IS A>B” is placed.
    (A) Connector    (B) Rectangular
    (C) Parallelogram (D) Diamond

(iii) Which of the following is not a part of planning stage?
    (A) Developing algorithm    (B) Flowcharting
    (C) Coding the program      (D) Writing pseudocode

(iv) Which type of instructions direct the computer to move information between computer’s memory and I/O unit?
    (A) Control    (B) Input/Output
    (C) Logical    (D) Specification

(v) Name the error which you think to exit in the formula C = C*D/C
    (A) Logical    (B) Syntax
    (C) Execution    (D) NONE
Q.9.04 Match the items given in Column I with those given in Column II

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) PRINT NUM</td>
<td>a) Debugging</td>
</tr>
<tr>
<td>ii) Average = A+B+C/3</td>
<td>b)</td>
</tr>
<tr>
<td>iii) Removing errors of a program</td>
<td>c) Logical error</td>
</tr>
<tr>
<td>iv) A+^2</td>
<td>d) Compilation</td>
</tr>
<tr>
<td>v) Writing Program in HLL</td>
<td>e) Syntax error</td>
</tr>
<tr>
<td>vi) K = K+2</td>
<td>f)</td>
</tr>
<tr>
<td>vii) Translation of High Level Language into Machine code</td>
<td>g)</td>
</tr>
<tr>
<td>viii) IS A&gt;B</td>
<td>h) coding</td>
</tr>
</tbody>
</table>

Ans:  
i) (f)  
ii) (c)  
iii) (a)  
iv) (e)  
v) (h)  
vi) (b)  
vii) (d)  
viii) (g)

Q.9.05 Explain the importance of problem definition in computer with some suitable example.

Ans:  
**Importance of Problem definition:**
Computer cannot perform any task unless it has been defined clearly and correctly in detail. If problem is defined badly than it will be difficult for the computer to solve it. Computer needs planned decision so that every step of the problem should be accumulated with one another.

**Example:**
We study the problem first completely. We come to know that we have to find the area of a triangle. The next thing is to what are the inputs of the triangle. That will be a,b,c and finally it will give the area of triangle.

Q.9.06 Describe the various steps necessary to solve a problem.

Ans:  
**Following are steps to solve a problem.**

1. **Problem Identification stage:**
a. **Defining the problem:** Defining the problem means knowing the objective of the problem.

b. **Analyzing the problem:** It means understanding the problem.

2. **Planning Stage:**
   a. **Developing the algorithm:** It is the step by step problem solving procedure.
   b. **Flow Charting:** It is the pictorial view of the algorithm.
   c. **Writing Pseudocode:** It means writing the algorithm in a simple language.

3. **Coding and Testing stage:**
   a. **Writing the program:** It is converting the algorithm into a computer program using a programming language.
   b. **Testing and debugging the program:** In this step programmer test and remove errors in the program.
   c. **Running the program:** In this step programmer use the program.

4. **Implementation and Documentation:**
   a. **Implementing the program:** It is taking the program and placing it into operation.
   b. **Documenting the program:** It is describing the input, the output it produces and the way the computer must be operated.

Q.9.07 What is an algorithm? What are the characteristics necessary for set of instruction to quality as an algorithm?

**Algorithm:**

**Ans:** Algorithm is a step by step procedure developed to solve a problem before writing an actual program. More precisely an algorithm is a complete procedure or plan that describes the logic of a program.

**Characteristics of Algorithm:**
Following are the characteristics necessary for set of instruction to quality as an algorithm:

- Each and every step should be precise and clear.
- Each step should be performed in a finite time.
- Steps should not be repeated infinitely.
- The desired result should be obtained after the algorithm terminates.

Q.9.08 Write the algorithm for the conversion of temperature from Celsius scale to Fahrenheit scale.

**Ans:** The algorithm for conversion from scale to Fahrenheit scale.

1. Multiply 1.8 by Celsius temperature.
2. Add this result to 32.
Q.9.09 What is a flow chart? What are its advantages?

Flowchart:
A flowchart is a pictorial view that illustrates the algorithm. Flow charts are perhaps the best method for expressing what the computer is going to do. It demonstrates clearly the logical flow of the computer program.

Advantages of Flow Chart:
Following are the advantages of Flow Chart:
- The flow chart helps us in planning work in an organized manner.
- A flow chart can help the persons, the one who is running the program and someone else who is reviewing the program.
- Easy to understand the flow of the computer program.

Q.9.10 Describe the four symbols used in flow chart.

Ans: There are mainly six basic symbols that are used in drawing the flowchart of a program. These symbols are given below:

i) Flow Line:
A line with an arrow head represents the flow of control between various symbols in a flowchart.

ii) Terminal Symbol:
An oval shape symbol is used to represent the starting and the stopping point of a flow chart.

iii) Input / Output Symbol:
A parallelogram represents either input or output operation.

iv) Processing Symbol:
A rectangular block is used to represent processing symbol. It shows all the calculations.

v) Decision Symbol:
A diamond represents a decision symbol used for comparison or a decision. It changes the flow of control and computer decides a particular path to be followed.

vi) **Connector Symbol:**
A small circle represents a connector symbol and is used to join various parts of a flow chart. Connectors are used when a flow chart is very large.

Q.9.11 Convert the algorithm of question 9.08 into a flowchart.
Ans: Following is the flowchart of algorithm of Celsius to Fahrenheit.

Q. Q.9.12 Your table lamp is not in working order. Develop a flowchart for locating the trouble in it. The trouble may be either in the plug or in the converting wire or the bulb may be fused.

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Q. 9.13 Develop a flow chart for identifying and printing an odd number.

Ans:

Q. 9.14 Develop a flow chart for finding printing the sum of squares of all the natural numbers between 2 and 10.
**Q.9.15 What is meant by computer program?**

**Ans:** A computer program is a list of instructions that tell the computer what to do and how to do? All these instructions are numbered and the computer executes these instructions in ascending numeric order. A program will have only one START and one END point, but may have a number of possible paths between these points. The exact path taken each time will depend upon the value of data input.

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**Q.9.17 Mention the advantages of programming in BASIC.**

**Ans:** BASIC is easy to learn, easy to use language. Many of terms in BASIC are based on English words. The language uses simple English keywords like INPUT, READ, PRINT, GOTO etc.

This language is used for solving large variety of problems relating to business, medicine, science and engineering. The simplicity and versatility of BASIC has made it very popular language.

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**Q.9.18 What is debugging? Why it is necessary to test or debug a program?**

**Ans:** The process of finding and removing errors from a computer program is called debugging.

Testing and debugging are very important steps in developing computer program. Once the program has been written, it must be tested to ensure that it works correctly. If a program does not produce correct result, it must be examined for errors, correct errors, and test the program again.

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**Q.9.19 Mention some of the errors that occur in computer programming.**

**Ans:** Following are the three types of errors which occur in computer programming.

i. **Logical Errors**

ii. **Syntax Errors**

iii. **Execution Errors**

i. **Logical Errors:**

Logical errors may be due to improper use of the formula or incorrect formula or wrong use of symbols or data.

For example, if we write the formula for speed as:

\[ \text{Speed} = \text{Distance} \times \text{Time} \]

Instead of

\[ \text{Speed} = \frac{\text{Distance}}{\text{Time}} \]

A computer cannot detect such errors and thus give out wrong result. Such types of errors are called logical errors.
ii. **Syntax Errors:**
Syntax errors caused due to the wrong use of programming language. This involves incorrect punctuation, incorrect word sequence, undefined terms or misuse of the terms.
For example if a statement such as
\[ C = A + / B \]
appears in the source program, then the computer will not process the data. The computer will indicate the syntax error on execution.

iii. **Execution Errors:**
Execution errors arise due to the limitation of the computer. For example if a program contains a division of number by zero. The execution errors like logical errors are also difficult to locate.

**Q.9.20 Why it is necessary to document a program?**
**Ans:** Documentation tells the user about the input necessary for the program, the output it produces and the way the computer must be operated.
Well-documented programs are extremely valuable whenever the program is to be rewritten for another computer or whenever someone else wants to modify the program.