(1) Comment - "C is a middle level language"

→ C is called middle-level language because it is actually bind the gap between a machine level languge and high level languages. Users can use C language to do system programming (for writing operating systems) as well as for application programing (for generating user friendly applications). That's why it is called middle level language. Other middle level languages are Java, C++, forth etc.

(2) What is problem solving?

→ A problem is defined as any question, something involving doubt, uncertainity, difficulty, situation whose solution is not immediately obivous. Solving any such problem by understanding it and applying knowledge is known as problem solving.

(3) What are the six steps of problem solving?

→ i) Defining the program
ii) Planing the code
iii) Testing the program
iv) Coding the program
v) Refining the program
vi) Documenting the program.

(4) Define Algorithm and state the rules for writting an algorithm.

→ A finite sequence of unambiguous, executable steps or instructions, which if followed would ultimately terminate and give the solution of the problem

Rules of writting an Algorithm:

- Be consistent.
- Have well defined input and output
- Do not use any syntax of any specific programming language.

(5) Discuss about how the problems can be solved with computers.

→ Problems can be solved with computers by understanding and applying logic. Success in solving an problem is only possible after we have made the effort to understand the problem at hand. Also we must extract from the problem statement a set of precisely defined tasks.

(6) What is a program?

→ A computer program is a collection of instructions that performs a specific task when executed by a computer. A program is usually written to perform a specific task for which it is written for.

(7) Why is problem solving important?

→ Problem solving is important because it helps us to resolve the given scenario in an apt way and provides the required solution to the asked problem. Without problem solving, we would just complicate things for us.

(8) What are the tools of problem solving available?
→ A human brain is the biggest tool one can have to. Computer is also an important tool which is used to implement and execute the beautiful ideas that come in the human brain. Critical thinking and creative thinking are main tools used in problem solving.

(9) How do problem solving tools help us in leading to solution?
→ Critical thinking helps us to imagine, invent, create design and change whereas critical thinking helps us to analyse, break down, compare and categorise the given problem. A certain mixture of these both help us to solve the given problem in an effective way.

(10) Why is it important to test a solution before coding it?
→ It is important to test as ~~code~~ solution, as only by testing it we come to know if there are any errors and we can correct them. Also testing helps us to check whether the solution is apt for the problem and does the solution satisfies our required output

(11) What is an algorithm? Give its characteristics.

→ An algorithm is a finite sequence of unambiguous, executable steps or instructions, which, if followed would ultimately terminate and give the solution of the problem.

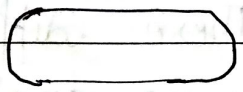
Properties

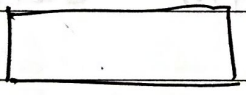
- Finite: They must eventually terminate
- Complete: Must always give a solution when one exists.
- Correct & Sound: Always give a correct situation

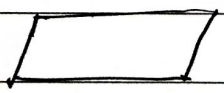
(12) What is a flowchart? Give the symbols / shapes used in flowchart.

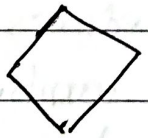
→ A flowchart is a diagramatic representation of a computer program in relation to its sequence of functions.

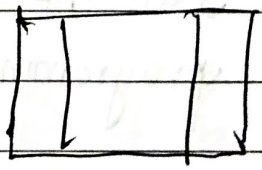
Symbols as

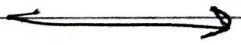
Terminator 

Process 

Input / Output 

Decision 

Subprogram 

Arrow 

(13) Discuss pseudocode ~~with~~ and give its importance with an example

→ Pseudocode is a detailed yet readable description of what a computer program or algorithm must do, expressed in a formally-styled natural language rather than in a programing language.

Pseudocode is similar to programming code and enables the programmer to concentrate on Algorithm. It rather gives a description of the algorithm and if accepted is transformed into actual program code.

(14) Discuss the difficulties with problem solving in detail.

→ The major difficulties to problem solving are confirmation bias, mental set, functional fixedness, unnecessary constans and irrelevant or ambigous information. These difficulties can be overcome by improving one's programing skills and observation skills.

(15) Differentiate between constants and variable. Write down the rules for naming variables.

→ The difference between variables and constants is that variable can change their value at time but constants can never change their value. Constant have a fixed value.

Rules for naming a variable

(i) All variable names must begin with a letter, or an underscore (_)

(ii) Variable names may contain letters and numbers

(iii) Keywords cannot be used as variable name

(iv) Uppercase and lowercase characters are distinct.

(16) State the use of %d and %f. Write a printf statement in C using the above mentioned symbols.

→ %d and %f are format specifiers in C which are used to represent integers and float values respectively. These are used during input and output. It tells the compiler what type of data is on the variable.

```
printf("%d", i); // prints the value stored in integer i
printf("%f", flo); // prints the value stored in float flo.
```

(17) What is main difference between variable and constant?

→ q. No 15

(18) Explain bitwise left shift operator

→ A left shift operator shifts the bits of the first operand, the second operand decides the number of places to shift. Or in other words left shifting an integer 'x' with an integer 'y' (x<<y) is equivalent to multiplying x with 2^y (2 raise to power y).

(19) Explain the different data types supported in C

→ ① primary

q 20

② Derived

Derived data types are nothing but primary datatypes but a little twisted or grouped together like array, structure, union and pointer. These are derived from primary data types.

(20) Explain the primary data types in C

→ Primary data types are fundamental data types in C namely integer (int), floating point (float), character (char) and void.

(21) State the rules for declaring variables in C

→ q is.

(22) Discuss about scope of variables in C

→ The variables in C language are basically of 2 types depending on their scope.

(i) Global variable

These variables are declared at the above of all the functions and these can be used in all the functions in the program

(ii) Local variable

These variables are declared locally i.e in a specific function and its scope is limited to that function and it can be used only in that function.

(23) Categorize and explain the various formatted input and output functions in C

→ Formatted input and output functions read and write all types of data values, arranges data in particular format. They required format specifier to identify the data type

Eg. printf and scanf functions

(24) Show the output

→ 4
4
1
8

(28) Show Output

→ 1
1
-1
-1

(26) Difference between formatted & unformatted statements

→ Unformatted statements are the most basic form of statements. They transfer the internal binary representation of data directly between memory and the file. formatted output converts the internal binary representation of the data to ASCII characters, which are written to the output file. formatted input reads characters from the input file and converts them to internal form. formatted statements need something known as format specifiers, which are different for each data type.

(27) What is meant by storage class of variable?

→ q6 B

(28) Find the output

→ x = 3

y = 9

z = 27

(29) C program to calculate simple interest

→

```
#include <stdio.h>
int main()
{
    int p,r,t;
    float si;
    scanf("%d %d %d", &p, &r, &t);
    si = (p*r*t)/100;
    printf("%f", si);
    return 0;
}
```

(30) Sum of first and last digit of a number

→

```
#include <stdio.h>
int main()
{
    int f,l,n,sum=0;
    scanf("%d",&n);
    l = n%10;
    while(n>0)
    {
        f = n%10;
        n = n/10;
    }
    sum = l+f;
    printf("Sum of first and last digit
            is %d", sum);
    return 0;
}
```

(31) C program to find cost of one item

→

```
#include <stdio.h>
int main()
{
    int sp, profit, cp, cost;
    scanf("%d%d", &sp, &profit);
    cp = sp - ((profit/100) * sp);
    cost = sp/15;
    printf("%d", cost);
    return 0;
}
```

(32) Explain with example, ++i and i++

→ ++i is a prefix operator which first increase the value of i and then executes the statement whereas i++ is a postfix increament operator which first carries out the statement and then increases the value of i

for eg

i=2, j=2;

j = ++i → output i=3 j=3

j = i++ → output i=3 j=2

(33) Solve the following expression using C programing
$(a+b)^2$

→ pow((a+b), 2);

(34) Output

→ 11
11
9
9