PROGRAMMING LOGIC

TCS Preparation

Day 1

Syllabus

- Given a code in C language/pseudocode, Identify the functionality of the code.

- Given a code in C language/pseudocode, identify the bug (syntactic/ semantic) in the code.

- Conceptual Questions in programming

- Elementary algorithms based questions

- Elementary data structures based questions

- Questions based on basics of C language

- Basic Concepts behind compiling, linking, OS

Example 1

```
#include
int main(intargc, char **argv)
{
char **items;
int j = 3, i;
items =argv;
for(i = 1; (i%4); i++)
{
int **p = &items[j];
printf("%c", **p);
j--;
}
return 0;
}
```

What will be the output of the above program?

The above code is run with three command line parameters mentioned here:**Paper Ink Pen**

Example 2

Q) Improper formation of which of the following data-structures can cause un-intentional looping of a program that uses it.

a) Linked list

b) Array

c) Queue

d) Stack

Q) What is the data type that occupies the least storage in "C" language?

Please give the answer in the blank line: _____

Example 3

Q) Which of the following is true?

a) Array is a dynamic data structure whose size can be changed while stacks are static data structures whose sizes are fixed.

b) Array elements can be accessed and modified(elements can be added or removed) only at the ends of the array while any elements of the stack can be accessed or modified randomly through their indices.

c) An array can have elements of different data types.

d) Elements of a linked-list can be accessed only sequentially.

Example 4

Q) Which of the following statements is FALSE?

a) The time complexity of binary search is O(log n).

b) A linear search requires a sorted list.

c) A binary search can operate only on a sorted list.

d) The time complexity of linear search is O(n).

Example 5

Q) Eesha wrote a function fact( ) in "C" language to calculate factorial of a given number and saved the file as fact.c. She forgot to code the main function to call this fact function. Will she be able to compile this fact.c without the main() function?

a) Yes, she can compile provided the compiler option -no strict-checking is enabled.

b) No, she can not compile as the main function is required to compile any C program file.

c) Yes, she can compile as main( ) is not required at compile time.

d) Yes, she can compile and run as the system will supply default values to fact function.

Example 6

Q) The difference between variable declaration and variable definition is:

a) Declaration and definition are the same. There is no difference.

b) A declaration is used for variables and definitions is used for functions.

c) Declaration associates type to the variable whereas definition associates scope to the variable.

d) Declaration associates type to the variable whereas definition gives the value to the variable.

Example 7

Q) The in order and pre order traversal of a binary tree are _db ea fc g_ and _a bd ec f g_, respectively. The post-order traversal of the binary tree is:

a) d eb fg c a

b) de fgb ca

c) e db fg ca

d) e db gf c a

Example 8

Q) Ajay wrote a recursive function that takes the first node in a linked list as an argument, reverses the list, returning the first Node in the result. The pseudo code for this function is given below. However, she did not get the correct result. In which line number did she make a mistake?

```
public Node reverse(Node first)
{
if (first == null) return null;
if (first.next == null) return first;
Node second = first.next;
Node rest = reverse (second);
second.next = first;
first.next = null;
return rest.next;
}
```

Please give the answer in the blank line: _____

PREVIOUSLY ASKED QUESTIONS

TCS Preparation

1) How many times the below loop will be executed?

```c
#include<stdio.h>
int main()
{
int x, y;
for(x=5;x>=1;x--)
{
for(y=1;y<=x;y++)
printf("%dn",y);
} }
```

A. 15

B. 11

C. 10

D. 13

2) Where are the local variables stored?

A. Disk

B. Stack

C. Heap

D. Code

3) Which datatype has more precision?

A. double

B. float

C. int

D. long int

4) Find the output of the following code?

```
int main
{
float f = 0.1;
if (f = 0.1)
printf (yes);
else print (no);
}
```

5) What will happen if in a C program you assign a value to an array element whose subscript exceeds the size ofarray?

A. The element will be set to 0.

B. The compiler would report an error.

C. The program may crash if some important data gets overwritten.

D. The array size would appropriately grow.

6) What does the following declaration mean?

int (*ptr)[10];

A. ptr is array of pointers to 10 integers

B. ptr is a pointer to an array of 10 integers

C. ptr is an array of 10 integers

D. ptr is an pointer to array

7) In C, if you pass an array as an argument to a function, what actually gets passed?

A. Value of elements in array

B. First element of the array

C. Base address of the array

D. Address of the last element of array

8) What will be the output of the program?

```c
#include<stdio.h>
int main()
{
   int a[5] = {5, 1, 15, 20, 25};
   int i, j, m;
   i = ++a[1];
   j = a[1]++;
   m = a[i++];
   printf("%d, %d, %d", i, j, m);
   return 0;
}
```

A. 2, 1, 15

B. 1, 2, 5

C. 3, 2, 15

D. 2, 3, 20

9) Is there any difference in the following declarations?

int fun(int arr[]);

int fun(int arr[2]);

A. Yes

B. No

10) Are the expressions arr and &arr same for an array of 10 integers?

A.Yes

B.No

11) Which of the flowing statements should be used to obtain a remainder after dividing 3.14 by 2.1?

A. rem = 3.14 % 2.1;

B. rem = modf(3.14, 2.1);

C. rem = fmod(3.14, 2.1);

D. Remainder cannot be obtain in floating point division.

12) What are the types of packages?

A. Internal and External

B. External, Internal and None

C. External and None

D. Internal

13) Which of the following special symbols are allowed in a variable name?

A. * (asterisk)

B. | (pipepne)

C. -(hyphen)

D. _(underscore)

14) Is there any difference between following declarations?

1 : extern int fun();

2 : int fun();

A. Both are identical

B. No difference, except extern int fun(); is probably in another file

C. int fun(); is overrided with extern int fun();

D. None of these

PROGRAMMING LOGIC

Prime Focus

Day 2

Specific Syllabus

- **Programming Concepts:** Iteration, recursion, procedural vs OOP.

- **C Language:** call by value/reference, basic and derived data types, storage class, scope and visibility, basics of pointers, basic header files, library functions, branching and looping, command line arguments, user-defined functions.

- **Algorithms:** Basic search algorithms, basic sort algorithms (tree traversal, dynamic programming, etc)

- **Data Structures:** Array, Stack, Queue, List (tree, hash table, etc)

Note: Coding using Command Line Arguments is not mandatory in TCS exam. However, you may expect some programming MCQs based on command line Arguments.

1) Eesha was in a wonderland where she saw a treasure trove of seven items of various items (in lakhs) and weights (in kgs) as per the table given below.

Value	Weight
12	4
10	6
8	5
11	7
14	3
5	10
5	12

She wanted to bring back the maximum value of items but she was not able to carry more than 10 kgs. Using dynamic programming, what is the maximum value of the items that she could carry back with her.
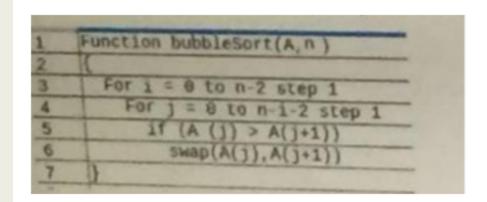
2) In C language, if a function return type is not explicitly defined then it defaults to what data type?

3) Which of the following syntax is correct for command -line arguments?

a) int main (char *argv[], intargc)

b) none of the three options

c) int main () { intargv, char *argc[]; }

d) int main(int var, char *varg[])

4) The full set of operations allowed on a stack are

a) Push, pop

b) Push, pop, remove

c) Push, pop, add, remove

d) Push,pop,add,remove,substitute

5) Realloc() function is used to:

a) Get back the memory that was released earlier usingdree() function

b) Reallocate a file pointer when switching between files

c) Change the size of an array

d) Change the size of the dynamically allocated memory

6) Which of the below is NOT a data type in C language:

a) Signed int

b) Big int

c) Short int

d) Long int

7) Eesha wants to implement an image viewer application to view images in a given folder. The application will be able to display an image and will also know what its next and previous images are at any given point of time so that the user can so that the user can view next/previous image by pressing right/left keys on the keyboard. Which data structure is appropriate for Esha to use?

a) Tree

b) Queue

c) Linked list

d) Stack

8)The pseudo code below sorts an array using bubble sort. Here A is the array and the n is the number of elements in it. Function swap exchanges the value of 2 given value.

```
1    Function bubbleSort(A,n)
2    {
3        For i = 0 to n-2 step 1
4            For j = 0 to n-1-2 step 1
5                if (A (j)) > A(j+1))
6                    swap(A(j),A(j+1))
7    }
```

This function is called with A and 7 as parameter where the array initially contains the element 64, 34, 25,12, 22, 11, 9

a) 34 25 12 22 11 9 64

b) 25 12 22 11 9 34 64

c) 11 9 12 22 25 34 64

d) 12 11 9 22 25 34 64

9) #define is used to

a) Define a variable

b) Define a macro

c) Define a function

d) Define a constant

10) What type of data structures are queues?

a) First in last out

b)First in first out

c)Last in first out

d)Last in last out

11) Which of the following is NOT a valid storage class in C language?
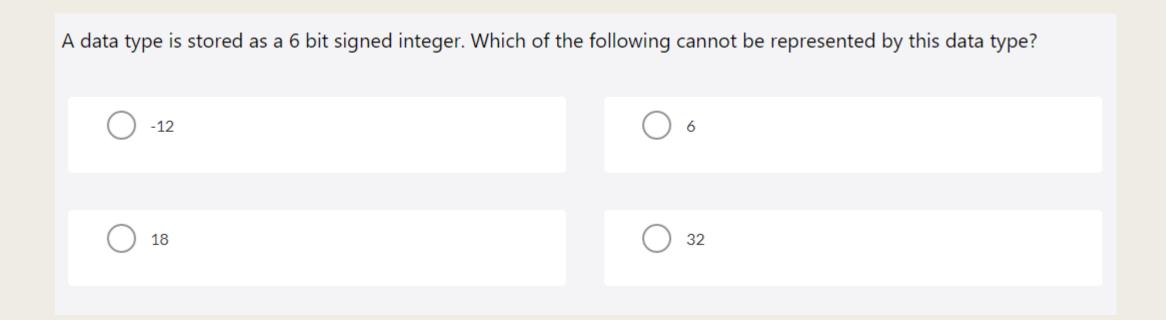
a)Extern

b)Dynamic

c)Register

d)Auto

12) Eesha is developing a word processing software in which she wants to provide undo feature. The software will maintain all the sequential changes and at any point of time pressing control z will undo the latest change, what data structure should Eesha use for this?

a)Stack

b)Queue

c)Linked list

d) Array

13) #include

Main(intargc,char**argv)

{

printf(%sn,argv[--argc]);

Return 1;

}

The above program was run with the following command line parameters

Asha usha nisha easha

What was the output?

a) Nisha

b) Unable to run due to compilation error

c) No output, runtime error

d) easha

Question 1

Neelam wants to share her code with a colleague, who may modify it. Thus she wants to include the date of the program creation, the author and other she wants to include the date of the program creation, the author and other information with the program. What component should she use?

○ header files

○ Iteration

○ Comments

○ pre processor

Question 2

What is the output of the following code statements? The compiler saves the first integer at the memory location 4165 and the rest at consecutive memory spaces in order of declaration. Integer is one byte long.

```
integer a

pointer c, d

a = 30c = &a

c = &a

d = c

a = a + 10

print *c
```

○ 30	○ 40
○ 4165	○ 4166

Question 3

A data type is stored as a 6 bit signed integer. Which of the following cannot be represented by this data type?

- ○ -12
- ○ 6
- ○ 18
- ○ 32

Question 4

A language has 28 different letters in total. Each word in the language iscomposed of maximum 7 letters. You want to create a data-type to store a word ofthis language. You decide to store the word as an array of letters. How many bytes will you assign to the data-type to be able to store all kinds of words of the language.

○ 7

○ 75

○ 28

○ 196

Question 5

A 10-bit unsigned integer has the following range:

- ○ 0 to 1000
- ○ 0 to 1024
- ○ 0 to 1023
- ○ 0 to 1025

Question 6

Parul takes as input two numbers: a and b. a and b can take integer valuesbetween 0 and 255. She stores a, b and c as 1-byte data type. She writes the following code statement to process a and b and put the result in c.

c = a + 2*b

To her surprise her program gives the right output with some input values of a and b, while gives an erroneous answer for others. For which of the following inputs will it give a wrong answer?

○ a = 200 b = 10

○ a = 10 b = 200

○ a = 50 b = 100

○ a = 100 b = 50

Question 7

Which is used to convert source code to target language

- ◯ Linker
- ◯ Loader
- ◯ Executer
- ◯ Compiler

Question 8

Which of the following options is an exception to being a part of composite data types?

- ◯ Union

- ◯ Structure

- ◯ Arrays

- ◯ Stacks

Question 9

Which is the character array used to accept command line arguments?

○ char argv

○ char* argv[]

○ char argv[]

○ char* argv

Question 10

What is a dangling pointer ?

○ points to garbage value

○ points to zero

○ points to null value

○ None of the above

Question 11

Which is not a string function ?

○ strstr

○ strupr

○ strcmp

○ strchr

Question 12

Which of the following does not require to include math.h header file ?

○ pow()

○ rand()

○ sqrt()

○ sinh()

Question 13

What is the task of pre-processor ?

- ○ Compiling
- ○ Expanding
- ○ Linking
- ○ All of the above

Question 14

Which of the following is true ?

○ realloc() can change the memory size of arrays

○ Unary operator works on only one operand

○ Struct and Union works in same way.

○ None of the above

Question 15

Which of this is used to skip one iteration:

- ◯ continue
- ◯ goto
- ◯ return
- ◯ break

Question 16

Which address does a pointer to an array store ?

○ Memory address of the first element of the array.

○ Memory address of the sum of array elements.

○ value of first element of the array.

○ None of the above.

Question 17

Another output based question which basically displayed the input string in reverse pattern. For example, ABRACADABRA was displayed as **ARBADACARBA.** Comment on the below while statement while(0 == 0)

{

}

○ It has syntax error as there are no statements within braces

{}

○ It will run for ever

○ It compares 0 with 0 and since they are equal it will exit the loop immediately

○ It has syntax error as the same number is being compared with itself

Links & References

https://prepinsta.com/tcs-nqt/placement-papers/programming-logic/