1) In a competition, four different functions are observed. All the functions use a single for loop and within the for loop, same set of statements are executed. Following for loops:

|  |
| --- |
| A) for(i = 0; i < n; i++)    B) for(i = 0; i < n; i += 2)    C) for(i = 1; i < n; i \*= 2)    D) for(i = n; i > -1; i /= 2 |

If **n** is the size of input(positive), which function is most efficient from time point of view?

(A) A  
 (B) B  
 (C) C  
 (D) D

**Answer: C**

2) Consider a string PIZZA

Some of the following transformations can be made to or any string resulting from applying transformation.

PI PIPI

PI IP

ZZ ZZZZ

A AA

For example, PIZZA can become PIPIZZZZAA (by the first, third and fourth transformation applied sequentially), and then to IPPIZZZZAA (by the second transformation)

Consider the following statements

1. The string IPPIZZZZZAAA can be obtained after some set of transformations
2. The string IPPIZZZZZZAAAA can be obtained after some set of transformations
3. Only I is true
4. Only II is true
5. Both I and II are true
6. Neither A nor B is true

**Answer: D**

3) **Depth-first search (DFS)** is an [algorithm](https://brilliant.org/wiki/algorithm/) for searching a [graph](https://brilliant.org/wiki/depth-first-search-dfs/(https:/brilliant.org/wiki/graphs/)) or [tree](https://brilliant.org/wiki/trees-basic/) data structure. The algorithm starts at the root (top) node of a tree and goes as far as it can down a given branch (path), then backtracks until it finds an unexplored path, and then explores it. The algorithm does this until the entire graph has been explored. The main strategy of depth-first search is to explore deeper into the graph whenever possible.

Comment about the space complexity of DFS

1. Space requirements grow quadratically with depth
2. Space requirements grow exponentially with depth
3. Space requirements remains constant and is decided by total nodes in the tree
4. Space requirements grow linearly with depth

**Answer: D**

4) A hash table of length 10 uses open addressing with hash function h(k)=k mod 10, and linear probing. After inserting 6 values into an empty hash table. The table is as shown below:

|  |  |
| --- | --- |
| 0 |  |
| 1 |  |
| 2 | 42 |
| 3 | 23 |
| 4 | 34 |
| 5 | 52 |
| 6 | 46 |
| 7 | 33 |
| 8 |  |
| 9 |  |

Which one of the following choices gives a possible order in which the key values could have been inserted in the table?

* 34, 42, 23, 52, 33, 46
* 46, 34, 42, 23, 52, 33
* 46, 42, 34, 52, 23, 33
* 42, 46, 33, 23, 34, 52

5) Eesha wrote a function to calculate the maximum depth or height of a Binary tree – the number of nodes along the longest path from… Farthest leaf node, as below:

Int maxDepth (struct node\* node)

{

If (node==NULL)

return 0;

/\*compute the depth of each sub-tree \*/

{

int lDepth = maxDepth(node->left);

int rDepth = maxDepth(node->right);

/\* use the larger one \*/

If (lDepth > rDepth)

return X;

else return Y;

}

}

What should be the values of X and Y in the above code so that the function works

Correctly?

1. X= lDepth + 1, Y= rDepth + 1
2. X= lDepth + 1, Y= rDepth - 1
3. X= lDepth, Y= rDepth
4. X= lDepth - 1, Y= rDepth - 1

**Answer: A**

6) The figure below shows a minefield, mines being indicated by red dots. A robot starts at the left

corner. At each step, it can move either right by one cell or down by one cell. If there is a mine in the

cell, it deactivates it safely. As it makes one pass from the top left to the bottom right cell, how many

of the mines will be deactivated by the robot?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

7) Tower of Hanoi consists of three pegs or towers with n disks placed one over the other. The objective of the puzzle is to move the stack to another peg following these simple rules.

1. Only one disk can be moved at a time.
2. Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack or on an empty rod.
3. For temporary storage, peg B may be used.
4. No disk can be placed on top of the smaller disk.

Eesha tried to manually carryout re-ordering of 14 disks using the above rules. She first worked out the strategy to make the minimum number of moves, and then carried this out. She made1 move per day in arranging disks. She started her first move on a Monday. On which day did she finish the game?



* Friday
* Sunday
* Wednesday
* Monday

8) Which of the below is NOT a valid storage class in “C” language?

1. Extern
2. Auto
3. Dynamic
4. Register

**Answer: C**

9) #include<stdio.h>

main(int argc, char \*\* argv)

{

Printf(“%s\n”, argv[--argc]);

Return 1;

}

The above program was run with the following command line parameter:

Asha Usha Nisha Eesha

What was the output?

1. No output. Run time error
2. Nisha
3. Unable to run due to compilation error
4. Eesha

**Answer: B**

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

|  |  |
| --- | --- |
| 1 | Function bubbleSort(A, n) |
| 2 | { |
| 3 | for i = 0 to n-2 step 1 |
| 4 | for j = 0 to n-i-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 parameters where the array A initially contains the elements 34, 14, 65, 22, 12, 71, 5. What will be the value of the elements in A after 3 iterations of the outer loop?

1. 14 34 22 12 65 5 71
2. 14 22 12 34 5 65 71
3. 14 12 22 5 34 65 71
4. 12 14 5 22 34 65 7

**Answer: C**

11) 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 the pressing control-Z will undo the change . what data structure should Eesha use for this?

1. Array
2. Stack
3. Linked list
4. Queue

**Answer: B**

12) #define a consant

* define a constant
* define a variable
* define a function
* define a macro

13) Which of the following is TRUE about binary trees?

1. The number of nodes on the last level is equal to the sum of the number of nodes on all other levels
2. The total number of nodes is one less than a power of 2
3. A node may have one child
4. Every node must have 2 children

**Answer: D**

14) main(int argc, char\*argv[])

In the above definition of main function, the variable argv denotes:

1. An array of character pointers the first array item pointing to the program name and remaining pointing to the command line parameters
2. A pointer to character that points to command line parameters
3. A pointer to pointer that points to the memory location where the program has been loaded to the memory
4. An array of character pointer each pointing to the command line parameters.

**Answer: A**

15) In the below code, what concept is used:

#include <studio . h>

long int fact (int n);

Int main ()

{

Int n;

Printf (“Enter a positive integer: “);

Scanf (“%d”, &n);

printf(“factorial of %d = %ld “, n, fact (n));

return 0;

}

long int fact (int n)

{

If (n>=1)

return n\*fact (n-1)

else

return 1;

}

1. Recursion
2. Segmentation
3. Iteration
4. Polymorphism

**Answer: A**

16) The recommended data structure to represent the below arithmetic expression (after it is parsed) is: 2 + ((8 + 1) \* 4)

1. Array
2. Stack
3. Circular queue
4. Binary tree

**Answer: B**

17) what will be the output of the below program, assuming the data type sizes mentioned as part of the program? Ignore any data alignment, padding and data packing requirements.

#include<stdio.h>

/\*

Size of int = 4

Size of char = 1

Size of float = 4

Size of short = 2

\*/

main()

{

Struct student

{

Int rollno;

Char name[30];

Short age;

Float weight;

Float height;

Char gender;

};

Printf(“%d\n”, sizeof(struct student));

return 0;

}

**Answer: 48**

18) what will be the behavior of the below program

#include<stdio.h>

Int main()

{

Int n, ch;

for(n=7;n!=0;n--)  
Print(“n = %d”, n--);  
Ch=get char();

return 0;

}

1. Infinite loop
2. Number display from 7 to 0 in descending order
3. None of the other 3 choices as there is a compilation error
4. Number display from 7 to 1 in descending order.

**Answer: C**

19) Eesha works for ISRO where she is involved in a mission to intercept a comet that is likely to collide with in each with in 1 month. She is developing a c program to calculate the trajectory of the missile to be launched to intercept and destroying the approaching comet.in order to achieve highest accuracy of the missile trajectory what data type should she use for the variables in her equations?

1. Long int
2. Int
3. Float
4. Double

**Answer: A**

20) In the below code, the program expects the user to enter two numbers. If the user enter the two numbers as 6 and 15, what is the output value printed:

#include<stdio.h>

int fg(int, int);

int main()

{

int n1, n2, g;

printf(“\nEnter two numbers : “);

scanf(“%d %d”, &n1, &n2);

g = fg(n1 , n2);

printf(”%d” , g);

return 0;

}

int fg(int x, int y)

{

While(x!=y)

{

if(x>y)

return fg(x – y, y);

else

return fg(x – y, x);

}

return x;

}

21) Which of the following is not a core function of operating system?

1. Virus protection
2. File management
3. Memory handling
4. Multi-tasking

**Answer: A**

22) 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?

1. stack
2. queue
3. tree
4. linked list

**Answer: D**

23) Eesha is developing an internet browser application. She wants to incorporate “history” feature, by which when the user presses the “Go back” button, the user should be able go back 1 page and visit the previous page that he/she visited. What data structure will you recommend to Eesha to incorporate this feature?

1. Stack
2. Queue
3. Tree
4. Array

**Answer: A**

24) The following are some statements about array datatype:

1. The count of items is known apriori
2. The items are of the same data type
3. Suitable if you need flexibility to change the size at run time
4. The items are located sequentially

Which of the statements are correct?

1. A, B, C, D
2. A, B
3. A, D
4. A, B, D

**Answer:C**

25) Size of operator is used to get the size of

1. Program file in memory
2. Data type only
3. Data type or variable
4. Available free memory

**Answer: b**

26) Eesha wrote a C program to calculate permutations and combinations. For this, she decided to code a factorial function fact (). She evoked this function in her permutations and combinations calculation. However, she forgot to implement the fact() function and went ahead and complied the program. What error message she would have got?

1. Unresolved external
2. File not found
3. Syntax error
4. No error message as the complier would have automatically used the built- in fact() math library of C language

**Answer: C**

27) In the context of C language, where are the local variables that are defined inside any user-defined function stored?

1. As specified by the programmer
2. Heap memory
3. Hard disk
4. Stack memory

**Answer: D**

28) Eesha 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? Please give the answer in the blank line: \_\_\_\_\_\_\_\_\_\_\_\_

public Node  reverse(Node first)  
{  
if (first == null)   return null;1)  
if (first.next == null)   return first;  
Node second = first.next;  
Node rest  = reverse (second);  
second.next = first;  
first.next = null;  
return rest.next;  
}

29) Eesha wrote a function to return the number of times it has been called in a program. She called that function 10 times in her program. The program is as below. But it is possible that there is a bug in the code. Enter the line number where you think the bug is in the space given. If you think there is no bug, enter the value 0.

|  |  |
| --- | --- |
| 1 | #include <stdio.h> |
| 2 | int counter() |
| 3 | { |
| 4 | Inti=0; |
| 5 | i++; |
| 6 | return I; |
| 7 | } |
| 8 | main() |
| 9 | { |
| 10 | int j, count; |
| 11 | for(j=0; j<10;j++) |
| 12 | count = counter() |
| 13 | printf(“%d\n”, count); |
| 14 | return 0; |
| 15 | } |

**Answer: 12**

30) Eesha is developing a word processor in which she wants to implements “auto complete” feature. With this feature, as and when we start typing a word, the word processor will suggest the rest of the word. To implement this, what data structure is most suitable?

1. Tree
2. Stack
3. List
4. Array

**Answer: A**

31) What is correct about circular linked list?

1. There is no pointer that points to NULL
2. A node can be inserted but cannot be deleted
3. Doubly linked circular list is NOT possible to implement
4. Can be used to implement undo feature in word processing

**Answer: A**

32) Which of the below is NOT a predefined file stream in “C” language?

1. stdin
2. stdio
3. stdout
4. stderr

**Answer: b**

33) int main(int ac, char \*av[])

In the above declaration of main function, what do the **variables av and ac** indicate respectively?

1. None of the other options as the declaration is incorrect
2. argument vector, argument control
3. argument count, argument variables
4. argument vector, argument count

**Answer: d**

34) A union in “C” language is

1. User defined data type holding similar or dissimilar data types that share memory
2. Another name for structure data type
3. A collection of similar user defined data types with shared memory
4. System defined data type that holds predefined collection of data types with shared memory

**Answer: A**

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

|  |  |
| --- | --- |
| 1 | Function bubbleSort(A, n) |
| 2 | { |
| 3 | for i = 0 to n-2 step 1 |
| 4 | for j = 0 to n-i-2 step 1 |
| 5 | if (A[j] > A[j+1]) |
| 6 | swap(&A[j],&A[j+1]); |
| 7 | } |

Assuming array A initially contains the elements 14, 53, 25, 22, 72, 63, 4. What will be the value of the elements in A after 3 iterations of the outer loop

1. 14 22 4 25 53 63 72
2. 14 22 25 53 4 63 72
3. 14 25 22 53 63 4 72

**Answer: A**

36) Eesha wrote a C function minval() that returns the minimum value from a given integer array. The parameters passed to this function are the integer array and the number of elements in the INT\_MAX is the biggest integer value supported by the complier and its value is automatically assigned by the complier. The function is as below. But it is possible that there is a bug in this code .. in that space given, enter the line number where you think the bug is. If you think there is no bug, enter the value 0.

#include <limits.h> -- Line 1

#include<stdio.h> -- Line 2

Int minval(int a, int n) -- Line 3

{

Int currmin=INT\_MAX; -- Line 4

for (int i=0; i<n; i++)-- Line 5

if(A[i]> currmin) -- Line 6

currmin = A[i]; -- Line 7

return currmin; -- Line 8

}

main()

{

int A[]={1, 2, 3, 4, 5};-- Line 9

int X=minval (A,5); -- Line 10

printf(”%\n”,X); -- Line 11

return 0; -- Line 12

}

**Answer: Line 3 – int A[] and Line 6 if(A[i] < currmin) and Line 11 - “%d”**

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

|  |  |
| --- | --- |
| 1 | Function bubbleSort(A, n) |
| 2 | { |
| 3 | for i = 0 to n-2 step 1 |
| 4 | for j = 0 to n-i-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 parameters where the array A initially contains the elements 64, 34, 25, 12, 22, 11, 9. What will be the value of the elements in A after 3 iterations of the outer loop?

1. 25 12 22 11 9 34 64
2. 12 11 9 22 25 34 64
3. 11 9 12 22 25 34 64
4. 34 25 12 22 11 9 64

**Answer: None of the Above**

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

1. None of the mentioned choices are correct
2. int main ()

{

int argv, char \*argc[];

}

1. int main (char \*argv[], int argc)
2. int main(int var, char \*varg[])

**Answer: C**

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

1. Push ,pop
2. Push, pop, add, remove
3. Push, pop, remove
4. Push, pop, add, remove, substitute

**Answer: A**

40) Realloc () function is used to

1. Change the size of dynamically allocated memory
2. Get back the memory that was released earlier using free() function
3. Reallocate a file pointer when switching between files
4. Change the size of an array

**Answer: A**

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

1. Big int
2. Long int
3. Signed int
4. Short int

**Answer: A**

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

|  |  |
| --- | --- |
| 1 | Function bubbleSort(A, n) |
| 2 | { |
| 3 | for i = 0 to n-2 step 1 |
| 4 | for j = 0 to n-i-2 step 1 |
| 5 | if (A[j] > A[j+1]) |
| 6 | swap(&A[j],&A[j+1]); |
| 7 | } |

Assuming array A initially contains the elements 44, 53, 65, 22, 12, 13, 4. What will be the value of the elements in A after 3 iterations of the outer loop?

1. 44 22 12 13 4 53 65
2. 22 12 13 4 44 53 65
3. 44 53 22 12 13 4 65
4. 12 13 4 22 44 53 65

**Answer : L**

43) A structure in C language is

1. Another name for union data type
2. System defined data type that holds predefined collection of data types
3. User defined data type holding similar or dissimilar data types
4. A collection of similar user defined data types

**Answer: C**

43) in C language, argv(0) points to

1. NULL
2. Count of the arguments in argv[] vector
3. The name by which the program was involved
4. The name of source file that has been completed

**Answer: C**

44) What type of data structure are stacks?

1. Last in first out
2. First in first out
3. First in last out
4. Last in last out

**Answer: A**

45) In c language, if a function return type is not explicitly defined then it defaults to what data type?

**Answer: int**

46) Eesha is developing an IP telephony software in which the audio is encoded and transmitted by the sender as network packets through a communication channel. At the other end these packets are assembled and processed further.eesha recognizes that there maybe a very large number of packets this number is unknown nd which will be processed while more packets are being received .assume that the packets arrive in right order .what data structure should eesha use?

* 1. Array
  2. List
  3. Queue

1. Stack

**Answer: C**

47) Which are crt options for array

1. same type
2. sequential memory allocation
3. we can change size of array at run time
4. counting items appropriate

**Answer: A**