

1) Null function is also known as _____.

- A. Anonymous Function
- B. Generic Function
- C. Void Function
- D. Null Operator**

2) A complete binary tree has a property that the value at each node is at least as large as the values at its children nodes. What is this binary tree known as?

A. Binary Search Tree

B. AVL Tree

C. Completely Balanced Tree

D. Heap

3) Which of the following is NOT a data type?

A. Integer

B. Character

C. Boolean

D. Array

4) Which of the following sorting algorithms yields approximately the same worst-case and average-case running time behavior in $O(n \log n)$?

A. Bubble sort and Selection sort

B. Heap sort and Merge sort

C. Quick sort and Radix sort

D. Tree sort and Median-of-3 Quick sort

5) A programmer is making a database of animals in a zoo along with their properties. The possible animals are dog, lion and zebra each one has attributes as herbivorous, color and nocturnal. The programmer uses the object-oriented programming paradigm for this. How will the system be conceptualized?

A. Class: Animal; objects: dog, lion and zebra: data members: herbivorous, color and nocturnal

B. Class: Animal; objects: herbivorous, color and nocturnal: data members: dog lion and Zebra

C. Classes: dog lion and zebra: objects: Animal; data members; herbivorous, color and nocturnal

D. None of the above

6) A stack is implemented as a linear array $A[0 \dots N-1]$ A programmer writes the function given below to pop out an element from the stack

Function POP (top, N)

```
{  
if (X)  
{  
top = top -1  
}  
else  
{  
“Print Underflow”  
}  
return top
```

Which of the following should substitute the condition”X”?

A. $\text{top} < N-1$

B. $\text{top} < N$

C. $\text{top} > 1$

D. $\text{top} \geq 0$

7) A queue is implemented as a singly linked-list. Each node has an element and a pointer to another node. The Rear and the Front contain the addresses of the rear and the front nodes, respectively. What can be inferred about the linked list if the condition (rear isequal front) is true?

- A. It has no elements
- B. It has one element**
- C. There is an error
- D. None of the above

8) Consider the code given below. Assume that “a” and “b” are passed reference. What will the output of the program be when the function calculate() is executed?

```
function modify(b,a)
{
return a -b
}
function calculate()
{
integer a = 5, b = 12, c
c = modify(a,b):
print c
}
```

A. 7

B. -7

C. 8

D. Error

Passage

```
function myfunc()
{
    constant integer i=5
    if (i > 3)
        print "i am smali"
    if ( i-- > 5 )
        print "i am iarge"
    else print "i am different"
}
```

A pseudo-code is used which is self explanatory.

9) What will be the output of the given code?

A. I am small

B. I am small am large

C. I am small am different

D. This code will generate an error

10) A librarian has to rearrange the library books on a shelf in a proper order at the end of each day. Which of the following sorting techniques should be the librarian's ideal choice?

A. Bubble sort

B. Insertion sort

C. Selection sort

D. Heap sort

11) A tree has 5 levels and each node has either 4 or no children. All nodes on the same level have the same number of children. How many nodes are there in the tree?

A. 341

B. 256

C. 1024

D. None of the above

12) Why is an algorithm designer concerned primarily about the run time and not the compile time while calculating time complexity of an algorithm?

A. Run time is always more than the compile time.

B. Compile time is always more than the run time.

C. Compile time is a function of run time.

D. A program needs to be compiled once but can be run several times.

13. For which of the following is the stack implementation useful?

- A. Radix search
- B. Breadth first search
- C. Recursion**
- D. None of the above

14. Passage

```
Function print_me(integer n) // Statement 1
{
if ( n < 1 ) return // Statement 2
print n // Statement 3
print_me(n-1) //Statement 4
}
```

A pseudo-code is used which is self explanatory,
// in pseudo code refers to comment

Pooja has written the following code to print numbers from 0 to n in reverse order using the recursive approach. Find if there exists any error in the given code.

A. Statement 1

B. Statement 2

C. Statement 3

D. There is no error

15. How can a call to an overloaded function be ambiguous?

A. The name of the function might have been misspelled

B. There might be two or more functions with the same name

C. There might be two or more functions with equally appropriate signatures

D. None of the above

16. What will the output of the following pseudocode statements be?

(Note: Assume that when two data types are processed through an operator. The answer maintains the same data type as that of input. Also, all data types have enough range to accommodate any number. If two different data types are operated upon, the result assumes the data type that is more expressive.)

Integer a = 456, b, c, d = 10

b = a/b

c = a – b

Print c

A. 410

B. 410.4

C. 411.4

D. 411

17. Passage

```
while (j<=3*i)
```

```
{
```

```
  print j
```

```
  print blank space
```

```
  j = j + 3
```

```
}
```

```
print end-of-line //takes the cursor to the next line
```

```
i = i + 1
```

```
}
```

A. 0

0 3

B. 0 3

0 3 6

C. 0 3

0 3 6

0 3 6 9

D. 0 3 6

0 3 6 9

0 3 6 9 1 2

18. What does the following function do?

```
function operation (int a, int b)
{
  if (a>b)
  { return operation(b, a) }
  else
  { return a: }
}
```

- A. Always returns the first parameter
- B. Returns the min of (a,b)**
- C. Returns the max of (a,b)
- D. Loops forever

19. What is the average time required to perform a successful sequential search for an element in an array $A(1:n)$?

A. $(n+1)/2$

B. $\log_2 n$

C. $n(n+1)/2$

D. n^2

20. How are protected members of a base class accessed in the derived class when inherited privately in C++?

- A. Privately**
- B. Publicly
- C. Protectedly
- D. Not inherited

21. How many nodes does a full binary tree with n non-leaf nodes contain?

A. $\log n$

B. $n + 1$

C. $2n + 1$

D. $2n$

22. A programmer mistakenly writes “gor” instead of the keyword “for” used in loops, while writing a program in C++. What will this result in?

A. The code would not compile.

B. The code would give an error while execution.

C. The code may work for some inputs and not for the others

D. The code would not create any problem.

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

- A. Union
- B. Array
- C. Structure**
- D. Stack

24. Which characteristic of data does a binary search use and a linear search does not?

- A. Order of the list
- B. Length of the list
- C. Maximum value of the list**
- D. None of the above

25. A sorting algorithm iteratively traverses through a list to exchange the first element with any element less than it. It then repeats with a new first element. What is this sorting algorithm called?

- A. Insertion sort**
- B. Selection sort
- C. Heap sort
- D. Quick sort

26. In which of the following methods is sorting NOT possible?

- A. Insertion
- B. Selection
- C. Exchange
- D. Deletion**

27. A programmer is making a database of animals in a zoo along with their properties. The possible animals are dog. Lion and zebra each one has attributes as herbivorous. Color and nocturnal. The programmer uses the object- oriented programming paradigm for this. How will the system be conceptualized?

A. Class: Animal; objects: dog, lion and zebra: data members: herbivorous, color and nocturnal

B. Class: Animal; objects: herbivorous, color and nocturnal: data members: dog lion and Zebra

C. Classes: dog lion and zebra: objects: Animal; data members; herbivorous, color and nocturnal

D. None of the above

28. Q is an empty queue. The following operations are done on it:

ADD 5

ADD 7

ADD 46

DELETE

ADD 13

DELETE

DELETE

ADD 10

What will be the content of Q after these operations.

Front is marked by (F) and Rear is marked by (R).

Option 1 : 10(R) 13(F)

Option 2 : 5(R) 10(F)

Option 3 : 13(R) 10(F)

Option 4 : 10(R) 5(F)

29. Sruti is making a questionnaire of True-False question. She wants to define a data-type which stores the response of the candidate for the question. What is the most suited data type for this purpose?

- a. Integer
- B. Boolean**
- c. float
- d. character

30. Parthiv has included several classes and their subjects in his project. Now he wants to use something that will hold all these objects (of different classes). Which of the following options provides him with the best iterative?

- A. Store them in database
- B. Final class
- C. **Generic class**
- D. Anonymous class

31. Shasi wants to make a program to print the sum of the first 10 multiples of 5. She writes the following program, where statement 5 is missing.

```
integer i=0
integer sum=0
while ( i<= 50)
{
    sum =sum+1
    -- MISSING STATEMENT --
}
print sum
```

Which of the following options will you use for statement 5?

- A. $i = 5$
- B. $i = 5 * i$
- C. $i = i + 1$
- D. $i = i + 5$**

32. Ravi is writing a program in C++. C++ uses the 'for' keyword for loops. Due to distraction Ravi writes 'gor' instead of 'for'. What will this result to?

A. The code will not compile

B. The code will give an error while in execution

C. The code may work for some inputs and not for others

D. It will create no problems.

33. Which of the following sorting algorithm yield approximately the same worst-case and average-case running time behaviour in $O(n \log n)$?

A. Bubble sort and Selection sort

B. **Heap sort and Merge sort**

C. Quick sort and Radix sort

D. Tree sort and Median-of-3 Quick sort

34. What is implied by the argument of a function?

A. Variables passed to it when it is called

B. The value is returns on execution

C. The execution code inside it D. Its return type

35. Which of the following statements is true regarding the sorting and searching algorithms?

A. Linear searching is faster than the most efficient sorting algorithm

B. Linear searching is slower than the most efficient sorting algorithm

C. Linear searching and the most efficient sorting algorithm take up almost same time

D. Their complexities cannot be compared

36. A sorting algorithm traverses through a list, comparing adjacent elements and switching them under certain conditions. What is this sorting algorithm called?

- A. Insertion sort
- B. Heap sort
- C. Quick sort
- D. **Bubble sort**

37. What is the space complexity of a program?

A. Amount of hard-disk space required to store the program

B. Amount of hard-disk space required to compile the program

C. Amount of memory required by the program to run

D. Amount of memory required for the program to compile

38. Srishti writes a program to find an element in the array A[5] with the following elements in order: 8 30 40 45 70. She runs the program to find a number X. X is found in the first iteration of binary search. What is the value of X? Choose the correct answer

- A. 40**
- B. 8
- C. 70
- D. 30

39. Saloni writes the code for a function that takes as input n , an even integer and calculates the sum of 1st n natural numbers

```
function sum (n)
{
if(n equals 2)
return 2
else
return ( n+ sum( n-1))
}
```

She then calls the function by the statement, `sum(30)`. How many times will the function `sum` be called to compute this sum? Choose the correct answer?

A. 1 B. 30 C. 15 D. 16

40. Shalini wants to programme to print the largest number out of 3 inputted numbers. She writes the following programme

```
Int number 1, number 2, number 3, temp;
```

```
Input number 1, number 2, number 3;
```

```
If ( number 1 > number 2)
```

```
Temp = number 1
```

```
Else
```

```
Temp= number 2
```

```
End if
```

```
If ( ??) // statement 1
```

```
Temp = number 3
```

```
End if
```

```
Print temp
```

Fill in the ??in statement 1 ? Choose the correct answer?

A. Number 3> number 2 B. **Number 3> temp** C.

Number 3< temp D. Number 3> number 1

41. How many pointers will have to be changed when a new node is to be added in a linear linked list in the middle?

A. 0

B. 1

C. 2

D. All the pointers will be changed

42. A variable cannot be used?

Choose the correct answer

- A. Before it is declared**
- B. After it is declared
- C. In the function it is declared in
- D. Can always be used

43. In which area of a class are data and function directly accessible outside the class?

Choose the correct answer

- A. Public**
- B. Private
- C. Protected
- D. None

44. Which of the following options is true regarding inheritance in Object Oriented Programming ? Choose the correct answer?

A. There is reduced interaction with the hardware

B. A class may or may not have any object

C. Two or more functions can have the same name and number and type of arguments in a program

D. Class- object relation can be changed at run time

45. Every element of a data structure has an address and a key associated with it. A search mechanism deals with two or more values assigned to the same address by using the key. What is this search mechanism?

- A. Linear search
- B. Selection search
- C. **Hash coded search**
- D. Binary search
- E. None of this

46. Which of the following abstract data types can be used to represent many – to- many relations? Choose the correct answer?

- A. Tree
- B. Stack
- C. **Graph**
- D. Queue

47. Pragya sells footballs. She has a large container to store footballs which is closed from below. Footballs are piled one on top of the other in the box. When new balls are supplied, Pragya puts the balls in the box from the top. When a customer buys a ball, she delivers the ball at the top of the pile to the customer. Each ball has a code. She wants to store the ball codes in the data structure to keep track of her inventory. What data structure should she use? Choose the correct answer?

A. Queue B. **Stack** C. Array D. Graph

48. For the given array, find the arrangement of the elements after 3rd pass of selection sort. Assume that the array is being sorted in ascending order list ; 33,22, 11, 77, 66, 88, 55

- A. 22, 11, 33, 66, 77, 55, 88
- B. 11, 22, 33, 55, 66, 77, 88
- C. 11, 22, 33, 55, 66, 88, 77
- D. **11, 22, 33, 77, 66, 88, 55**

49. For solving a problem, which of these in the 1st step in developing a working programme for it? Choose the correct answer?

A. Writing the program in the programming language

B. Writing the step by step algorithm to solve the problem

C. Compiling the libraries required

D. Code debugging

50. The algorithm design technique used in quick sort algorithm is?

Choose the correct answer

- A. Dynamic programming
- B. Back tracking
- C. **Divide and conquer**
- D. Greedy search

51. How can call to an overloaded function be ambiguous?

A. By misspelling the name

B. There might be two or more functions with the same name

C. There might be two or more functions with equally appropriate signatures

D. none of these

52. Consider the given statement for their correctness with respect to stacks data structure

1. Stacks follow a LIFO approach
2. Stacks are used to convert binary numbers to corresponding decimal numbers.
3. Stacks use two pointers for performing PUSH and POP respectively

- A. **TTF**
- B. **TTT**
- C. **TFF**
- D. **FTF**

53. Which of the following options gives the lower bound on running time for an algorithm?

- A. Best case complexity of the algorithm
- B. Average case complexity of the algorithm
- C. **Worst case complexity of the algorithm**
- D. Number of iterations taking place in the algorithm

```
54. function main() {  
    integer i=0.7  
    static float m=0.7  
    if (m equals i)  
print "we are Equal"  
    else if( m>i )  
print "I am greater"  
    else  
print "I am lesser"  
}
```

- A. We are equal
- B. **I am greater**
- C. I am lesser
- D. This code will generate an error

55. Consider an array on which bubble sort is used. The bubble sort would compare the element $A[x]$ to which of the following elements in a single iteration?

A. $A[x+1]$

B. $A[x+2]$

C. $A[x+2x]$

D. All of these

56. Choose the correct answer. Consider the statement

```
while (a < 10.0) {  
    a = a*a  
}
```

Assuming a is positive, for what value of a will this code statement result in an infinite loop?

- A. **a < 1.0**
- B. a < sqrt (10)
- C. a > sqrt (10)
- D. a = 0

57. Choose the correct answer. Ankita takes as input 2 integer numbers, a and b, whose value can be between 0 and 31. He stores them as 5 bit numbers. He writes the following code to process these numbers to produce a third number c.

$$c = 2*(a - b)$$

In how many minimum bits should Ankita store c?

- A. 6 bits
- B. 7 bits**
- C. 8 bits
- D. 9 bits

58. Recursive function is executed in a

- A. Last in First Out Order**
- B. First in First Out Order
- C. Parallel Fashion
- D. All of the above

59. Yukta created an interface to use it in different parts of the program by implementing it. But she forgot to specify the access specifier for each contained method. What will be the access specifier of the methods that will be inherited/implemented?

A. Public

B. Private

C. Protected

D. An error will be generated

60. Which of the following statements are true?

- 1)An Arithmetic left shift multiplies a signed number by two
- 2)An Arithmetic right shift divides a signed number by two
- 3)Mask operation is an AND micro-operation and insert is an OR micro-operation
- 4)In a logical shift, the serial input to the shift is one

- A. Both 1 and 2
- B. Both 3 and 4
- C. 1, 2 and 3**
- D. 2, 3 and 4

61. Choose the correct answer. A Queue is implemented by a linear array of size 10 (and not as a circularly connected array). Front and Rear are represented as an index in the array. To add an element, the rear index is incremented and the element is added. To delete an element, the front index is incremented. The following operations are done on an empty queue.

ADD 1; DELETE; ADD 2; ADD 3; ADD 4; DELETE, DELETE.

After this set of operations, what is the maximum capacity of the queue?

A. 6

B. 7

C. 10

D. None of these

62. A 8-bit signed integer has the following range?

A. 0 to 255

B. **-128 to 127**

C. -255 to 254

D. 0 to 509

63. Pankaj makes a program to print the product of cubes of the first 10 whole numbers

She writes the following program:

```
integer x = 0 // statement 1
```

```
integer sum = 0 // statement 2
```

```
while ( x < 10 ) // statement 3
```

```
{
```

```
sum = x*x*x // statement 4
```

```
x = x + 1 // statement 5
```

```
}
```

```
print sum // statement 6
```

Is her program correct? If not, which statement will you modify to correct it?

A. No error, the program is correct

B. Statement 1

C. **Statement 4**

D. statement 6

64. Here is an infix notation: $((A+B)*C-(D-E))^{(F+G)}$
Choose the correct postfix notation of the above from the given options?

A. $AB+CD^*E-FG+^{\wedge}$

B. **$AB+C*DE-FG+^{\wedge}$**

C. $AB+C*DE-FG-+^{\wedge}$

D. $A+BC*DE-FG-+^{\wedge}$

65. One of the following options is a form of access used to add and remove nodes from a queue.

A. LIFO

B. FIFO

C. Both LIFO and FIFO

D. None of these

66. What is the time complexity of adding three matrices of size $N \times N$ cell-by-cell?

A. $O(N)$

B. $O(N^2)$

C. $O(N^3)$

D. None of these

67. What is the output of the pseudocode statements given below?

(Note: Assume that when two data types are processed through an operator, the answer maintains the same data type as that of the input. Also, all data types have enough range to accommodate any number. If two different data types are operated upon, the result assumes the data type that is more expressive.)

```
integer a=984, b=10
```

```
//float is a data type to store real numbers.
```

```
float c
```

```
c = a / b
```

```
print c
```

A. 984

B. 98.4

C. 98

68. What will be the output generated when the given code is executed? A pseudo-code is used which is self explanatory.

```
function main()
{
integer a=5
switch(a)
{
default: print "hello"
case 5:  print "How are you?"
break

}
```

```
}
```

A. hello

B. How are you

C. HelloHow are you?

D. This code will generate a compile time error

69. A language has 28 different letters in total. Each word in the language consists of a maximum of 7 letters. A programmer wants to create a data type to store a word of this language. She decides to store the word as an array of letters. How many bits should she assign to the data type to store all kinds of words of the language?

- A. 7
- B. 35**
- C. 28
- D. 196

70. How can the largest number in a list of twenty numbers be found?

A. Use bubble sort to sort the list in a descending order and then print the first number of the series

B. Use selection sort to sort the list in a descending order and then print the first number of the series

C. Implement one iteration of selection sort for descending order and print the first number in the series

D. None of the above

71. A programmer writes an efficient program to sum two square diagonal matrices (matrices with elements only on the diagonal positions). The size of each matrix is $n \times n$. What is the time complexity of the algorithm?

A. $O(n^2)$

B. **$O(n)$**

C. $O(n \cdot \log(n))$

D. None of the above

72. How many nodes does a full binary tree with “n” leaves contain?

- A. $2n + 1$ nodes
- B. $\log_2 n$ nodes
- C. $2n - 1$ nodes**
- D. $2n$ nodes

73. Refer to the pseudocode given in the 'Passage'. The code is similar to that in C++ and is self-explanatory. An accessible member function and a data member for an object are accessed by the statements *objectname.functionname* and *objectname.datamembername*, respectively. Which statement should be deleted from the code to rectify the error in it ?

- A. Statement 1
- B. Statement 2
- C. Statement 3
- D. Statement 4**

74. The following values are to be stored in a hash Table-15,22,41,19,102,18,37

Using the division method of hashing with a table size of 10 (use sequential method of resolving collision),give the contents of Hash Table.

A. 41,22,102,15,37,18,19,Null, Null, Null

B. Null, Null, Null,41,22,102,15,37,18,19

C. 41,22,102,15,37,18,19

D. Null,41,22,102,Null, 15,Null, 37,18,19

75. Consider the code given below. How many times will “Hello” be printed if $m < n$ and exactly one of (m, n) is even?

```
for i = m to n increment 2  
{ print “Hello!” }
```

A. $(n - m + 1)/2$

B. $1 + (n - m)/2$

C. $1 + (n - m)/2$ if m is even, $(n - m + 1)/2$ if m is odd

D. $(n - m + 1)/2$ if m is even, $1 + (n - m)/2$ if m is odd

1.Q) What will the output of the following pseudo code statements be?

(Note: Assume that when two data types are processed through an operator, the answer maintains the same data type as that of the input. Also, all data types have enough range to accommodate any number. If two different data types are operated upon, the result assumes the data type that is more expressive.)

Integer a = 456, b, c, d = 10

b = a/d

c = a – b

print c

A.410

B. 410.4

C. 411.4

D. 411

2.Q) The function given below takes a number “n” as the input and calculates the sum of first “n” natural numbers. Which of the following statements should be inserted in place of “??” to get the required output?

```
function sum(n)
{
if (??)
return 1
else
return (n + sum(n-1))
end
}
```

A. n equals 1

B. n equals 2

C. $n \geq 1$

D. $n > 1$

3.Q) Which of the following implies that there are two loops that are nested?

A. Two loops, one after the other

B. Two loops, one inside the other

C. One loop with two different iteration counts

D. Two loop with the same iteration count

Choose the correct answer.

Passage

```
function main()
```

```
{
```

```
static integer abc = 5
```

```
print abc—
```

```
if ( abc )
```

```
main() // calling main function
```

```
}
```

Choose the correct answer:

A pseudo-code is used which is self explanatory.

// in pseudo code refers to comment

4.Q) What will be the output of the given code?

A. 43210

B. 54321

C. This code will enter an infinite loop

D. This code will generate an error

5.Q) The function given below takes an even integer “n” as the input and calculates the sum of first “n” even natural numbers. The function is called by the statement “sum (30)”. How many times will the function “sum” be called to compute the sum?

```
function sum(n)
{
  if (n equals 2)
    return 2
  else
    return (n + sum(n-2))
  end
}
```

- A. 1
- B. 30
- C. 15**
- D. 16

Passage

Class rocket

```
{
private:
integer height, weight
public: \\statement 1
function input a, int b)
{
height = a;
weight = b;
}
}
function main( )
{
Rocket rocket1, rocket2
}
```

6.Q) Refer to the pseudocode given in the ‘Passage’. The code is similar to that in C++ and is self-explanatory. An accessible member Function and a data member for an object are accessed by the statements objectname.Functionname and objectname.Datamembername, respectively.

What can be inferred from this code?

- A. “rocket” is a class with “rocket1” and “rocket2” as its objects, with “height” and “weight” as its attributes.**
- B. “rocket” is a class with “rocket1” and “rocket2” as its objects, with “height” and “weight” as its objects.
- C. “rocket” is a class with “rocket1” and “rocket2”, “height” and “weight” as its attributes.
- D. “rocket” is a class with “rocket1” and “rocket2”, “height” and “weight” as its objects.

7.Q) In which of the following situations can a constructor be invoked?

A. When an object is created

B. When an object is assigned the value 0

C. Only at the end of the code

D. When the scope of the object is over

8.Q) What will happen if some indentations are made in some statements of a code written in C++?

- A. Faster execution of the code
- B. Lower memory requirement for the code
- C. Correction of errors in the code
- D. Better readability of the code.**

9.Q) In an implementation of a linked list, each node contains data and address. Which of the following can the address field possibly contain?

A. Address of the next node in sequence

B. Its own address

C. Address of the last node

D. Address of the first node

10.Q) Consider the structure of a queue as given below

—

FRONT = 2, REAR = 4

Queue: _, L, M, N, _

What will be the values of FRONT and REAR respectively after the insertion of an element 'Q' in the given queue?

A. 1,4

B. 2,5

C. 1,5

D. 2,4

12.Q) Which of the following can be inherited by a derived class from a base class?

- A. Data members
- B. Member functions
- C. Constructors and destructors
- D. Data members and member functions**

13.Q) A programmer wants the program given below to print the largest number out of three numbers entered by the user.

```
int number1, number 2, number 3, temp;  
input number 1, number 2, number 3;  
if (number1>number2)  
temp = number 1  
else  
temp = number 2  
end if  
if (??) // Statement 1  
temp = number 3  
end if  
print temp
```

Which of the following should be substituted in place of “??” in Statement 1 in the code?

A. number3> number2

B. number3> temp

C. number3> temp

D. number3> number1

14.Q) Which of the given function prototypes can be considered to be overloaded (no ambiguity)?

A. function my Func(integer Num, float me) // does not return anything

B. function my Func(integer Num, double me) // does not return anything

C. function my Func(character Num, float me) // does not return anything

D. function my Func(integer Num, float me) // return an integer

Passage

```
function moify(y,z)
```

```
{
```

```
y = y + 1;
```

```
z = z + 1;
```

```
return y – z
```

```
}
```

```
function calculate ( )
```

```
{
```

```
integer a = 5, b = 10, c
```

```
c = modify (a, b);
```

```
print a
```

```
print space
```

```
print c
```

```
{
```

15.Q) Consider the code given in the 'Passage'. Assume that "a" and "b" are passed by value. What will the output of the program be when the function calculate () is executed?

- A. 11 -5
- B. 10 -5
- C. 6 -5
- D. 5 -5**

Passage

```
function preordertraverse(node)
{
    print node      value
    if (condition x)
    { preordertraverse(node    left)}
    if condition y)
    { preordertraverse(node    right)}
    return
}
```

16.Q) Consider a binary tree implementation. The root address is stored in the variable root. The address of a node is given in the variable node. The value of the node and its right and left child nodes can be accessed using the statements given below.

node → value,
node → right,
node → left.

A programmer writes the function given in the 'Passage' to do a preorder traversal of the tree.

What are Condition X and Condition Y ?

- A. **Condition X: node → left is not equal**
Condition Y: node → right is not equal
- B. Condition X: node → right is not equal
Condition Y: node → left is not equal
- C. Condition X: node → left is equal
Condition Y: node → right is equal
- D. Condition X: node → right is equal
Condition Y: node → left is equal

17. Q) The following operations are performed on an empty R “A”.

PUSH(1)

PUSH (2)

POP

PUSH(5)

PUSH(6)

POP

What will the stack contain after these operations?

(Note: The top of the stack is underlined in the options below.)

A. 5 6

B. 1 5

C. 5 6

D. 1 5

18.Q) How many nodes does a full binary tree with “n” non-leaf nodes contain?

A. $\log n$

B. $n + 1$

C. $2n + 1$

D. $2n$

19.Q) A programmer mistakenly writes “gor” instead of the keyword “for” used in loops. While writing a program in C++. What will this result in ?

A. The code would not compile.

B. The code would give an error while execution.

C. The code may work for some inputs and not for the others.

D. The code would not create any problem.

20.Q) Every element of a data structure has an address and a key associated with it. A search mechanism deals with two or more values assigned to the same address by using the key. What is this search mechanism?

- A. Linear search
- B. Binary search
- C. Hash coded search**
- D. None of the above

21.Q) Which of the following abstract data types can be used to represent a many-to-many relation?

- A. Tree
- B. Stack
- C. Graph**
- D. Queue

22.Q) Why is an algorithm designer concerned primarily about the run time and not the compile time while calculating time complexity of an algorithm?

A. Run time is always more than the compile time.

B. Compile time is always more than the run time.

C. Compile time is a function of run time.

D. A program needs to be compiled once but can be run several times.

Passage

Function main()

{

Automatic variable var

Print var

}

Choose the correct answer.

A pseudo-code is used which is self explanatory.

23.Q) What will be the output generated when the given code is executed?

A. 0

B. 1

C. Garbage Value

D. This code will generate a compile time error

24. Q) In which of the following methods is sorting NOT possible?

- A. Insertion
- B. Selection
- C. Exchange
- D. Deletion**

25.Q) Which of the following algorithm design techniques is used in the quick sort algorithm?

- A. Dynamic programming
- B. Back tracking
- C. Divide and conquer**
- D. Greedy search

26.Q) A programmer is making a database of animals in a zoo along with their properties. The possible animals are dog, lion and zebra. Each one has attributes as herbivorous, color and nocturnal. The programmer uses the object-oriented programming paradigm for this. How will the system be conceptualized?

A. Class: Animal; objects: lion and zebra; data members: herbivorous, color and nocturnal

B. Class: Animal; objects: herbivorous, color and nocturnal; data members: dog, lion and zebra

C. Classes: dog, lion and zebra; objects: Animal; data members: herbivorous, color and

27.Q) The program to print the sum of all cubes that lie between 0 and 100 is given below. Does this program have an error? If yes, which statement should be modified to correct the program?

```
integer i = 0,a // Statement 1
```

```
integer sum = 0;
```

```
a = (i * i * i)
```

```
while (1<100) // Statement 2
```

```
{
```

```
sum = sum + a // Statement 3
```

```
i = i + 1
```

```
a = (i * i * i ) // Statement 4
```

```
}
```

```
Print sum
```

A. Statement 1

B. Statement 2

C. Statement 3

D. Statement 4

E. No error

28.Q) What is the output of the pseudocode statements given below?

(Note: Assume that when two data types are processed through an operator, the answer maintains the same data type as that of the input. Also, all data types have enough range to accommodate any number. If two different data types are operated upon, the result assumes the data type that is more expressive.)

```
integer a = 984, b=10
```

```
//float is a data type to store real numbers.
```

```
float c
```

```
c = a / b
```

```
print c
```

A.984

B. 98.4

C. 98

D. Error

29.Q) Code a contains a set of eight lines that occur ten times in different points of the program. This code is passed to a programmer who puts the set of eight lines in a function definition and calls them at the ten points in the program. Assume this new code to be Code B. Which code will run faster using an interpreter?

Code A

Code B

Both the codes would run at the same speed

None of the above

Passage

```
function MyFunc 1(integer n)
{
return n*2
}
function MyFunc2(integer n)
{
print "The value is " n
}
```

30.Q) Which of the given two functions can be categorized as procedure?

A. My Func 1

B. My Func 2

C. Both MyFunc1 and MyFun2

D. A function cannot be a procedure

31.Q) Which of the following statements is TRUE about a breadth first search?

A. Beginning from a node, all the adjacent nodes are traversed first

B. Beginning from a node, each adjacent node is fully explored before traversing the next adjacent node

C. Beginning from a node, the nodes are traversed in cyclic order

D. None of the above

32.Q) How does inheritance relate to abstraction?

A. A base class is an abstraction of all its derived classes.

B. A derived class is an abstraction of all its base classes.

C. Base and derived classes are abstractions of each other.

D. Inheritance prevents abstraction.

33.Q) Consider the code given below. How many times will “Hello” be printed if $m < n$ and exactly one of (m, n) is even?

```
For i= m to n increment 2  
{ print “Hello!”}
```

A. $(n - m + 1)/2$

B. $1 + (n - m)/2$

C. $1 + (n - m)/2$ if m is even, $(n - m + 1)/2$ if m is odd

D. $(n - m + 1)/2$ if m is even, $1 + (n - m)/2$ if m is odd

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

A. -12

B. 0

C. 32

D. 18

35.Q) Consider the code given below. Assume that “a” and “b” are passed by reference. What will the output of the program be when the unction calculate() is executed?

```
function modify(b,a)
{
return a – b
}
function calculate ()
{
Integer a = 5, b = 12, c
c = modify(a,b);
print c
}
```

A.7

B. -7

C. 8

36.Q) Each bucket in a Hash Table is the head of
_____.

A. A Heap

B. A Stack

C. An Array

D. A Queue

37.Q) A programmer implements a queue as a singly-linked list. He queue has “n” elements. What will be the time complexity to ADD an element to the queue?

A. $O(1)$

B. $O(\log_2 n)$

C. $O(n)$

D. $O(n \log_2 n)$

```
passage
class entity
{
private:
integer a,b
public:
integer c
function entity () {a= 0; b=0}
function compare ( )
{if (a>b) return 1;
return 0
}
}
function main( )
{
entityn black
int value 2 = 5
value = black. compare()    // Statement 1
black.c = value02    // Statement2
print black a    // Statement 3
```

38.Q) Refer to the pseudocode given in the 'Passage'. The code is similar to that in C++ and is self-explanatory. An accessible member function and a data member for an object are accessed by the statements `objectname.functionname` and `objectname.datamembername`, respectively. Identify the statement with an error.

- A. Statement 1
- B. Statement 2
- C. Statement 3**
- D. Statement 4
- E. None of the above

39.Q) What is the maximum number of edges in an undirected graph with “n” vertices?

A. $n*(n-1)/2$

B. $n*(n+1)/2$

C. $n*n$

D. $2*n$

40.Q)What will be returned if f(a,b) is called in the following functions?

```
function g(int n)
```

```
{
```

```
if (n>0) return 1;
```

```
else return -1;
```

```
}
```

```
function f(int a, int b)
```

```
{
```

```
if (a>b) return g(a-b);
```

```
if (a<b) return g(-b+a);
```

```
return 0;
```

```
}
```

A. Always +1

B. 1 if a>b, -1 if a<b, 0 otherwise

C. -1 if a>b, -1 if a<b, 0 otherwise

D. 0 if a equals b, -1 otherwise

41.Q) In the execution process of a program, this technoque involves the intermediate representation to be compiled to native machine code at runtime. What is the name of this technique?

- A. Static compilation
- B. Run time interpretation
- C. Static interpretation
- D. Just in time compilation**

42.Q)Choose the correct answer.

A sorting mechanism uses the binary tree concept such that any number in the tree is larger than all the numbers in the sub-tree below it. What is this method called?

A. Selection sort

B. Insertion sort

C. Heap sort

D. Quick sort

43. Q) The following operations are performed on an empty stack “A”.

PUSH(1)

PUSH (2)

POP

PUSH(5)

PUSH(6)

POP

What will the stack contain after these operations?

(Note: The top of the stack is underlined in the options below.)

A. 5 6

B. 1 5

C. 5 6

44.Q) What will happen if some indentations are made in some statements of a code written in C++?

- A. Faster execution of the code
- B. Lower memory requirement for the code
- C. Correction of errors in the code
- D. Better readability of the code**

45.Q) Which of the following abstract data types can be used to represent a many-to-many relation?

- A. Tree
- B. Stack
- C. Graph**
- D. Queue

46.Q) A librarian has to rearrange the library books on a shelf in a proper order at the end of each day. Which of the following sorting techniques should be the librarian's ideal choice?

A. Bubble sort

B. Insertion sort

C. Selection sort

D. Heap sort

47.Q)Tricha needs to store a list of binary data.
Which of the following data types should she
use?

A. Integer

B. Float

C. Character

D. Boolean

48.Q) A programmer writes an efficient program to add two upper triangular 10×10 matrices with the elements on the diagonals retained. How many total additions will the program make?

- A. 100
- B. 55
- C. 25
- D. 10

49.Q) A problem to be solved is broken into a sequence of smaller sub-problems until a stage where the sub-problem can be easlved. What is this design approach called?

- A. Top-Down approach**
- B. Bottom-Up approach
- C. Procedural programming
- D. None of the above

50.Q) Consider an array on which bubble sort is used. To which of the following elements will the bubble sort compare the element $A[X]$ with, in a single iteration?

A. $A[x + 1]$

B. $A[x + 2]$

C. $A[x + 2x]$

D. All of the above

Choose the correct answer.

51.Q) A programmer is making a database of animals in a zoo along with their properties. The possible animals are dog, lion and zebra. Each one has attributes herbivorous, color and nocturnal. The programmer uses the object-oriented programming paradigm for this. How will the system be conceptualized?

A. Class: Animal; objects: dog, lion and zebra; data members: herbivorous, color and nocturnal

B. Class: Animal; objects: herbivorous, color and nocturnal; data members: dog, lion and zebra

C. Class: dog, lion and zebra; objects: Animal;

52.Q) A programmer writes a program to find an element in the array A[5] with the elements: 8:30 40 45 70. The program is run to find a number “X”, that is found in the first iteration of binary search. What is the value of “X”?

A. 40

B. 8

C. 70

D. 30

Choose the correct answer.

53.Q) A stack is implemented as a linear array $A[0 \dots N-1]$. A programmer writes the function given below to pop out an element from the stack.

```
function POP( top,N )
```

```
{
```

```
if (X)
```

```
{
```

```
top = top -1
```

```
}
```

```
else
```

```
{
```

```
print"Underflow"
```

```
}
```

```
return top
```

```
}
```

Which of the following should substitute the condition "X"?

A. $top < N-1$

B. $top < N$

C. $top > 1$

D. $top \geq 0$

54.Q) What is the difference between a function and a method?

A. Function is a named code unlike method which is a part of an object

B. Function contained in an object is called a method

C. Function cannot change variables outside its scope unlike method

D. There is no difference between the two

Choose the correct answer.

55.Q) Which of the following is the lowest level format to which the computer converts a program in a higher language before execution?

A. English code

B. Machine code

C. Assembly language

D. System language

Passage

class brush

{

private:

integer size, c

rcode

function getdata() { } // Statement 1

public:

integer name // Statement 2

function putdata() { }

}

function main

{

brush b1, b2

print b1.name //Statement 3

b2.getdata() //Statement 4

}

Choose the correct answer.

56.Q) Refer to the pseudocode given in the 'Passage'. The code is similar to that in C++ and is self-explanatory. An accessible member Function and a data member for an object are accessed by the statements objectname.Functionname and objectname.Datamemnername, respectively. Which statement should be deleted from the code to rectify the error in it?

- A. Statement 1
- B. Statement 2
- C. Statement 3
- D.Statement 4**

57.Q) A developer writes the program given below to print the sum of the squares of the first five whole numbers(0...4). Is the program correct? If not, which statement should be modified to correct the program?

```
integer i = 0 // Statement 1
```

```
integer sum = 0 // Statement 2
```

```
while (i<5) // Statement 3
```

```
{
```

```
sum = i*i // Statement 4
```

```
i = i + 1 // Statement 5
```

```
}
```

```
print sum // statement 6
```

A. No error, the program is correct

B. Statement 1

C. Statement 4

D. Statement 6

Choose the correct answer.

58.Q) The program to print the sum of all cubes that lie between 0 and 100 is given below. Does this program have an error? If yes, which statement should be modified to correct the program?

```
integer i = 0, a // Statement 1
integer sum = 0;
a = (i * i * i)
while (i < 100) // Statement 2
{
    sum = sum + a // Statement 3
    i = i + 1
    a = (i * i * i) // Statement 4
}
print sum
```

- A. Statement 1
- B. Statement 2
- C. Statement 3
- D. Statement 4
- E. No error

Passage

```
integer i = 1 // Statement 1
```

```
while (i<= 3 )
```

```
{
```

```
int j // Statement 2
```

```
while ( j<= i ) // Statement 3
```

```
{
```

```
print j
```

```
print blank space
```

```
j = j + 1 // Statement 4
```

```
}
```

```
print end-of-line //takes the cursor to the next line
```

```
i = i + 1
```

```
}
```

Choose the correct answer.

59.Q) A programmer writes the program given in the 'Passage' to print the following pattern on the screen:

1

12

123

Will this program function properly? If not, which statement should be modified?

A. Statement 1

B. Statement 2

C. Statement 3

D. Statement 4

E. This program will function properly

Choose the correct answer

60.Q) What is the output of the program given below?

```
integer i = 0, j
```

```
while (i<2 )
```

```
{
```

```
  j = 0;
```

```
  while (j< 3*i)
```

```
  {
```

```
    print j
```

```
    print blank space
```

```
    j = j + 3
```

```
  }
```

```
  print end-of-line // takes the cursor to the next line
```

```
  i = i + 1
```

```
}
```

A. 0

0 3

B. 0 3

0 3 6

C. 0

0 3 6

Choose the correct answer.

61.Q) An Array MyArr with 10 rows and 15 columns is stored in a row major fashion in the memory. Given that the starting address of MyArr is 1000 and each element's size is 1, find the address of MyArr[6][11]. (Assume the lower bounds on columns and rows of this Array as 1 and 1 respectively)

- A. 1105
- B. 1060**
- C. 1160
- D. 1085

Choose the correct answer

62.Q) What is implied by the argument of a function?

A. The variables passed to the function when it is called

B. The value that the function returns on execution

C. The execution code inside function

D. Return type of the function

63.Q) How many nodes a full binary tree with “n” leaves contain?

A. $2n + 1$ nodes

B. $\log_2 n$ nodes

C. $2n - 1$ nodes

D. $2n$ nodes

Choose the correct answer.

64.Q)A sorting mechanism uses the binary tree concept such that any number in the tree is larger than all the numbers in the sub-tree below it. What is this method called?

- A. Selection sort
- B. Insertion sort
- C. Heap sort**
- D. Quick sort

Choose the correct answer.

65.Q) Preeti writes a program in low level language, now she wants to translate it into a higher language without rewriting the program. What another program she must use for this purpose?

- A. Compiler**
- B. Decompiler
- C. Interpreter
- D. Executer
- E. Cross compiler

Choose the correct answer

66.Q)A programmer prepares a questionnaire with “true or false” type of questions. He wants to define a data type that stores the responses of the candidates for the questions. Which of the following is the most suited data type for this purpose?

- A. Integer
- B. Boolean**
- C. Float
- D. Character

Choose the correct answer

67.Q) Which of the following is NOT a data type?

- A. Integer
- B. Character
- C. Boolean
- D. Array**

Choose the correct answer.

68.Q)What is the maximum number of edges in an undirected graph with “n” vertices?

A. $n*(n-1)/2$

B. $n*(n+1)/2$

C. $n*n$

D. $2*n$

Choose the correct answer.

69.Q) Which of the following data structures may produce an overflow error even though the current number of elements in it lower than its size?

- A. A queue implemented in a linear array**
- B. A queue implemented in a circularly connected array
- C. A stack implemented in a linear array
- D. None of the above

70.Q) X and Y are asked to write a program to sum the rows of a 2X2 matrix stored in an array A.

X writes the code (Code A) as follows:

```
For n = 0 to 1
```

```
sumRow1 [n] = A[n][1] + A[n][2]
```

```
end
```

Y writes the code (Code b) as follows:

```
Sum Row1[0] = A[0][1] + A[0][2]
```

```
Sum Row1[1] = A[1][1] + A[1][2]
```

Which of the following statements is correct about these codes if no loop unrolling is done by the compiler?

A. Code A would execute faster than Code B.

B. Code B would execute faster than Code A.

C. Code A is logically incorrect.

D. Code B is logically incorrect.

Choose the correct answer.

71.Q)A programmer tries to debug a code of 10,000 lines. It is known that there is a logical error in the first 25 lines of the code. Which of the following is an efficient way to debug the code?

A. Compile the entire code and check it line by line.

B. Use an interpreter on the first 25lines of code.

C. Compile the entire code and run it.

D. None of the above can be used to debug the code.

72.Q) For the given list of numbers, how many awaps will take place in Bubble Sort so that the list becomes sorted?

(Assume that the list is being sorted in ascending order)

List 23, 56, 78, 3, 11, 65

A. 4

B. 5

C. 6

D. 7

Choose the correct answer

73.Q) Which of the following sorting algorithms yields approximately the same worst-case and average-case running time behavior in $O(n \log n)$?

A. Bubble sort and Selection sort

B. Heap sort and Merge sort

C. Quick sort and Radix sort

D. Tree sort and Median-of-3 Quick sort

Choose the correct answer

74.Q) A programmer writes a sorting algorithm that takes different of time to sort two different lists of equal size. What is the possible difference between the two lists?

A. All numbers in one list are more than 100 while in the other are less than 100.

B. The ordering of numbers with respect to the magnitude in the two lists has different properties.

C. One list has all negative numbers while the other has all positive numbers.

D. One list contains 0 as an element while the other does not.

75Q) A programmer is making a base of animals in a zoo along with their properties. The possible animals are dog, lion and zebra. Each one has attributes herbivorous, color and nocturnal. The programmer uses the object-oriented programming paradigm for this. How will the system be conceptualized?

A. Class: Animal; objects: dog, lion and zebra; data members: herbivorous, color and nocturnal

B. Class: Animal; objects: herbivorous, color and nocturnal; data members: dog, lion and zebra

C. Class: dog, lion and zebra; objects: Animal; data members: herbivorous, color and nocturnal

76Q) Which of the following gives the maximum number of nodes at level :I' of a binary tree?

(Note: The root is at level 1.)

A. 2^{I-1}

B. 3^{I-1}

C. 2^I

D. 2^{I-1}

Passage

Integer num 1, num2

Input num1, num2

Integer k=0, final=num1

//missing statements

Print final

Choose the correct answer:

A pseudo-code is used which is self explanatory.

//in pseudo code refers to comment

77.Q)Reema wanted to multiply two numbers but the * key of her keyboard is broken. She decides to write the program without using * operator. She writes the given code, where some statements are missing.

What should be the missing statements in the given code?

A. While(k++ < num1)

final+=num1

B. While(k++ < num2-1)

final+=num1

C. While(k++ < num2)

final+=num1

D. While(k++ < num2)

final+=num2

78Q) The program to print the sum of all cubes that lie between 0 and 100 is given below. Does this program have an error? If yes, which statement should be modified to correct the program?

```
integer i = 0,a // Statement 1
integer sum = 0;
a = (i * i * i)
while (1<100) // Statement 2
{
sum = sum + a // Statement 3
i = i + 1
a = (i * i * i) // Statement 4
}
printsum
```

- A. Statement 1
- B. Statement 2**
- C. Statement 3
- D. Statement 4
- E. No error

Choose the correct answer.

79.Q) For which of the following is the stack implementation useful?

- A. Radix search
- B. Breadth first search
- C. Recursion**
- D. None of the above

Choose the correct answer.

80Q) A developer writes the program given below to print the sum of the squares of the first five whole numbers(0...4). Is the program correct? If not, which statement should be modified to correct the program?

```
integer i = 0 // Statement 1
```

```
integer sum = 0 // Statement 2
```

```
while (i<5) // Statement 3
```

```
{
```

```
sum = i*i // Statement 4
```

```
i = i + 1 // Statement 5
```

```
}
```

```
print sum // statement 6
```

A. No error, the program is correct

B. Statement 1

C. Statement 4

D. Statement 6

Choose the correct answer.

81.Q) Which of the following data structures may produce an overflow error even though the current number of elements in it lower than its size?

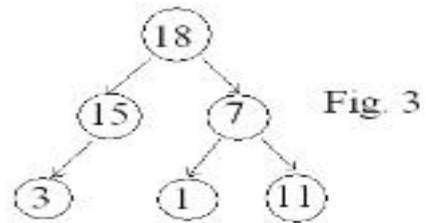
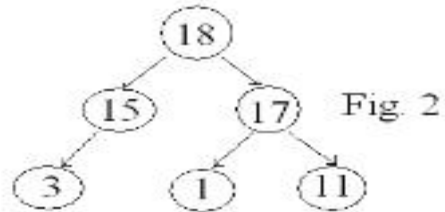
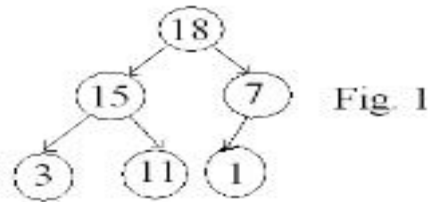
A. A queue implemented in a linear array

B. A queue implemented in a circularly connected array

C. A stack implemented in a linear array

D. None of the above

Passage



Choose the correct answer.

82.Q) Which tree (s) from the given figure is/are Heap(s)?

A. Only 1

B. Only 2

C. Only 3

D. Both 1 and 2

E. Both 1 and 3

82.Q) Which tree (s) from the given figure is/are Heap(s)?

A. Only 1

B. Only 2

C. Only 3

D. Both 1 and 2

E. Both 1 and 3