

Ques 1 : Choose the correct answer

There is a new data-type which can take as values natural numbers between (and including) 0 and 25. How many minimum bits are required to store this data-type.

Option 1 : 4 Option 2 : 5 Option 3 : 1 Option 4 : 3

Ques 2 : Choose the correct answer

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

Option 1 : -12 Option 2 : 0 Option 3 : 32 Option 4 : 18

Ques 3 : Choose the correct answer

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

Option 1 : 7 Option 2 : 35 Option 3 : 28 Option 4 : 196

Ques 4 : Choose the correct answer

A 10-bit unsigned integer has the following range:

Option 1 : 0 to 1000 Option 2 : 0 to 1024 Option 3 : 1 to 1025 Option 4 : 0 to 1023

Ques 5 : Choose the correct answer

Rajni wants to create a data-type for the number of books in her book case. Her shelf can accommodate a maximum of 75 books. She allocates 7 bits to the data-type. Later another shelf is added to her book-case. She realizes that she can still use the same data-type for storing the number of books in her book-case. What is the maximum possible capacity of her new added shelf?

Option 1 : 52 Option 2 : 127 Option 3 : 53 Option 4 : 75

Ques 6 : Choose the correct answer

A new language has 15 possible letters, 8 different kinds of punctuation marks and a blank character. Rahul wants to create two data types, first one which could store the letters of the language and a second one which could store any character in the language. The number of bits required to store these two data-types will respectively be:

Option 1 : 3 and 4 Option 2 : 4 and 3 Option 3 : 4 and 5 Option 4 : 3 and 5

Ques 7 : Choose the correct answer

Parul takes as input two numbers: a and b. a and b can take integer values between 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?

Option 1 : a = 10 b = 200 Option 2 : a = 200 b = 10 Option 3 : a = 50 b = 100 Option 4 : a = 100 b = 50

Ques 8 : Choose the correct answer

Prashant takes as input 2 integer numbers, a and b, whose value can be between 0 and 127. He stores them as 7 bit numbers. He writes the following code to process these numbers to produce a third number c.

$c = a - b$

In how many minimum bits should Prashant store c?

Option 1 : 6 bits Option 2 : 7 bits Option 3 : 8 bits Option 4 : 9 bits

Ques 9 : 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?

Option 1 : 6 bits Option 2 : 7 bits Option 3 : 8 bits Option 4 : 9 bits

Ques 10 : Choose the correct answer

A character in new programming language is stored in 2 bytes. A string is represented as an array of characters. A word is stored as a string. Each byte in the memory has an address. The word "Mahatma Gandhi" is stored in the memory with starting address 456. The letter 'd' will be at which memory address?

Option 1 : 468 Option 2 : 480 Option 3 : 478 Option 4 : 467

Ques 11 : Choose the correct answer

Stuti is making a questionnaire of True-false questions. 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?

Option 1 : integer Option 2 : boolean Option 3 : float Option 4 : character

Ques 12 : Choose the correct answer:

A pseudo-code is used. Assume that when two data-types are processed through an operator, the answer maintains the same data-type as the input data-types. Assume that all data-types have enough range to accommodate any number. If two different data-types are operated on, the result assumes the more expressive data-type.

What will be the output of the following pseudo-code statements:

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

b = a/d

c = a - b

print c

Option 1 : 410

Option 2 : 410.4

Option 3 : 411.4

Option 4 : 411

Ques 13 : Choose the correct answer:

A pseudo-code is used. Assume that when two data-types are processed through an operator, the answer maintains the same data-type as the input data-types. Assume that all data-types have enough range to accommodate any number. If two different data-types are operated on, the result assumes the more expressive data-type.

// in pseudo code refers to comment

What will be the output of the following pseudo-code statements:

integer a = 984, b, c, d = 10

print remainder(a,d) // remainder when a is divided by d

a = a/d

print remainder(a,d) // remainder when a is divided by d

Option 1 : 48

Option 2 : Error

Option 3 : 84

Option 4 : 44

Ques 14 : Choose the correct answer:

Assume the following precedence (high to low). Operators in the same row have the same precedence:

(.)

* /

+ -

AND

OR

For operators with equal precedence, the precedence is from left-to-right in expression.

What will be the output of the following code statements?

integer a = 50, b = 25, c = 0

print (a > 45 OR b > 50 AND c > 10)

Option 1 : 1

Option 2 : 0

Option 3 : -1

Option 4 : 10

Ques 15 : Choose the correct answer:

Assume the following precedence (high to low). Operators in the same row have the same precedence:

(.)

* /

+ -

AND

OR

For operators with equal precedence, the precedence is from left-to-right in expression.

What will be the output of the following code statements?

integer a = 50, b = 25, c = 5

print a * b / c + c

Option 1 : 120

Option 2 : 125

Option 3 : 255

Option 4 : 250

Ques 16 : Choose the correct answer:

Assume the following precedence (high to low). Operators in the same row have the same precedence:

(.)

* /

+ -

AND

OR

For operators with equal precedence, the precedence is from left-to-right in expression.

What will be the output of the following code statements?

integer a = 10, b = 35, c = 5

print a * b / c - c

Option 1 : 65

Option 2 : 60

Option 3 : Error

Option 4 : 70

Ques 17 : Choose the correct answer:

Assume the following precedence (high to low). Operators in the same row have the same precedence:

(.)

* /

+ -

AND

OR

For operators with equal precedence, the precedence is from left-to-right in expression.

integer a = 10, b = 35, c = 5

Comment about the output of the two statements?

print a * b + c / d

print c / d + a * b

Option 1 : Differ due
to left-to-right
precedence

Option 2 : Differ by
10

Option 3 : Differ by
20

Option 4 : Same

Ques 18 : Choose the correct answer:

Assume the following precedence (high to low). Operators in the same row have the same precedence:

(.)

* /

+ -

AND

OR

For operators with equal precedence, the precedence is from left-to-right in expression.

integer a = 40, b = 35, c = 20, d = 10

Comment about the output of the following two statements:

print a * b / c - d

print a * b / (c - d)

Option 1 : Differ by 80

Option 2 : Same

Option 3 : Differ by 50
Option 4 : Differ by 160

Ques 19 : Choose the correct answer:

Assume the following precedence (high to low). Operators in the same row have the same precedence:

(.)

* /

+ -

AND

OR

For operators with equal precedence, the precedence is from left-to-right in expression.

integer a = 60, b = 35, c = -30

What will be the output of the following two statements:

print (a > 45 OR b > 50 AND c > 10)

print ((a > 45 OR b > 50) AND c > 10)

Option 1 : 0 and 1

Option 2 : 0 and 0

Option 3 : 1 and 1

Option 4 : 1 and 0

Ques 20 : Choose the correct answer:

A pseudo-code is used. Assume that when two data-types are processed through an operator, the answer maintains the same data-type as the input data-types. Assume that all data-types have enough range to accommodate any number. If two different data-types are operated on, the result assumes the more expressive data-type.

// in pseudo code refers to comment

What will be the output of the following pseudo-code statements:

integer a = 984, b=10

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

float c

c = a / b

print c

Option 1 : 984

Option 2 : 98.4

Option 3 : 98

Option 4 : Error

Ques 21 : Choose the correct answer:

A pseudo-code is used. Assume that when two data-types are processed through an operator, the answer maintains the same data-type as the input data-types. Assume that all data-types have enough range to accommodate any number. If two different data-types are operated on, the result assumes the more expressive data-type.

// in pseudo code refers to comment

What will be the output of the following pseudo-code statements:

integer a = 984

//float is a data-type to store rational numbers.

float b= 10, c

c = a / b

print c

Option 1 : 984

Option 2 : Error

Option 3 : 98.4

Option 4 : 98

Ques 22 : Choose the correct answer

Smriti wants to make a program to print the sum of square of the first 5 whole numbers (0...4). She writes the following 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
```

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

Option 1 : No error, the program is correct. Option 2 : Statement 1 Option 3 : Statement 4 Option 4 : statement 6

Ques 23 : Choose the correct answer

Shashi 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 + i
    -- MISSING STATEMENT 5 --
}
print sum
```

Which of the following will you use for statement 5?

Option 1 : i = 5 Option 2 : i = 5 * i Option 3 : i = i + 1 Option 4 : i = i + 5

Ques 24 : Choose the correct answer

Shantanu wants to make a program to print the sum of the first 7 multiples of 6. He writes the following program:

```
integer i = 0 // statement 1
integer sum // statement 2
while ( i <= 42 ) // statement 3
{
    sum = sum + i // statement 4
    i = i + 6;
}
print sum // statement 6
```

Does this program have an error? If yes, which one statement will you modify to correct the program?

Option 1 : Statement 1	Option 2 : Statement <u>2</u>	Option 3 : Statement 3	Option 4 : Statement 4
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Ques 25 : Choose the correct answer

Sharmili wants to make a program to print the sum of all perfect cubes, where the value of the cubes go from 0 to 100. She writes the following 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
```

Does this program have an error? If yes, which one statement will you modify to correct the program?

Option 1 : Statement 1	Option 2 : Statement <u>2</u>	Option 3 : Statement 3	Option 4 : Statement 4	Option 5 : No error
------------------------	-------------------------------	------------------------	------------------------	---------------------

Ques 26 : Choose the correct answer

Bhavya wants to make a program to print the sum of all perfect squares, where the value of the squares go from 0 to 50. She writes the following program:

```
integer i = 1, a // statement 1
integer sum = 0
while ( a < 50 ) // statement 2
{
    sum = sum + a // statement 3
    i = i + 1
    a = ( i * i ); // statement 4
}
print sum
```

Does this program have an error? If yes, which one statement will you modify to correct the program?

Option 1 : Statement <u>1</u>	Option 2 : Statement 2	Option 3 : Statement 3	Option 4 : Statement 4	Option 5 : No error
-------------------------------	------------------------	------------------------	------------------------	---------------------

Ques 27 : Choose the correct answer

Vijay wants to print the following pattern on the screen:

```
2
2 4
2 4 6
2 4 6 8
```

He writes the following program:

```
integer i = 1, j=2 // statement 1
while ( i <= 4 ) // statement 2
{
    j = 2;
    while ( j <= ? ) // Statement 3
    {
        print j
        print blank space
        j = j + 2
    }
    print end-of-line \takes the cursor to the next line
    i = i + 1
}
```

What is the value of ? in statement 3 ::

Option 1 : 8

Option 2 : i

Option 3 : 2*i

Option 4 : 4

Ques 28 : Choose the correct answer

Shravanti writes the following program:

```
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
}
```

What will be the output of the program?

Option 1 : 0
0 3

Option 2 : 0 3
0 3 6

Option 3 : 0
0 3 6
0 3 6 9

Option 4 : 0 3 6
0 3 6 9
0 3 6 9 12

Ques 29 : Choose the correct answer

Vijay wants to print the following pattern on the screen:

```
1
1 2
1 2 3
```

He writes the following program:

```
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
}
```

Will this program function correctly? If not which one statement will you modify to make the program function correctly?

Option 1 : Statement 1	Option 2 : Statement <u>2</u>	Option 3 : Statement 3	Option 4 : Statement 4	Option 5 : Program does not have error.
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Ques 30 : Choose the correct answer

Charu writes the following program:

```
integer i = 1, j, a
while ( i <= 4 )
{
    j = 1;
    a = 0;
    while ( a <= 5*i )
    {
        a = 2^j;
        print a
        print blank space
        j = j + 1
    }
    print end-of-line \takes the cursor to the next line
    i = i + 1
}
```

What will be the output of the program?

Option 1 : 2	Option 2 : 2 4	Option 3 : 2 4	Option 4 : 2
2 4	2 4 8	<u>2 4 8</u>	2 4
2 4 8	2 4 8 16	<u>2 4 8</u>	2 4
2 4 8 16	2 4 8 16 32	<u>2 4 8 16</u>	2 4 8 16

Ques 31 : Choose the correct answer

Himanshu wants to write a program to print the larger of the two inputted number. He writes the following code:

```
int number1, number 2
input number1, number 2
if ("??") // Statement 1
print number1
else
print number2
end if
```

Fill in the ?? in statement 1.

Option 1 : <u>number1>number2</u>	Option 2 : number2>number1	Option 3 : number2 equals number1	Option 4 : number1 <= number2
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Ques 32 : Choose the correct answer

Shalini wants to program to print the largest number out of three inputted numbers. She writes the following program:

```
int number1, number 2, number3, temp;
input number1, number2, number3;
if (number1>number2)
temp = number1
else
temp = number2
end if
if (??) // Statement 1
temp = number3
end if
print temp
```

Fill in the ?? in Statement 1

Option 1 : number3 > number2	Option 2 : <u>number3</u> > temp	Option 3 : number3 < temp	Option 4 : number3 > number1
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Ques 33 : Choose the correct answer

Rohit writes the following program which inputs a number and prints "Double digit" if the number is composed of two digits and "Not a double digit" if it is not.

```
int number;
```

```

if (number>10 AND number < 100)
    print "Double digit"
else
    print "Not a double digit"
end if

```

Rohit tries the following inputs: 5 and 66. The program works fine. He asks his brother Ravi to try the program. When Ravi enters a number, the program doesn't work correctly. What did Ravi enter?

Option 1 : 8 Option 2 : 100 Option 3 : 99 Option 4 : 10

Ques 34 : Choose the correct answer

Rohan writes the following program which inputs a number and prints "Triple digit" if the number is composed of three digits and "Not triple digit" if it is not.

```

int number;
if (number>99)
    print "Triple digit"
else
    print "Not triple digit"
end if

```

Rohan tries the following inputs: 25 and 566. The program works fine. He asks his brother Ravi to try the program. When Ravi enters a number, the program doesn't work correctly. What did Ravi enter?

Option 1 : 99 Option 2 : 100 Option 3 : 0 Option 4 : 1000

Ques 35 : Choose the correct answer

Abhinav wants to find the largest number in a given list of 20 numbers. Which of the following is an efficient approach to do this?

Option 1 : Use bubble sort to sort the list in descending order and then print the first number of the series.	Option 2 : Use selection sort to sort the list in descending order and then print the first number of the series.	Option 3 : <u>Implement one iteration of selection sort for descending order and print the first number in the series.</u>	Option 4 : None of these
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Ques 36 : Choose the correct answer

Lavanya wants to find the smallest number out of 26 inputted numbers. How many minimum comparisons he has to make?

Option 1 : 25 Option 2 : 13 Option 3 : 26 Option 4 : 52

Ques 37 : Choose the correct answer

A company offers commission for selling its products to its salesperson. The commission rate is Rs. 5 per product. However if the salesperson sells more than 200 items, he gets a

commission of Rs. 10 on all items he sold after the first 200. Kanu writes a program to calculate the commission for the salesperson:

```
integer numberProducts, commission
input numberProducts
```

```
if ( numberProducts > 200 )
-- MISSING STATEMENT --
else
commission = numberProducts * 5
end if
print commission
```

Fill in the missing statement.

Option 1 :	Option 2 :	Option 3 :	Option 4 :
commission =	$\text{commission} = 200 * \frac{5 + (\text{numberProducts} - 200) * 10}{10}$	commission =	None of these

Ques 38 : Choose the correct answer

Vikram wants to write a program which checks whether the inputted number is divisible by any of the first 6 natural numbers (excluding 1). He writes the following efficient code for it.

```
int number, n = 2, isdivisible=0
input number
while ( n <=6) // Statement 1
{
  if ( remainder (number, n) == 0)
    isdivisible = 1
  end
  n = n+1 // Statement 2
}
if (isdivisible equals 1)
  print "It is divisible"
else
  print "It is not divisible"
end
```

Vikram takes the program to Hari. Hari tells Vikram that though the code is correct, it can be made more efficient. Hari modifies a single statement and makes the code more efficient. Which statement does he modify and how?

Option 1 : Statement 1 is changed to: <u>while (n <=6 AND isdivisible=0)</u>	Option 2 : Statement 1 is changed to: while (n <=6 OR isdivisible=0)	Option 3 : Statement 1 is changed to: while (isdivisible=0)	Option 4 : Statement 2 is changed to: n = n + 2
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Ques 39 : Choose the correct answer

Rajiv wants to make a program which inputs two numbers: a and b ($a > b$) and computes the number of terms between a and b (including a and b). What will be code statement to do this:

Option 1 : $a - b$ Option 2 : $a - b + 1$ Option 3 : $a + b$ Option 4 : $a - b - 1$

Ques 40 : Choose the correct answer

I have a problem to solve which takes as input a number n. The problem has a property that given the solution for (n-1), I can easily solve the problem for n. Which programming technique will I use to solve such a problem?

Option 1 : Iteration Option 2 : Decision-making Option 3 : Object Oriented Programming Option 4 : Recursion

Ques 41 : Choose the correct answer:

A pseudo-code is used with the following meaning.

"pointer" is a data-type which contains memory address (or pointers)

Statement " $a = *b$ " puts the value at the memory address referenced by b into a.

Statement " $a = \&b$ " puts the memory address of b into a.

Statement " $*b = a$ " puts the value a at the memory address referenced by b.

What is the output of the following code statements? The compiler saves the first integer at the memory location 4062. Integer is one byte long.

```
integer a
pointer b
a = 20
b = &a
print *b
```

Option 1 : 4062 Option 2 : 4063 Option 3 : 20 Option 4 : 10

Ques 42 : Choose the correct answer:

A pseudo-code is used with the following meaning.

"pointer" is a data-type which contains memory address (or pointers)

Statement " $a = *b$ " puts the value at the memory address referenced by b into a.

Statement " $a = \&b$ " puts the memory address of b into a.

Statement " $*b = a$ " puts the value a at the memory address referenced by b.

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, b
pointer c, d
a = 30
c = &a
b = *c
a = a + 10
print b
```

Option 1 : 30 Option 2 : 4165 Option 3 : 40 Option 4 : 4166

Ques 43 : Choose the correct answer:

A pseudo-code is used with the following meaning.

"pointer" is a data-type which contains memory address (or pointers)

Statement "a = *b" puts the value at the memory address referenced by b into a.

Statement "a = &b" puts the memory address of b into a.

Statement "*b = a" puts the value a at the memory address referenced by b.

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 = 30
c = &a
d = c
a = a + 10
print *c
```

Option 1 : 30

Option 2 : 4165

Option 3 : 40

Option 4 : 4166

Ques 44 : Choose the correct answer

What is space complexity of a program?

Option 1 : Amount of hard-disk space required to store the program

Option 2 : Amount of hard-disk space required to compile the program

Option 3 : Amount of memory required by the program to run

Option 4 : Amount of memory required for the program to compile

Ques 45 : Choose the correct answer

The memory space needed by an algorithm has a fixed part independent of the problem instance solved and a variable part which changes according to the problem instance solved. In general, which of these two is of prime concern to an algorithm designer?

Option 1 : Fixed part

Option 2 : Variable Part

Option 3 : Product of fixed part and variable part

Option 4 : None of these

Ques 46 : Choose the correct answer

While calculating time complexity of an algorithm, the designer concerns himself/herself primarily with the run time and not the compile time. Why?

Option 1 : Run time is always more than compile time.

Option 2 : Compile time is always more than run time.

Option 3 : Compile time is a function of run time.

Option 4 : A program needs to be compiled once but can be run several times.

Ques 47 : Choose the correct answer

Pankaj and Mythili were both asked to write the code to evaluate the following expression:

$$a - b + c/(a-b) + (a-b)^2$$

Pankaj writes the following code statements (Code A):

```
print (a-b) + c/(a-b) + (a-b)*(a-b)
```

Mythili writes the following code statements (Code B):

```
d = (a-b)
```

```
print d + c/d + d*d
```

If the time taken to load a value in a variable, for addition, multiplication or division between two operands is same, which of the following is true?

Option 1 : Code A uses lesser memory and is slower than Code B

Option 2 : Code A uses lesser memory and is faster than Code B

Option 3 : Code A uses more memory and is faster than Code B

Option 4 : Code A uses more memory and is slower than Code B

Ques 48 : Choose the correct answer

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

Option 1 : $\theta(n^2)$

Option 2 : $\theta(n)$

Option 3 : $\theta(n \cdot \log(n))$

Option 4 : None of these

Ques 49 : Choose the correct answer

Tarang writes an efficient program to add two upper triangular 10×10 matrices (elements on diagonal retained). How many total additions will his program make?

Option 1 : 100

Option 2 : 55

Option 3 : 25

Option 4 : 10

Ques 50 : Choose the correct answer

Ravi and Rupali are asked to write a program to sum the rows of a 2×2 matrices stored in the array A.

Ravi writes the following code (Code A):

```
for n = 0 to 1
```

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

```
end
```

Rupali writes the following code (Code B):

```
sumRow1[0] = A[0][1] + A[0][2]
```

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

Comment upon these codes (Assume no loop-unrolling done by compiler):

Option 1 : Code A will execute faster than Code B.

Option 2 : Code B will execute faster than Code A

Option 3 : Code A is logically incorrect.

Option 4 : Code B is logically incorrect.

Ques 51 : Choose the correct answer

There is an array of size n initialized with 0. Akanksha has to write a code which inserts the value 3^k at position 3^k in the array, where $k=0,1,\dots$ (till possible). Akanksha writes an

efficient code to do so. What is the time complexity of her code?

Option 1 : $\theta(n^2)$ Option 2 : $\theta(n)$ Option 3 : $\theta(\log_3(n))$ Option 4 : $\theta(3^n)$

Ques 52 : Choose the correct answer

There are two matrices A and B of size $n \times n$. The data in both these matrices resides only at positions where both the indices are a perfect square. Rest all positions have 0 as the data. Manuj has available a third matrix initialized with 0's at all positions. He writes an efficient code to put the sum of A and B in C. What is the time complexity of Manuj's program?

Option 1 : $\theta(n^2)$ Option 2 : $\theta(n)$ Option 3 : $\theta(n^{1/2})$ Option 4 : $\theta(\log(n))$

Ques 53 : Choose the correct answer

Ravi has to add an strictly upper triangular (no elements at diagonal) and a strictly lower triangular square matrix (no elements at diagonal) and put the result in a third matrix. What is the time complexity of Ravi's algorithm? Assume that storing a value in a memory space takes negligible time, while each addition between values takes the dominating amount of time.

Option 1 : $\theta(n^2)$ Option 2 : $\theta(n)$ Option 3 : $\theta(1)$ Option 4 : None of these

Ques 54 : Choose the correct answer

We have two 100×3 (rows \times column) matrices containing mid-term exam marks and end-term exam marks of 100 students. Each row refers to a particular student, while columns refer to marks in English, Social Sciences and Maths. The end-term and mid-term marks of each student in each subject have to be added to get his total score in each subject, to be put in a third matrix (100×3). Parinidhi writes a code (Code A), where the outer loop iterates over the rows, while the inner loop iterates over the columns. Shashi writes a code (Code B), where the outer loop iterates over the columns, while the inner loop iterates over rows. Which of the following is true with regard to their code ignoring any caching or memory storage effects?

Option 1 : Code A is faster than Code B Option 2 : Code B is faster than Code A Option 3 : Code A and Code B will run in the same amount of time Option 4 : The comparison between the speed of the codes cannot be made.

Ques 55 : Choose the correct answer

A code takes the following code steps (equivalently time unit) to execute: $5 \cdot n^3 + 6 \cdot n^2 + 1$. Which of the following is not true about the time complexity of the program?

Option 1 : It has a time complexity of $O(n^3)$ Option 2 : It has a time complexity of $O(n^4)$ Option 3 : It has a time complexity of $O(n^2)$ Option 4 : It has a time complexity of $\theta(n^3)$

Ques 56 : Choose the correct answer

We have two programs. We know that the first has a time complexity $O(n^2)$, while the second has a complexity $\omega(n^2)$. For sufficiently large n , which of the following cannot be true?

- | | | | |
|--|---|---|-------------------------------------|
| Option 1 : Both codes have same complexity | <u>Option 2 : The first code has higher time complexity than the second</u> | Option 3 : The second code has lower time complexity than the first code. | Option 4 : Both codes are the same. |
|--|---|---|-------------------------------------|

Ques 57 : Choose the correct answer

The time complexity of code A is $\theta(n)$, while for Code B it is $\theta(\log(n))$. Which of the following is true for sufficiently large n ?

- | | | | |
|--|---|--|--|
| Option 1 : Both code have the same time complexity | <u>Option 2 : Code A has higher time complexity</u> | Option 3 : Code B has higher time complexity | Option 4 : No comparison can be made between the time complexity of the two codes. |
|--|---|--|--|

Ques 58 : Choose the correct answer

Rajini is given an efficient code for summing two $n \times n$ matrices and putting the result in a third matrix. She is asked to find it's time complexity. She realizes that the number of iterations required is more than n . What can she claim with regard to the complexity of the code?

- | | | | |
|-------------------------|---------------------------|------------------------------|--|
| Option 1 : It is $O(n)$ | Option 2 : It is $O(n^2)$ | Option 3 : It is $\theta(n)$ | <u>Option 4 : It is $\omega(n)$</u> |
|-------------------------|---------------------------|------------------------------|--|

Ques 59 : Choose the correct answer

Gautam is given two codes, A and B, to solve a problem, which have complexity $\theta(n)$ and $\theta(n^2)$ respectively. His client wants to solve a problem of size k , which Gautam does not know. Which code will Gautam deliver to the client, so that the execution is faster?

- | | | | |
|-------------------|-------------------|---|---|
| Option 1 : Code A | Option 2 : Code B | <u>Option 3 : Gautam cannot determine</u> | Option 4 : Both codes have the same execution time, so deliver any. |
|-------------------|-------------------|---|---|

Ques 60 : Choose the correct answer

Surbhi is given two codes, A and B, to solve a problem, which have complexity $O(n^3)$ and $\omega(n^4)$ respectively. Her client wants to solve a problem of size k , which is sufficiently large. Which code will Surbhi deliver to the client, so that the execution is faster?

- | | | | |
|--------------------------|-------------------|------------------------------------|---|
| <u>Option 1 : Code A</u> | Option 2 : Code B | Option 3 : Surbhi cannot determine | Option 4 : Both codes have the same execution time, so deliver any. |
|--------------------------|-------------------|------------------------------------|---|

Ques 61 : Choose the correct answer

Vibhu is given two codes, A and B, to solve a problem, which have complexity $O(n^4)$ and $\omega(n^3)$ respectively. Her client wants to solve a problem of size k, which is sufficiently large. Which code will Gautam deliver to the client, so that the execution is faster?

Option 1 : Code A

Option 2 : Code B

Option 3 : Vibhu cannot determine

Option 4 : Both codes have the same execution time, so deliver any.

Ques 62 : Choose the correct answer

Pavithra is given two codes, A and B, to solve a problem, which have complexity $\theta(n^3)$ and $\omega(n^3)$ respectively. Her client wants to solve a problem of size k, which is sufficiently large. Which code should she deliver to the client in the present scenario?

Option 1 : Code A

Option 2 : Code B

Option 3 : Both codes have the same execution time, so deliver any.

Option 4 : None of these

Ques 63 : Choose the correct answer

Code A has to execute $4*n^2 + 64$ program statements, while Code B has to execute $32*n$ program statements for a problem of size n. The time for executing a single program statement is same for all statements. Rajesh was given a problem with a certain size k and he delivered Code A. What could be the possible value of k?

Option 1 : 1000

Option 2 : 5

Option 3 : 10

Option 4 : 3

Ques 64 : Choose the correct answer

Saumya writes a code which has a function which calls itself. Which programming concept is Saumya using?

Option 1 : This is bad programming practice and should not be done.

Option 2 : Recursion

Option 3 : Decision Making

Option 4 : Overloading

Ques 65 : Choose the correct answer

Shrishti writes the code for a function that computes the factorial of the inputted number n.

```
function factorial(n)
{
    if(n equals 1)
        return 1
    else
        -- MISSING STATEMENT --
}
```

```
end
}
```

Fill in the missing statement.

Option 1 : return factorial(n-1)	Option 2 : return n*factorial(n)	Option 3 : return n*(n-1)	Option 4 : return <u>n*factorial(n-1)</u>
-------------------------------------	-------------------------------------	------------------------------	--

Ques 66 : Choose the correct answer

Tanuj writes the code for a function that takes as input n and calculates the sum of first n natural numbers.

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

Fill in ?? in the code.

Option 1 : n equals 1 Option 2 : n equals 2 Option 3 : n >= 1 Option 4 : n > 1

Ques 67 : Choose the correct answer

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

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

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

Option 1 : 1	Option 2 : 30	<u>Option 3 : 15</u>	Option 4 : 16
--------------	---------------	----------------------	---------------

Ques 68 : Choose the correct answer

Consider the following function

```
function calculate( n )
{
    if(n equals 5)
        return 5
    else
```

```

    return (n + calculate(n-5))
end
}

```

Shishir calls the function by the statement, calculate(20). What value will the function return?

Option 1 : 50 Option 2 : 200 Option 3 : 35 Option 4 : 20

Ques 69 : Choose the correct answer

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?

Option 1 : The code will not compile. Option 2 : The code will give an error while in execution Option 3 : The code may work for some inputs and not for others. Option 4 : It will create no problems.

Ques 70 : Choose the correct answer

What does a compiler do?

Option 1 : Converts code from a high level language to a low level language Option 2 : Necessarily converts the code into assembly language Option 3 : Converts code from a low level language to a high level language Option 4 : Necessarily converts the code into machine language

Ques 71 : Choose the correct answer

A program is compiled by Tarun on his machine. Whether it will run on a different computer will depend upon:

Option 1 : Operating system on the computer Option 2 : Hardware configuration of the computer Option 3 : Both operating system and hardware configuration Option 4 : The language of the program

Ques 72 : Choose the correct answer

Sakshi writes a code in a high-level programming language on a Pentium-III machine, which she wants to execute on a Motorola chip. What of the following will she run on the code?

Option 1 : An interpreter Option 2 : A compiler Option 3 : A cross-compiler Option 4 : Linker

Ques 73 : Choose the correct answer

Shahaana has a 10,000 line code. She is trying to debug it. She knows there is a logical error in the first 25 lines of the code. Which of the following will be an efficient way of debugging:

Option 1 : Compile the whole code and step into it line by line Option 2 : Use an interpreter on the first 25 lines. Option 3 : Compile the whole code and run it Option 4 : None of these

line

Ques 74 : Choose the correct answer

Farhan writes a code to find the factorial of an inputted number. His code gives correct answer for some inputs and incorrect answers for others. What kind of error does his program have?

Option 1 : Syntactical error Option 2 : Run-time Error Option 3 : Logical Error Option 4 : None of these

Ques 75 : Choose the correct answer

Reshama is debugging a piece of code which takes several iterations of modifying and executing code, while Mohammad has to deliver a product to the customer, which the customer will run multiple times. Reshama wants her debug cycle to take minimum possible time, while Mohammad wants that his products run time is minimum. What tools should Reshama and Mohammad respectively use on their code?

Option 1 : Compiler, Interpreter Option 2 : Interpreter, Compiler Option 3 : Compiler, Compiler Option 4 : Interpreter, Interpreter

Ques 76 : Choose the correct answer

Gautam writes a program to run on a Motorola processor on his Pentium computer. He wants to see how the program will execute on the Motorola processor using his Pentium machine. What tool will he use?

Option 1 : Compiler Option 2 : Interpreter Option 3 : Assembler Option 4 : Simulator

Ques 77 : Choose the correct answer

Consider the following code:

```
function modify(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
}
```

Assume that a and b were passed by value. What will be the output on executing

function calculate()?

Option 1 : 11 -5

Option 2 : 10 -5

Option 3 : 6 -5

Option 4 : 5 -5

Ques 78 : Choose the correct answer

Consider the following code:

```
function modify(b,a)
{
    return a - b
}

function calculate( )
{
    integer a = 5, b = 12, c

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

Assume that a and b were passed by reference. What will be the output of the program on executing function calculate() ?

Option 1 : 7

Option 2 : -7

Option 3 : Error

Option 4 : 8

Ques 79 : Choose the correct answer

Consider the following code:

```
function modify(y,z)
{
    y = y + 1
    z = z + 1
    return y - z
}

function calculate( )
{
    integer a = 12, b = 20, c

    c = modify(a, b);
    print a
    print space
    print c
}
```

Assume that a and b were passed by reference. What will be the output of the function calculate() ?

Option 1 : 12 -8

Option 2 : 13 -8

Option 3 : 12 8

Option 4 : 13 8

Ques 80 : Choose the correct answer

Afzal writes a piece of code, where a set of three lines occur around 10 times in different parts of the program. What programming concept can he use to shorten his program code length?

Option 1 : Use for loops

Option 2 : Use functions

Option 3 : Use arrays

Option 4 : Use classes

Ques 81 : Choose the correct answer

Geetika writes a piece of code, where a set of eight lines occur around 10 times in different parts of the program (Code A). She passes on the code to Deva. Deva puts the set of eight lines in a function definition and calls them at the 10 points in the program (Code B). Which code will run faster using an interpreter?

Option 1 : Code A

Option 2 : Code B

Option 3 : Code A and Code B will run with the same speed

Option 4 : None of these

Ques 82 : Choose the correct answer

Consider the following code:

```
function modify(a,b)
{
    integer c, d = 2
    c = a*d + b
    return c
}

function calculate( )
{
    integer a = 5, b = 20, c
    integer d = 10
    c = modify(a, b);
    c = c + d
    print c
}
```

Assume that a and b were passed by value. What will be the output of the function calculate() ?

Option 1 : 80

Option 2 : 40

Option 3 : 32

Option 4 : 72

Ques 83 : Choose the correct answer

Consider the following code:

```
function modify(w,u)
{
    w = w + 2
    u = u - 3
    return (w - u)
}
```

```
function calculate( )
{
    integer a = 10, b = 20, c
    c = modify(a, b);
    print a
    print space
    print b
}
```

Assume that a was passed by value and b was passed by reference. What will be the output of the program on executing function calculate() ?

Option 1 : 12 17 Option 2 : 10 17 Option 3 : 12 20 Option 4 : 10 20

Ques 84 : Choose the correct answer

Consider the following function:

```
function run( )
{
    integer a = 0 // Statement 1
    while (a < 5)
    {
        integer c = 0 // Statement 2
        c = c + 1 // Statement 3
        a = a + 1
    }
    print c // Statement 4
}
```

At which statement in this program will the compiler detect an error?

Option 1 : Statement 1 Option 2 : Statement 2 Option 3 : Statement 3 Option 4 : Statement 4

Ques 85 : Choose the correct answer

Which one of the following is the lowest level format to which the computer converts a higher language program before execution?

Option 1 : English code Option 2 : Machine Code Option 3 : Assembly Language Option 4 : System Language

Ques 86 : Choose the correct answer

If you want to write a function that swaps the values of two variables, you must pass them by:

Option 1 : Value only Option 2 : Reference only Option 3 : Either A or B Option 4 : Neither A nor B

Ques 87 : Choose the correct answer

Consider the following code:

```
if (condition 1) {  
    if (condition 2)  
    { // Statement A }  
    else  
        if (condition 3)  
        { // Statement B }  
        else  
            { // Statement C }  
    else  
        if (condition 4)  
        { // Statement D }  
        else  
            { // Statement E }  
}
```

Which of the following conditions will allow execution of statement C?

Option 1 :
condition1 AND
condition3

Option 2 :
condition1 AND
condition4 AND
!condition2

Option 3 :
NOT(condition2)
AND
NOT(condition3)

Option 4 :
condition1 AND
NOT(condition2)
AND
NOT(condition3)

Ques 88 : Choose the correct answer

Consider the following code:

```
if (condition 1) {  
if (condition 2)  
    { // Statement A }  
    else  
        if (condition 3)  
        { // Statement B }  
        else  
            { // Statement C }  
    else  
        if (condition 4)  
        { // Statement D }  
        else  
            { // Statement E }  
}
```

Which of the following conditions will allow execution of statement E?

Option 1 :
condition1 AND
condition3

Option 2 :
NOT(condition1)
AND condition2
AND
NOT(condition4)

Option 3 :
NOT(condition2)
AND
NOT(condition3)

Option 4 :
condition1 AND
condition4 AND
NOT(condition2)
AND
NOT(condition3)

Ques 89 : Choose the correct answer

Consider the following code:

```
if (condition 1) {  
  if (condition 2)  
    { // Statement A }  
  else  
    if (condition 3)  
      { // Statement B }  
    else  
      { // Statement C }  
  else  
    if (condition 4)  
      { // Statement D }  
    else  
      { // Statement E }  
}
```

Which of the following condition will allow execution of statement A?

Option 1 :	Option 2 :	Option 3 :	Option 4 :
NOT(condition2)	condition1 AND	<u>condition1 AND</u>	NOT(condition1)
AND	condition4 AND	<u>condition2 AND</u>	AND condition2
NOT(condition3)	NOT(condition2)	<u>condition4</u>	AND
	AND		NOT(condition4)
	NOT(condition3)		

Ques 90 : Choose the correct answer

What does the following function do?

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

<u>Option 1 : Returns</u>	Option 2 : Returns	Option 3 : Loops	Option 4 : Always
<u>the max of (a,b)</u>	the min of (a,b)	forever	returns the second
			parameter

Ques 91 : Choose the correct answer

What does the following function do?

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

```

else
{ return a; }
}

```

Option 1 : Always returns the first parameter

Option 2 : Returns the min of (a,b)

Option 3 : Returns the max of (a,b)

Option 4 : Loops forever

Ques 92 : Choose the correct answer

```

function g(int n)
{
if (n > 0) return 1;
else return -1;
}

```

```

function f(int a, int b)
{
if (a > b) return g(b-a);
if (a < b) return g(a-b);
return 0;
}

```

If f(a,b) is called, what is returned?

Option 1 : Always -1	Option 2 : 1 if a > b, -1 if a < b, 0 otherwise	Option 3 : -1 if a > b, 1 if a < b, 0 otherwise	<u>Option 4 : 0 if a equals b, -1 otherwise</u>
----------------------	---	---	---

Ques 93 : Choose the correct answer

```

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;
}

```

If f(a,b) is called, what is returned?

Option 1 : 1 if a > b, -1 if a < b, 0 otherwise	Option 2 : Always +1	<u>Option 3 : 0 if a equals b, +1 otherwise</u>	Option 4 : -1 if a > b, 1 if a < b, 0 otherwise
---	----------------------	---	---

Ques 94 : Choose the correct answer

```

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;
}

```

If f(a,b) is called, what is returned?

Option 1 : Always +1	<u>Option 2 : 1 if a > b, -1 if a < b, 0 otherwise</u>	Option 3 : -1 if a > b, 1 if a < b, 0 otherwise	Option 4 : 0 if a equals b, -1 otherwise
-------------------------	--	---	--

Ques 95 : Choose the correct answer

```

function g(int n)
{
if (n > 0) return 1;
else return -1;
}

```

```

function f(int a, int b)
{
if (a > b) return g(b-a);
if (a < b) return g(-a+b);
return 0;
}

```

If f(a,b) is called, what is returned?

Option 1 : Always +1	<u>Option 2 : -1 if a > b, 1 if a < b, 0 otherwise</u>	Option 3 : 1 if a > b, -1 if a < b, 0 otherwise	Option 4 : 0 if a equals b, -1 otherwise
-------------------------	--	---	--

Ques 96 : Choose the correct answer

Consider the following code:

```

for i= m to n increment 2
{ print "Hello!" }

```

Assuming $m < n$ and exactly one of (m,n) is even, how many times will Hello be printed?

<u>Option 1 : $(n - m + 1)/2$</u>	Option 2 : $1 + (n - m)/2$	Option 3 : $1 + (n - m)/2$ if m is even, $(n - m + 1)/2$ if m is odd	Option 4 : $(n - m + 1)/2$ if m is even, $(n - m)/2$ if m is odd
--	----------------------------	---	---

Ques 97 : Choose the correct answer

Consider the following code:

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

Assuming $m < n$ and (m,n) are either both even or both odd, How many times will Hello be printed?

Option 1 : $(n - m + 1)/2$	Option 2 : $\frac{1 + (n - m)}{2}$	Option 3 : $1 + (n - m)/2$ if m is even, $(n - m + 1)/2$ if m is odd	Option 4 : $(n - m + 1)/2$ if m is even, $1 + (n - m)/2$ if m is odd
----------------------------	------------------------------------	--	--

Ques 98 : Choose the correct answer

Assuming $n > 2$, What value does the following function compute for odd n?

```
function f (int n)
{
if (n equals 1) { return 1 }
if (n equals 2) { return f(n-1) + n/2 }
return f(n-2) + n;
}
```

Option 1 : $1 + 2 + 3 + 4 + \dots + n$	Option 2 : $\frac{1 + 3 + 5 + 7 + \dots + n}{2}$	Option 3 : $n/2 + (1 + 3 + 5 + 7 + \dots + n)$	Option 4 : $1 + (1 + 3 + 5 + 7 + \dots + n)$
--	--	--	--

Ques 99 : Choose the correct answer

Assuming $n > 2$, What value does the following function compute for even n?

```
int f (int n)
{
if (n equals 1) { return 1 }
if (n equals 2) { return f(n-1) + n/2 }
return f(n-2) + n
}
```

Option 1 : $1 + 2 + 3 + 4 + \dots + n$	Option 2 : $1 + (2 + 4 + 6 + 8 + \dots + n)$	Option 3 : $1 + n/2 + (4 + 6 + 8 + \dots + n)$	Option 4 : $\frac{2 + 4 + 6 + 8 + \dots + n}{2}$
--	--	--	--

Ques 100 : Choose the correct answer

The for loop is equivalent to a while loop when

Option 1 : There is no initialization expression	Option 2 : There is no increment expression	Option 3 : A and B combined are true	Option 4 : It is never equivalent
--	---	--------------------------------------	-----------------------------------

Ques 101 : 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?

- Option 1 : $a < 1.0$ Option 2 : $a < \sqrt{10}$ Option 3 : $a > \sqrt{10}$ Option 4 : $a = 0$

Ques 102 : Choose the correct answer

```
int area(double radius)
{
return PI*radius*radius;
}
```

Which of the following is always true about the function area?

- Option 1 : It returns the area of a circle within the limits of double precision. Option 2 : It returns the area of a circle within the limits of the constant PI. Option 3 : It returns the area of a circle within the limits of precision of double, or the constant PI, whichever is lower. Option 4 : None of the above.

Ques 103 : Choose the correct answer

What does this function compute for positive n?

```
function f(int n)
{
if (n equals 1)
{ return 1 }
else
{ return f(n-1)/f(n-1) + n }
}
```

- Option 1 : $1 + n$ Option 2 : $1 + 2 + 3 + \dots + n$ Option 3 : $1 + n$, if $n > 1$, 1 otherwise Option 4 : None of the above

Ques 104 : Choose the correct answer

Which of these is not a data type?

- Option 1 : integer Option 2 : character Option 3 : boolean Option 4 : array

Ques 105 : Choose the correct answer

The construct "if (condition) then A else B" is for which of the following purposes?

- Option 1 : Decision-Making Option 2 : Iteration Option 3 : Recursion Option 4 : Object Oriented Programming

Ques 106 : Choose the correct answer

In a sequential programming language, code statements are executed in which order?

- Option 1 : All are executed Option 2 : From top to bottom Option 3 : From bottom to top Option 4 : None of these

simultaneously

Ques 107 : Choose the correct answer

A for-loop is used for which of the following purposes?

Option 1 : Decision-Making Option 2 : Iteration Option 3 : Recursion Option 4 : None of these

Ques 108 : Choose the correct answer

There are two loops which are nested. This implies which one of the following?

Option 1 : Two loop, one after the other Option 2 : Two loops, one inside the others Option 3 : One loop with two different iteration counts Option 4 : Two loops with the same iteration count

Ques 109 : Choose the correct answer

How will 47 be stored as an unsigned 8-bit binary number?

Option 1 : 10111101 Option 2 : 00101111 Option 3 : 10111000 Option 4 : 00101101

Ques 110 : Choose the correct answer

An integer X is saved as an unsigned 8-bit number, 00001011. What is X?

Option 1 : 22 Option 2 : 11 Option 3 : 10 Option 4 : None of these

Ques 111 : Choose the correct answer

A variable cannot be used...

Option 1 : Before it is declared Option 2 : After it is declared Option 3 : In the function it is declared in Option 4 : Can always be used

Ques 112 : Choose the correct answer

What is implied by the argument of a function?

Option 1 : The variables passed to it when it is called Option 2 : The value it returns on execution Option 3 : The execution code inside it Option 4 : Its return type

Ques 113 : Choose the correct answer

Which of the following is true about comments?

Option 1 : They are executed only once. Option 2 : They are not executed Option 3 : A good program does not contain them Option 4 : They increase program execution time.

Ques 114 : Choose the correct answer

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 information with the program. What component should she use?

Option 1 : Header files

Option 2 : Iteration

Option 3 : Comments

Option 4 : Preprocessor directive

Ques 115 : Choose the correct answer

Shashi writes a program in C++ and passes it on to Pankaj. Pankaj does some indentation in some statements of the code. What will this lead to?

Option 1 : Faster Execution

Option 2 : Lower memory requirement

Option 3 :

Correction of errors

Option 4 : Better readability

Ques 116 : Choose the correct answer

Zenab and Shashi independently write a program to find the mass of one mole of water, which includes mass of hydrogen and oxygen. Zenab defines the variables:

integer hydrogen, oxygen, water // Code A

while Shashi defines the three quantities as:

integer a, b, c // Code B

Which is a better programming practice and why?

Option 1 : Code B is better because variable names are shorter

Option 2 : Code A is better because the variable names are understandable and non-confusing

Option 3 : Code A will run correctly, while Code B will give an error.

Option 4 : Code B will run correctly, while Code A will give an error.

Ques 117 : Choose the correct answer

For solving a problem, which of these is the first step in developing a working program for it?

Option 1 : Writing the program in the programming language

Option 2 : Writing a step-by-step algorithm to solve the problem.

Option 3 : Compiling the libraries required.

Option 4 : Code debugging

Ques 118 : Choose the correct answer

A robust program has which one of the following features?

Option 1 : It runs correctly on some inputs

Option 2 : It is robust to hardware damage

Option 3 : It can handle incorrect input data or data types.

Option 4 : None of these

Ques 119 : Choose the correct answer

Tarun wants to write a code to divide two numbers. He wants to warn the user and terminate the program if he or she enters 0 as the divisor. Which programming construct can he use to do this?

Option 1 : Iteration

Option 2 : Decision-

Option 3 :

Option 4 : None of

making

Recursion

these

Ques 120 : Choose the correct answer

To solve a problem, it is broken in to a sequence of smaller sub-problems, till a stage that the sub-problem can be easily solved. What is this design approach called?

Option 1 : Top-down Approach

Option 2 : Bottom-Up Approach

Option 3 :
Procedural
Programming

Option 4 : None of these

Ques 121 : Choose the correct answer

The time complexity of linear search algorithm over an array of n elements is

Option 1 : $O(\log_2 n)$ Option 2 : $O(n)$

Option 3 : $O(n \log_2 n)$ Option 4 : $O(n^2)$

Ques 122 : Choose the correct answer

Rajesh implements queue as a singly-linked linked list. The queue has n elements. The time complexity to ADD a new element to the queue:

Option 1 : $O(1)$

Option 2 : $O(\log_2 n)$ Option 3 : $O(n)$

Option 4 : $O(n \log_2 n)$

Ques 123 : Choose the correct answer

The time required to insert an element in a stack with linked list implementation is

Option 1 : $O(1)$

Option 2 : $O(\log_2 n)$ Option 3 : $O(n)$

Option 4 : $O(n \log_2 n)$

Ques 124 : Choose the correct answer

In the following sorting procedures, which one will be the slowest for any given array?

Option 1 : Quick sort Option 2 : Heap sort

Option 3 : Merge Sort

Option 4 : Bubble sort

Ques 125 : Choose the correct answer

Pankaj stores n data elements in a hash table. He is able to get the best efficiency achievable by a hash table. What is the time complexity of accessing any element from this hash table?

Option 1 : $O(1)$

Option 2 : $O(n^2)$

Option 3 : $O(\log n)$

Option 4 : $O(n)$

Ques 126 : Choose the correct answer

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?

Option 1 : Linear Search

Option 2 : Binary search

Option 3 : Hash Coded Search

Option 4 : None of these

Ques 127 : Choose the correct answer

The order of magnitude of the worst case performance of a hash coded search (over N elements) is

Option 1 : N

Option 2 : $N \log_2 N$

Option 3 : $\log_2 N$

Option 4 : not dependent upon N

Ques 128 : Choose the correct answer

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

Option 1 : insertion sort

Option 2 : heap sort

Option 3 : quick sort

Option 4 : bubble sort

Ques 129 : Choose the correct answer

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?

Option 1 : insertion sort

Option 2 : selection sort

Option 3 : heap sort

Option 4 : quick sort

Ques 130 : Choose the correct answer

A sort which uses the binary tree concept such that any number in the tree is larger than all the numbers in the subtree below it is called

Option 1 : selection sort

Option 2 : insertion sort

Option 3 : heap sort

Option 4 : quick sort

Ques 131 : Choose the correct answer

The average time required to perform a successful sequential search for an element in an array A(1 : n) is given by

Option 1 : $(n+1) / 2$

Option 2 : $\log_2 n$

Option 3 : $n(n+1) / 2$

Option 4 : n^2

Ques 132 : Choose the correct answer

How many comparisons are needed to sort an array of length 5 if a straight selection sort is used and array is already in the opposite order?

Option 1 : 1

Option 2 : 10

Option 3 : 50

Option 4 : 20

Ques 133 : Choose the correct answer

Queues serve a major role in

Option 1 : simulation of recursion

Option 2 : simulation of arbitrary linked list

Option 3 : simulation of limited resource allocation

Option 4 : expression evaluation

Ques 134 : Choose the correct answer

The average search time of hashing with linear probing will be less if the load factor

Option 1 : is far less than one Option 2 : equals one Option 3 : is far greater than one Option 4 : none of these

Ques 135 : Choose the correct answer

Number of vertices of odd degree in a graph is

Option 1 : is always even Option 2 : always odd Option 3 : either even or odd Option 4 : always zero

Ques 136 : Choose the correct answer

The algorithm design technique used in the quick sort algorithm is

Option 1 : Dynamic programming Option 2 : Back tracking Option 3 : Divide and conquer Option 4 : Greedy Search

Ques 137 : Choose the correct answer

Linked lists are not suitable for

Option 1 : Insertion sort Option 2 : Binary search Option 3 : Queue implementation Option 4 : None of these

Ques 138 : Choose the correct answer

A connected graph is the one which

Option 1 : Cannot be partitioned without removing an edge Option 2 : Can be partitioned without removing an edge Option 3 : does not contain a cycle Option 4 : Has even number of vertices

Ques 139 : Choose the correct answer

Stack is useful for implementing

Option 1 : radix search Option 2 : breadth first search Option 3 : recursion Option 4 : none of these

Ques 140 : Choose the correct answer

Which of the following is useful in traversing a given graph by breadth first search?

Option 1 : stack Option 2 : set Option 3 : list Option 4 : queue

Ques 141 : Choose the correct answer

Which of the following is useful in implementing quick sort?

Option 1 : stack Option 2 : set Option 3 : list Option 4 : queue

Ques 142 : Choose the correct answer

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

Option 1 : Tree Option 2 : Stack Option 3 : Graph Option 4 : Queue

Ques 143 : Choose the correct answer

Two lists, A and B are implemented as singly linked link-lists. The address of the first and last node are stored in variables *firstA* and *lastA* for list A and *firstB* and *lastB* for list B. Given the address of a node is given in the variable *node*, the element stored in the node can be accessed by the statement *node->data* and the address to the next node can be accessed by *node->next*. Pankaj wants to append list B at end of list A. Which of the following statements should he use?

Option 1 : lastB -> next = firstA Option 2 : lastA = firstB Option 3 : lastA->next = firstB Option 4 : lastB = firstA

Ques 144 : Choose the correct answer

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

Option 1 : Bubble sort and Selection sort Option 2 : Heap sort and Merge sort Option 3 : Quick sort and Radix sort Option 4 : Tree sort and Median-of-3 Quick sort

Ques 145 : Choose the correct answer

A complete binary tree with 5 levels has how many nodes? (Root is Level 1)

Option 1 : 15 Option 2 : 25 Option 3 : 63 Option 4 : 31

Ques 146 : Choose the correct answer

The maximum number of nodes on level I of a binary tree is which of the following? (Root is Level 1)

Option 1 : 2^{I-1} Option 2 : 3^{I-1} Option 3 : 2^I Option 4 : $2^I - 1$

Ques 147 : Choose the correct answer

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.

Option 1 : $A[x+1]$ Option 2 : $A[x+2]$ Option 3 : $A[x+2x]$ Option 4 : All of these.

Ques 148 : Choose the correct answer

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

Option 1 : Address of next node in sequence Option 2 : It's own address Option 3 : Address of last node Option 4 : Address of first node

Ques 149 : Choose the correct answer

Surbhi wants to implement a particular data structure using a static array. She uses the concept of circular list to implement the data structure, because this allows her to efficiently use all fields of the array. Which data structure is Surbhi implementing?

Option 1 : a stack Option 2 : a queue Option 3 : Binary Tree Option 4 : None of these

Ques 150 : Choose the correct answer

Which of the following is a bad implementation for a queue?

- | | | | |
|--------------------------|-------------------------------|-------------------------------|---------------------------------------|
| Option 1 : Circular List | Option 2 : Doubly linked list | Option 3 : Singly linked List | <u>Option 4 : Linear Static Array</u> |
|--------------------------|-------------------------------|-------------------------------|---------------------------------------|

Ques 151 : Choose the correct answer

Which of the following statements are true about a doubly-linked list?

- | | | | |
|---|--|---|--------------------------|
| <u>Option 1 : it may be either linear or circular</u> | Option 2 : it must contain a header node | Option 3 : it will occupy same memory space as that of linear linked list, both having same number of nodes | Option 4 : None of these |
|---|--|---|--------------------------|

Ques 152 : Choose the correct answer

Which of the following data structure may give overflow error, even though the current number of element in it is less than its size ?

- | | | | |
|---|--|--|--------------------------|
| <u>Option 1 : Queue implemented in a linear array</u> | Option 2 : Queue implemented in a circularly connected array | Option 3 : Stack implemented in a linear array | Option 4 : none of these |
|---|--|--|--------------------------|

Ques 153 : Choose the correct answer

Number of possible ordered trees with 3 nodes A, B, C is

- | | | | |
|---------------|----------------------|---------------|---------------|
| Option 1 : 16 | <u>Option 2 : 12</u> | Option 3 : 13 | Option 4 : 14 |
|---------------|----------------------|---------------|---------------|

Ques 154 : Choose the correct answer

The best sorting methods if number of swapping done is the only measure of efficiency is

- | | | | |
|------------------------|---------------------------|----------------------------------|-----------------------|
| Option 1 : Bubble sort | Option 2 : Selection sort | <u>Option 3 : Insertion sort</u> | Option 4 : Quick sort |
|------------------------|---------------------------|----------------------------------|-----------------------|

Ques 155 : Choose the correct answer

As part of the maintenance work, you are entrusted with the work of rearranging the library books in a shelf in proper order, at the end of each day. The ideal choice will be

- | | | | |
|------------------------|----------------------------------|---------------------------|----------------------|
| Option 1 : bubble sort | <u>Option 2 : insertion sort</u> | Option 3 : selection sort | Option 4 : heap sort |
|------------------------|----------------------------------|---------------------------|----------------------|

Ques 156 : Choose the correct answer

A hash table can store a maximum of 10 records. Currently there are records in locations 1, 3, 4, 7, 8, 9, 10. The probability of a new record going into location 2, with a hash function resolving collisions by linear probing is

- | | | | |
|-----------------------|----------------|----------------|----------------|
| <u>Option 1 : 0.6</u> | Option 2 : 0.1 | Option 3 : 0.2 | Option 4 : 0.5 |
|-----------------------|----------------|----------------|----------------|

Ques 157 : Choose the correct answer

A full binary tree with n leaves contains

Option 1 : $2n + 1$
nodes

Option 2 : $\log_2 n$
nodes

Option 3 : $2n - 1$
nodes

Option 4 : $2n$
nodes

Ques 158 : Choose the correct answer

An array contains the following elements in order: 7 6 12 30 18. Insertion sort is used to sort the array in ascending order. How many times will an insertion be made?

Option 1 : 2

Option 2 : 3

Option 3 : 4

Option 4 : 5

Ques 159 : Choose the correct answer

An array of 5 numbers has the following entries in order: 7 4 5 10 8. Prashant uses selection sort to sort this array in descending order. What will the array contain after two iterations of selection sort?

Option 1 : 10 8 7 5 4 Option 2 : 10 8 5 7 4

Option 3 : 8 10 5 7

Option 4 : None of these

Ques 160 : Choose the correct answer

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 ?

Option 1 : 40

Option 2 : 8

Option 3 : 70

Option 4 : 30

Ques 161 : Choose the correct answer

The array A has n elements. We want to determine the position of X in the array. We know that X is present in the array A and X can be present at any location in the array with equal probability. How many comparisons will be required on average to find the element X using linear search?

Option 1 : n

Option 2 : $(n+1)/2$

Option 3 : $2*n$

Option 4 : n^2

Ques 162 : Choose the correct answer

A is an empty stack. The following operations are done on it.

PUSH(1)

PUSH(2)

POP

PUSH(5)

PUSH(6)

POP

What will the stack contain after these operations. (Top of the stack is underlined)

Option 1 : 5 6

Option 2 : 1 5

Option 3 : 5 6

Option 4 : 1 5

Ques 163 : Choose the correct answer

A stack is implemented as a linear array $A[0...N-1]$. Farhan writes the following functions for pushing an element E in to the stack.

function PUSH(top, E , N)

```

{
  if(X)
  {
    top= top+1
    A[top] = E
  }
  else
  {
    print "Overflow"
  }
  return top
}

```

Fill in the condition X

Option 1 : $\text{top} < N$ Option 2 : top Option 3 : $\text{top} > 0$ Option 4 : $\text{top} > 1$

Ques 164 : Choose the correct answer

A stack is implemented as a linear array $A[0 \dots N-1]$. Noor writes the following functions for popping an element from the stack.

function POP(top, N)

```

{
  if(X)
  {
    top = top - 1
  }
  else
  {
    print "Underflow"
  }
  return top
}

```

Fill in the condition X

Option 1 : $\text{top} < N-1$ Option 2 : top Option 3 : $\text{top} > 1$ Option 4 : $\text{top} \geq \underline{0}$

Ques 165 : Choose the correct answer

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)

Ques 166 : Choose the correct answer

A queue is implemented as a (singly linked) linked-list for easy addition and deletion of elements. Each node has an element and pointer to another node. Which node will point to empty/no location?

Option 1 : Front

Option 2 : Rear

Option 3 : Both

Option 4 : None of these

Ques 167 : Choose the correct answer

A stack is implemented as a (singly-linked) linked-list, where each node contains data and address of another node. The top node will contain the address of which node?

Option 1 : No node.
It will be empty

Option 2 : The node
containing the first
element pushed into
the stack.

Option 3 : The
node containing the
element which was
pushed just before
the top element.

Option 4 : None of
these

Ques 168 : 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?

Option 1 : 6

Option 2 : 7

Option 3 : 10

Option 4 : None of
these

Ques 169 : Choose the correct answer

A queue is implemented as a (singly linked) linked-list. Each node has an element and pointer to another node. *Rear* and *Front* contain the addresses of the rear and front node respectively. If the condition (rear isequal front) is true and neither is NULL, what do we infer about the linked list?

Option 1 : It has no
elements

Option 2 : It has one
element

Option 3 : There is
an error

Option 4 : None of
these

Ques 170 : Choose the correct answer

Jaswinder has a book of tickets and wants to store ticket numbers in a data structure. New tickets are added to the end of the booklet. Ticket at the top of the stack is issued to the customer. Which data structure should Jaswinder use to represent the ticket booklet?

Option 1 : Queue

Option 2 : Stack

Option 3 : Array

Option 4 : Graph