

(8)

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|                     |                                                                                                                                                                                                                                                                                                          |                                            |                        |                           |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------|---------------------------|
| <b>Programme</b>    | <b>:</b>                                                                                                                                                                                                                                                                                                 | <b>B.Tech.</b>                             | <b>Semester</b>        | <b>: Fall 2021-22</b>     |
| <b>Course Name</b>  | <b>:</b>                                                                                                                                                                                                                                                                                                 | <b>Programming for Computing Engineers</b> | <b>Course Code</b>     | <b>: PLA1001</b>          |
| <b>Faculty Name</b> | <b>:</b>                                                                                                                                                                                                                                                                                                 |                                            | <b>Slot / Class No</b> | <b>: A11+A12+A13-0471</b> |
| <b>Time</b>         | <b>:</b>                                                                                                                                                                                                                                                                                                 | <b>1½ hours</b>                            | <b>Max. Marks</b>      | <b>: 50</b>               |
| <b>Q.No.</b>        | <b>Question Description</b>                                                                                                                                                                                                                                                                              |                                            |                        | <b>Marks</b>              |
| 1                   | <p>Which of the following option leads to the portability and security of Java?</p> <p>A) Bytecode is executed by JVM<br/>           B) The applet makes the Java code secure and portable<br/>           C) Use of exception handling<br/>           D) Dynamic binding between objects</p> <p>Ans:</p> |                                            |                        | 1                         |
| 2                   | <p>Which of the following is a valid declaration of a char Java?</p> <p>A) char ch = '\utea';<br/>           B) char ca = 'tea';<br/>           C) char cr = \u0223;<br/>           D) char cc = '\itea';</p> <p>Ans:</p>                                                                                |                                            |                        | 1                         |
| 3                   | <p>What is the extension of compiled java classes?</p> <p>A) .out<br/>           B) .java<br/>           C) .class<br/>           D) None of the above</p> <p>Ans:</p>                                                                                                                                   |                                            |                        | 1                         |
| 4                   | <p>What is the range of 'byte' datatype in Java?</p> <p>A) -32768 to 32767<br/>           B) -128 to 127<br/>           C) -2147483648 to 2147483647<br/>           D) None of the above</p> <p>Ans:</p>                                                                                                 |                                            |                        | 1                         |

5 In Java, Which data type value is returned by all transcendental math functions?

- A) float
- B) double
- C) Int
- D) Can be any of the above

Ans:

6 Which of these is used to perform all input & output operations in Java?

- A) classes
- B) Variables
- C) streams
- D) Methods

Ans:

7 What will be the output of the program given below?

```
class A
{
    public static void main(String args[])
    {
        int g = 3;
        System.out.print(++g * 8);
    }
}
```

- A) 25
- B) 24
- C) 32
- D) 33

Ans:

8 Predict the output of following Java Program

~~2 | 4  
2 | 2  
1 → D~~

```
class B {  
    public static void main(String args[]) {  
        int x = -4;  
        System.out.print(x>>1);  
        System.out.print(" ");  
        int y = 4;  
        System.out.print(y>>1);  
    }  
}
```

1 10

- A) Compiler Error
- B) -2 2
- C) 2 2
- D) 0 2

1 100

1 100

Ans:

0 110

9 Choose the output of the following program from the given options.

```
class C {  
    public static void main(String args[]) {  
        System.out.print(10 + 20 + "Finalexams ");  
        System.out.println("FinalExams" + 10 + 20);  
    }  
}
```

- A) 30FinalExams FinalExams30
- B) 1020FinalExams FinalExams1020
- C) 30FinalExams FinalExams1020
- D) 1020FinalExams FinalExams30

Ans:

10 For switch case statement in Java, which of the following is a valid datatype

- 1. Short
- 2. Byte
- 3. Int
- 4. Char

- A) 1 Only
- B) 1 and 2 Only
- C) 1, 2 and 3
- D) All of the above

Ans:

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|    |                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |
| 11 | Which of these is necessary to specify at time of array initialization?<br>A) Row<br>B) Column<br>C) Both Row and Column<br>D) None of the mentioned                                                                                                                                                                                                                                                                                          | 1 |
|    | Ans:                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |
| 12 | What will be the output of the following Java code?<br><pre>Class A {     public static void main(String args[])     {         int array_variable [] = new int[10];         for (int i = 0; i &lt; 10; ++i)         {             array_variable[i] = i;             System.out.print(array_variable[i] + " ");             i++;         }     } }</pre><br>A) 0 2 4 6 8<br>B) 1 3 5 7 9<br>C) 0 1 2 3 4 5 6 7 8 9<br>D) 1 2 3 4 5 6 7 8 9 10 | 1 |
|    | Ans:                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |
| 13 | Which of the following statement is correct with respect to Java Collections?<br>A) HashMap internally implements HashSet<br>B) HashMap is the interface; HashSet is the concrete class<br>C) HashSet internally implements HashMap<br>D) HashSet is the interface; HashMap is the concrete class                                                                                                                                             | 1 |
|    | Ans:                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |
| 14 | Which of the below is invalid identifier with the main method?<br>A) public<br>B) static<br>C) private<br>D) final                                                                                                                                                                                                                                                                                                                            | 1 |
|    | Ans:                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |

15 How can we identify whether a compilation unit is class or interface from a .class file?

- A) Java source file header
- B) Extension of compilation unit
- C) We cannot differentiate between class and interface
- D) The class or interface name should be postfixed with unit type

Ans:

16

What is the time complexity of following code:

```
int a = 0
int i = 0;
int N = <some integer value>
```

```
while (i < N)
{
    a += i;
    System.out.println(i)
    i *= 2
}
```

*at*

- A. O(N)
- B. O(Sqrt(N))
- C. O(N / 2)
- D. O(log N)

Ans:

17

```
int i, j, k = 0;
for (i = n / 2; i <= n; i++) {
    for (j = 2; j <= n; j = j * 2) {
        k = k + n / 2;
    }
}
```

For the code given above, what is the time complexity?

- A) O(n)
- B) O(nlogn)
- C) O(n^2)
- D) O(n^2logn)

Ans:

18 Which among the following is a Short Circuit AND operator?

- A) &
- B) &&
- C) |
- D) ||

Ans:

19 What is the output of the following snippet?

```
void func(int x,int y)
{
    Print x y;      x = 10 , y = 20
    x=x+y;          x = 30
    y=x-y;          y = 10
    x=x-y;          x = 20
    Print y x
    return;
}
```

What would be the output of the program if the function call func(10,20) is made?

- A) 10 20 and 20 10
- B) 10 20 and 15 20
- C) 10 20 and 20 18
- D) 10 20 and 10 20

Ans:

20 What is the output for simple sieve of size n=8?

- A) 2 3 5 7 8
- B) 2 3 5 7
- C) 1 2 3 4 5
- D) 1 2 3 5 7

1

Ans:

21 How is the segmented sieve better than a simple sieve

1. Has better time complexity
2. Has better locality of reference

1

- A) Only 1
- B) Both 1 and 2
- C) Only 2
- D) Neither of 1 and 2

Ans:

22

The phi-function  $\phi(n)$  does the following

1

- A) Finds the HCF and LCM of the numbers
- ~~B)~~ Outputs the coprime number of n
- ~~C)~~ Outputs the coprimes or the count of coprimes between 1 and n
- D) None of the Above

1

Ans:

23

Which of the following is NOT a Strobogrammatic number?

1

- A) 8008
- ~~B)~~ 8969
- C) 8968
- D) 1961

Ans:

24

Which of the following are NOT a problem of simple sieve

1

- a) It consumes exponential space
- b) It is not cache friendly
- ~~c)~~ It crashes frequently
- ~~d)~~ None of the Above

Ans:

25

The function func converts a given integer 'n' to its binary format. What are the values that the strings X, Y and Z can take so that the function func can print the binary equivalent of 'n'?

```
static void func(int n)
{
    long i;
    System.out.print(X);
    for (i = 1 << 30; i > 0; i = i / 2)
    {
        if((n & i) != 0)
        {
            System.out.print(Y);
        }
        else
        {
            System.out.print(X);
        }
    }
}
```

$$\begin{array}{r} 2 \\ \hline 2 | 2 \rightarrow 1 \\ \quad \quad \quad 1 \rightarrow 1 \end{array}$$

$$\begin{array}{r} 101 \\ 610 \\ \hline 100 \\ 010 \\ \hline 1000 \end{array}$$

- A) 110  
 B) 001  
 C) 100  
 D) 101

Ans:

26

In a step of segmented sieve, it finds primes smaller than or equal to

- a)  $\sqrt{n}$   
 b)  $\sqrt{\log n}$   
 c) N  
 d)  $N/2$

Ans:

27

We have been given an array A of 'N' numbers which are \_\_\_\_\_. We also have been given with another array B of size N which denote the \_\_\_\_\_ when divided by a number 'p'. According to the remainder theorem, how do we find the minimum possible value of the number 'p' which produces the given array B?

Fill in the blanks with the options given below

- A) Pairwise coprime, remainders of the numbers in array A
- B) Divisible by 'x', pairwise coprime
- C) Divisible by 'x', remainders of the numbers in array A
- D) remainders of the numbers in array A, pairwise coprime with array A

Ans:

28

The space complexity of Sieve of Eratosthenes is \_\_\_\_\_ (Consider the input as N and the size of input as K)

- A.  $\text{Log}(k)$
- B.  $N^{(0.5)}$
- C.  $K^{(N/2)}$
- D.  $K \text{Log}K$

Ans:

1

29

Which of the following sets does NOT contain all Strobogrammatic numbers?

1

- Set 1: 8008 1001 9006 6009 8888 1881  
 Set 2: 8888 1881 9886 6889 1691  
 Set 3: 8888 1881 9886 6889 1961

0, 1, 6, 8, 9

- A) Set 1
- B) Set 1 and 2
- C) Set 2 and 3
- D) All sets contain only Strobogrammatic numbers

Ans:

30)

In regular multiplication, there are \_\_\_\_\_ subproblems and Karatsuba algorithm reduces the number of subproblems in multiplication to \_\_\_\_\_. What are the values for the above blanks?

- A) 2 and 1  
 B) 4 and 2  
~~C) 4 and 3~~  
 D) 3 and 2

Ans:

31)

In Karatsuba multiplication of  $47 * 78$ , which of the following is NOT a subproblem?

- A)  $4*7$   
 B)  $(11*15) - 28 - 56$   
 C)  $7*8$   
~~D) All of the above~~

All of the above are the subproblems of the multiplication of the numbers

Ans:

32)

Given num = 01100100, fill in the below equation to NOT a

~~(x  $\Delta$  0xF0)  $\ll$  4 || (x  $\Delta$  0x0F)  $\gg$  4.~~

(Fill in the blanks to swap the two nibbles

$$\begin{array}{l} 4 \\ \times t \\ \hline t \times 4 \end{array}$$

- A)  $\&,<<,>>,\&$   
 B)  $\&\&,<<,>>,\&\&$   
 C)  $\&,>>,<<,\&$   
~~D) None of the above~~

Ans:

33)

The best solution for the maximum product subarray has the limitations of

1. The array cannot contain negative numbers  
 2. The array cannot contain 0  
 3. The array cannot contain repeated elements

Which of the following is true

- A) 1 Only  
 B) 1 and 2 Only  
 C) All of 1,2 and 3  
 D) 2 Only

Ans:

|      |                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 34   | <p>According to _____ algorithm, We keep on subtracting the smaller number from the larger number repeatedly to obtain the _____</p> <p>A) Euclid, LCM<br/>     B) Euler, Greatest Common Divisor<br/>     C) Euclid, Highest Common Factor<br/>     D) Manacher, Greatest Common Divisor</p>                                                                                                                             | 1 |
| Ans: |                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 35   | <p>Given an string "apple", which of the following represents a subarray, a subset string and a subsequence.</p> <p>Note:<br/>     Set cannot contain duplicates<br/>     A set string is the members of the set represented as a string (in any order)</p>                                                                                                                                                               | 1 |
|      | <p>1. apel → <i>subset</i><br/>     2. ape → <i>sub sequence</i><br/>     3. apple → <i>subarray</i><br/>     4. pp</p> <p>Which of the following option best matches with the above list?</p> <p>A) 1 - subsequence, 2 - subset, 3 - subsequence<br/>     B) 1 - subset, 2 - subsequence, 3 - subset<br/>     C) 1 - subsequence, 2 - subsequence, 3 - substring<br/>     D) 1 - subset, 2 - sequence, 3 - substring</p> |   |
| Ans: |                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 36   | <p>The iterative and recursive solutions of block swap algorithms have a time complexity</p>                                                                                                                                                                                                                                                                                                                              | 1 |
|      | <p>A) Constant<br/>     B) Logarithmic<br/>     C) Quadratic<br/>     D) Linear</p>                                                                                                                                                                                                                                                                                                                                       |   |
| Ans: |                                                                                                                                                                                                                                                                                                                                                                                                                           |   |
| 37   | <p>Consider the following array arr[] = {65, 32, 53, 132, 34, 31, 42, 53}; Which of the following are the elements of the leader array</p> <p>A) {132, 53}<br/>     B) {65, 132, 42, 53}<br/>     C) {65, 132, 53}<br/>     D) None of the following</p>                                                                                                                                                                  | 1 |
| Ans: |                                                                                                                                                                                                                                                                                                                                                                                                                           |   |

38

Given the following 2D matrix, what is the maximum sum of hourglass.

```
int arr[3][3] =
```

|   |   |   |
|---|---|---|
| 1 | 1 | 0 |
| 0 | 1 | 0 |
| 1 | 1 | 0 |

  

|   |   |   |
|---|---|---|
| 0 | 0 | 2 |
| 0 | 0 | 2 |
| 0 | 0 | 2 |

|   |   |   |
|---|---|---|
| 0 | 0 | 2 |
| 0 | 0 | 2 |
| 0 | 0 | 2 |

- A) 6  
 B) 8  
C) 9  
D) 11

Ans:

39

Give an integer n. We can flip exactly one bit. Write the output to find the length of the longest sequence of 1's you could create if  $n = 59$

- A) 6  
B) 3  
C) 2  
D) 1

Ans:

40

What is the solution for the Josephus problem if the value of n and k are 7 and 3 respectively?

- A) 3  
B) 2  
C) 6  
D) 4

Ans:

$$\begin{array}{r} 2 \mid 59 \\ 2 \quad 29 \rightarrow 1 \\ 2 \quad 14 \rightarrow 1 \\ 2 \quad 7 \rightarrow 0 \\ 3 \quad 1 \rightarrow 1 \end{array}$$

$$\begin{array}{r} 7 \quad 1 \\ 7 \quad 2 \quad 1 \\ 7 \quad 3 \quad 2 \\ 7 \quad 4 \quad 3 \\ 7 \quad 5 \quad 4 \\ 7 \quad 6 \quad 5 \\ 7 \quad 7 \quad 6 \end{array}$$

41

Suppose we have a  $O(n)$  time algorithm that finds median of an unsorted array. Now consider a QuickSort implementation where we first find median using the above algorithm, then use median as pivot. What will be the worst case time complexity of this modified QuickSort.

1

- A)  $O(n^2 \log n)$
- B)  $O(n^2)$
- C)  $O(n * n \log n)$
- D)  $O(n \log n)$

Ans:

42

Why is the Kadane's Algorithm used?

1

- A) To find the LCM of the given two numbers
- B) To find the subsequence of an array with the largest sum
- C) To find the maximum product subarray out of an array
- D) To find the maximum product subsequence out of an array

Ans:

43

What is the meaning of an in-place sorting algorithm?

1

- A) It needs  $O(1)$  or  $O(\log n)$  memory to create auxiliary locations
- B) The input is already sorted and in-place
- C) It requires additional storage
- D) It requires additional space

Ans:

44

What is the condition for the worst case scenario of Quicksort?

1

- A) When the sum of differences between consecutive array elements is the largest
- B) When the chosen pivot is in the middle
- C) When the pivot is largest or the smallest
- D) None of the above

Ans:

Which of the following are the true statements with respect to the two lists  
where each number 'n' is such that  $1 \leq n \leq 21$

List-1: 1 10 11 12 2 20 21 3 4 5 6 7

List-2: 1 2 3 4 5 6 7 10 11 12 20 21

- A) List-1 is naturally sorted and List-2 is sorted sorted alphanumerically
- B) List-1 is sorted according to ASCII values and List-2 is alphanumerically sorted
- C) List-1 is naturally sorted and List-2 is sorted alphanumerically
- D) List-1 is sorted alphanumerically and List-2 is sorted naturally

Ans:

Given a character string, Which algorithm is used to find the longest palindromic substring?

1

- A) Hamacher's algorithm
- B) Josephus Algorithm
- C) Manacher's Algorithm
- D) Kruskal's Algorithm

Ans:

Given a list of characters and you want to list out all the combinations of the characters. A solution for this problem can be derived from \_\_\_\_\_

1

- A) Manacher's
- B) Newton's
- C) Singular
- D) Pascal's

Ans:

In Dynamic Programming, if a problem can be broken into subproblems which are reused several times, the problem possesses \_\_\_\_\_

1

- A) Overlapping subproblems
- B) Optimal substructure
- C) Memoization
- D) Greedy

49

The following represents the structure of the Josephus problem.

$$\text{josephus}(n, k) = (\text{josephus}(n - 1, k) + k - 1) \% n + 1$$

What is the significance of n and k here? Select the options of the true statements accordingly?

1. N people in a circle and k-1th person is killed
2. N people in a circle and kth person is killed
3. N people in a circle and k-1 people spared

- A) Only 1 is True  
~~B~~) 2 and 3 are true  
C) 1 and 2 are True  
D) 1 and 3 are true

Ans:

50

Which of the following sorting algorithms in its typical implementation gives best performance when applied on an array which is sorted or almost sorted.

- A) Quicksort  
B) Heap Sort  
C) Merge Sort  
D) Insertion Sort

Ans:

5      1

4      2

3