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TNQT Digital Sample Questions

Scope:

Advanced Quantitative Aptitude:

1. Of 60 students in a class, anyone who has chosen to study Maths elects to study Physics as well. But no student studies Maths and Chemistry, and 16 study Physics and Chemistry. Each of the students elect for at least one of the three subjects and the number of people who study exactly one of the three is more than the number who do more than one of the three. What are the maximum and minimum number of students who could have studied only Chemistry?

Option 1 : 44, 0
Option 2 : 38,2
Option 3 : 28,0
Option 4 : 40,0

2. The average score in an examination of 10 students of a class is 60. If the scores of the top five students are not considered, the average score of the remaining students falls by 5. The pass mark was 40 and the maximum mark was 100. It is also known that none of the students failed. If each of the top five scorers had distinct integral scores and each of their scores are greater than any of the remaining scores, the maximum possible score of the topper is
Option 1 : 95
Option 2 : 100
Option 3 : 87
Option 4 : 99

3. 3L of milk are drawn from a container containing 30L of milk. It is replaced by water and the process is repeated 2 times. What is the ratio of milk to water at the end?

Option 1 : 729 / 271
Option 2 : 2187/100
Option 3 : 81/ 19
Option 4 : 743/229

4. a, b, c are real numbers in a Geometric Progression (G.P.) such that |a + b + c| = 15. The median of these three terms is a, and b = 10. If a > c, what is the product of the first 4 terms of this G.P.?
Option 1 : 40,000
Option 2 : 32,000
Option 3 : 8,000
Option 4 : 2,500

5. B takes 12 more hours than A to complete a task. If they work together, they take 16 fewer hours than B would take to complete the task. How long will it take A and B together to complete a task twice as difficult as the first one?

Option 1 : 16 hours
Option 2 : 12 hours
Option 3 : 14 hours
Option 4 : 8 hours

6. A number when divided by 18 leaves a remainder 7. The same number when divided by 12 leaves a remainder n. How many values can n take?
Option 1 : 1
Option 2 : 2
Option 3 : 0
Option 4 : 3

7. In how many ways can we stack n different coins so that two particular coins are not adjacent to each other? [Note that m! = (1)(2)(3)...(m)]
Option 1 : (n − 2) * (n − 1) !
Option 2 : (n − 2) !
Option 3 : (n − 1) * (n − 1) !
Option 4 : (n) * (n − 2) !

8. For how many integer values does the following inequality hold good?
(x + 2) (x + 4) (x + 6)...(x + 100) < 0

9. Consider the set S = {8, 5, 1, 13, 34, 3, 21, 2}. Akshay lists all the two element subsets of S and takes the larger of the elements in each set. If he sums all these numbers, the sum he will obtain is _____

10.Set P comprises all positive multiples of 4 less than 500. Set Q comprises all positive odd multiples of 7 less than 500, Set R comprises all positive multiples of 6 less than 500. How many elements are present in P ∪ Q ∪ R ?_____

Advanced Programming Logic :

1. Which one of the following algorithm design techniques is used in finding all pairs of shortest distances in a graph?

Option 1 : Dynamic programming
Option 2 : Backtracking
Option 3 : Greedy
Option 4 : Divide & Conquer

2. Eesha wrote the below program . Comment about the correctness of the program.

```
#include <stdio.h>
int main ()
{
   printf("%f\n", sum(10.1, 5.2));
   return 0;
}
sum(a, b)
{
   return (a+b);
}
```

Option 1 : Problem with return type and parameter types in function definition
Option 2 : conio.h not included
Option 3 : Command line parameters for main() not declared
Option 4 : There are no bugs in this program

3. What is the time complexity of following function fun()? Assume that log(x) returns log value in base 2.

```
void fun()
{
int i, j;
for (i=1; i<=n; i++)
  for (j=1; j<=log(i); j++)
    printf("hello"); }
}
```

Option 1 : Θ(nLogn)
Option 2 : Θ(n)
Option 3 : Θ(n^2)
Option 4 : Θ(n^2(Logn))

4. Consider the below code for insertion sort. The initial value of the array elements is given in the program as part of array initialisation. What will be the value of the array elements at the beginning of 6th iteration .

```
#include <stdio.h>
#define N 10
int main()
{
  int c, d, t;
  int arr[N]={60,10,90,15,50,80,40,100,4,2};
  for (c = 1 ; c <= N - 1; c++)
  {
    d = c;
    while ( d > 0 && arr[d-1] > arr[d])
    {
      t    = arr[d];
      arr[d]   = arr[d-1];
      arr[d-1] = t;
      d--;
    }
  }
  return 0;
}
```

Option 1 : 10 15 50 60 80 90 40 100 4 2
Option 2 : 10 15 50 60 90 80 40 100 4 2
Option 3 : 10 15 40 50 60 80 90 100 4 2
Option 4 : 10 15 60 90 50 80 40 100 4 2
5. A binary search tree is generated by inserting in order the following integers: 50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24. The number of nodes in the left subtree is _____

Advanced Coding:

Problem Statement : Card Shuffle

You have 100 cards, numbered 1 to 100. You distribute them into k piles and collect back the piles in order. For example, if you distribute them into 4 piles, then the first pile will contain the cards numbered 1, 5, 9, … and the 4^{th} pile will contain the cards numbered 4, 8, 12, …. While collecting back the cards you collect first the last pile, flip it bottom to top, then take the third pile, flip it bottom to top and put the cards on top of the 4^{th} pile and so on. Next round, you distribute the cards into another set of piles and collect in the same manner (last pile first and first pile last).

If we have 10 cards, and put them into 2 piles, the order of the cards in the piles (top to bottom) would be
9, 7, 5, 3, 1 and 10, 8, 6, 4, 2
We flip the piles to get the order
1, 3, 5, 7, 9 and 2, 4, 6, 8, 10
We put second pile at the bottom and first on top of it to get the deck
1, 3, 5, 7, 9, 2, 4, 6, 8, 10
Given the number of rounds (m), number of piles in each round (k_i), you need to write a program to find the N^{th} card from the top at the end of the final round.

Input

The input consists of a single line of (m+2) comma separated integers.
The first number is m, the number of rounds. The next m numbers are k_i which represent the number of piles in each round.
The last number in the input is N, the position in the final pile whose value is to be determined.

Output

One integer representing the N^{th} card after all rounds have been played.

Constraints

Number of rounds <= 10, number of piles in each round <= 13.

Example 1

Input
2, 2, 2, 4
Output
13
Explanation
m = 2, k_1 = 2, k_2 = 2 and N = 4.
We have two rounds. The first round has two piles. At the end of the round, the deck is in the following order:
1, 3, 5, …, 99, 2, 4, 6, …, 100
The next round also has 2 piles and after the second round, the cards are in the order
1, 5, 9, 13, ….
The fourth card from the top has number 13.

Example 2

Input
3, 2, 2, 3, 2
Output
13
Explanation
m = 3, k_1 = 2, k_2 = 2, k_3 = 3 and N = 2.
After the second round, the cards are in the order
1, 5, 9, 13, …
The third round has 3 piles. Thus after this round the cards will be in the order
1, 13, ….
Second card is 13.