

Comilla University
Faculty of Engineering
Department of Computer Science and Engineering
B.Sc. (Engg.) 2nd Year 2nd Semester Final Examination 2019
Session: 2017-18
Course Code: CSE-2207 Course Title: Concrete Mathematics
Answer any Four (04) questions

Time: 2 hours

Marks: 30

1. a) What is Dynamic Programming? Describe the properties of Dynamic Programming. 4
b) The Tribonacci series is a generalization of the Fibonacci sequence where each term is the sum of the three terms. 3.5

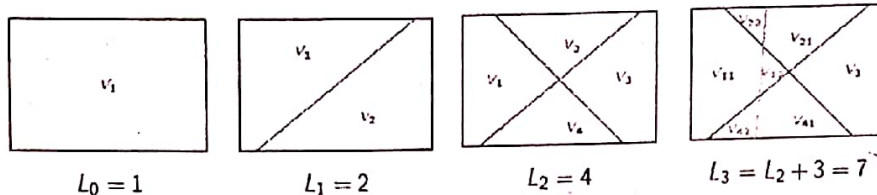
The tribonacci sequence: 0,0,1,1,2,4,7,13,... so on

```
#include <iostream>
using namespace std;
int printTrib(int n)
{
    int dp[n];
    dp[0] = dp[1] = 0;
    dp[2] = 1;
    for(int i = 0; i < n; i++)
        cout<<dp[i]<<" ";
}
// Driver code
int main()
{
    int n = 10;
    printTrib(n);
    return 0;
}
```

2. a) Using Euclidean algorithm find the GCD of 2322 and 654. 3
b) 178! Ends in a string of zeros. How many zeros are in this string? 2.5
c) What is the output of this code: 2

```
int recur(int n){
    if(n==0)
        return 0;
    recur(n-1);
    cout<<n<<endl; }
int main()
{
    int i=10;
    recur(i);
    return 0;
}
```

3. a) You have a large pizza. You can make N straight cuts with a pizza knife on that pizza. Determine maximum numbers of pizza slices that you can get. 4



Derive a recurrence relation for L_n .

- b) N people numbered 1 to N are standing around a circle. We eliminate every second remaining person until only one survives. 3.5
Your Task is to compute the survivor's number, $J(n)$. Find the recurrence relation to solve the problem.

4. a) List of primes between 401 and 430 using Sieve of Eratoshenes. Circle the primes and cross out non-primes. 2.5
b) What is the next prime after 879? 2
c) A derangement is a permutation of the elements of a set, such that no element appears in its original position. For example, $\{3,1,2\}$ is derangement of permutation $\{1,2,3\}$. 3
Now derive a recursive formula for calculating the derangement of the permutation $\{1, 2, 3, \dots, N\}$ and hence calculate the number of derangement for $N = 9$.

5. a) Using recursion write down a program to print all N digits binary numbers. 3
b) Write an algorithm to find out the prime factors of a number. 2.5

Sample Input:

315

Sample Output:

3 3 5 7

- c) Find a pair (n,r) in an integer array such that value of nPr is maximum. 2

Input: $\text{arr}[] = \{5, 2, 3, 4, 1\}$

Output: $n = 5$ and $r = 4$

$5P4 = 5! / (5-4)! = 120$ which is maximum possible.

Input: $\text{arr}[] = \{0, 2, 3, 4, 1, 6, 8, 9\}$

Output: $n = 9$ and $r = 8$

6. a) Define the following terms: 2.5

- Probability
- Expectation
- Mean
- Variance
- Standard Deviation

- b) Consider that, You are in a maze; seeing n doors in front of you in beginning. You can choose any door you like. The probability for choosing a door is equal for all doors. 5
If you choose the i^{th} door, it can either take you back to the same position where you begun in x_i minutes, or can take you out of the maze after x_i minutes. If you come back to the same position, you can't remember anything. So, every time you come to the beginning position, you have no past experience.
Find the expected time to get out of the maze. Derive a recurrence for solving this problem.