

*Heaven's Light is Our Guide*  
**Computer Science & Engineering**  
**Rajshahi University of Engineering & Technology**

## Lab Manual

Module- 05

**Course Title:** Sessional based on CSE 2101  
**Course No. :** CSE 2102

## **Experiment No. 5**

**Name of the Experiment:** Counting

**Duration:** 1 Cycle

**Background Study:** Kenneth H. Rosen, "Discrete Mathematics and its Application", 6<sup>th</sup> Edition: Chapter 5 (Counting)

- ALGORITHM 1. Generating the Next Permutation in Lexico graphic Order
- ALGORITHM 2. Generating the Next Larger Bit String.
- ALGORITHM 3. Generating the Next r-Combination in Lexico graphic Order.

### **Experiments/Problems:**

- [1] Given a positive integer  $n$  and a non negative integer not exceeding  $n$ , find the number of  $r$ -permutations and  $r$ -combinations of a set with  $n$  elements.
- [2] Given positive integers  $n$  and  $r$ , find the number of  $r$ -permutations when repetition is allowed and  $r$ -combinations when repetition is allowed of a set with  $n$  elements.
- [3] Given a sequence of positive integers, find the longest increasing and the longest decreasing subsequence of the sequence.
- [4] Given an equation  $x_1 + x_2 + \dots + x_n = C$ , where  $C$  is a constant, and  $x_1, x_2, \dots, x_n$  are non negative integers, list all the solutions.
- [5] Given a positive integer  $n$ , list all the permutations of the set  $\{1, 2, 3, \dots, n\}$  in lexico graphic order.
- [6] Given a positive integer  $n$  and a non negative integer  $r$  not exceeding  $n$ , list all the  $r$ -combinations of the set  $\{1, 2, 3, \dots, n\}$  in lexico graphic order.
- [7] Given a positive integer  $n$  and a non negative integer  $r$  not exceeding  $n$ , list all the  $r$ -permutations of the set  $\{1, 2, 3, \dots, n\}$  in lexico graphic order.
- [8] Given a positive integer  $n$ , list all the combinations of the set  $\{1, 2, 3, \dots, n\}$ .
- [9] Given positive integers  $n$  and  $r$ , list all the  $r$ -permutations, with repetition allowed, of the set  $\{1, 2, 3, \dots, n\}$ .
- [10] Given positive integers  $n$  and  $r$ , list all the  $r$ -combinations, with repetition allowed, of the set  $\{1, 2, 3, \dots, n\}$ .

### **Report:**

Your completed work must be submitted through a LAB REPORT.

### **Read:**

- [1] Kenneth H. Rosen, "Discrete Mathematics and its Application", 7<sup>th</sup> Edition: Chapter 6 (Counting).