1.1. Algebra of Sets and Counting Methods

Exercise:

1. The letters of the word MISSISSIPPI are arranged. Find
   a. All possible arrangements.
   b. All arrangements in which 4S's come together.
   c. All arrangements in which 4S's do not come together.
   d. All arrangements in which 4S's and 4I's come together.

2. If A and B stands in a line along with 10 other persons, then find the number of ways in which there are three persons between A and B.

3. If A and B stands in a circle along with 10 other persons, then find the number of ways in which there are three persons between A and B.

4. The letters of the word FLOWER are taken 4 at a time and arranged in all possible ways. Find the number of arrangements that
   a. Begins with F and ends with R .
   b. Contain the letter E.
5. Find the number of ways in which the letters of the word HOSTEL can be arranged so that
   a. The vowels may not be separated.
   b. The vowels occupy even places.

6. All the letters of the word EAMCET are arranged in all possible ways. Find the number of arrangements in which no two vowels are adjacent.

7. Find the number of arrangements that can be made by taking all the letters of the word ALGEBRA.

8. Find the number of arrangements that can be made by taking all the letters of the word MATHEMATICS such that
    a. 2M's come together.
    b. 2M's do not come together.

9. There are 5 maths, 6 physics and 8 chemistry books. How many ways are there to pick
    a. Two books not both on the same subject.
    b. Any two books.

10. How many ways are there to form a 3 letter words using the letters A, B, C, D, E, F.
    a. with repetition of letters.
    b. without repetition of any letter.
    c. without repetition that contain the letter E.
    d. with repetition that contain E.

11. Find the number of arrangements which can be made using all the letters of the word LAUGH if the vowels are adjacent.

12. If all permutations of the letters of the word AGAIN are arranged as in dictionary, find the 50^{th} word.

13. Find the number of ways in which any four letters can be (i) arranged and (ii) selected from the word CORGOO

14. Find the total number of (i) permutations and (ii) combinations of 4 letters that can be made out of the letters of the word EXAMINATION.

15. The digits 1,2,3,4 and 5 are given. Find

a. 3 digit numbers without repetitions.
b. 3 digit numbers with repetitions.
c. 3 digit odd numbers without repetitions.
d. 3 digit odd numbers with repetitions.
e. 3 digit even numbers without repetitions.
f. 3 digit even numbers with repetitions.
g. 5 digit numbers without repetitions.
h. 5 digit numbers with repetitions.

16. Find the number of 3 digit odd numbers that can be formed with digits 1,2,3,4, 5 when repetition of digits is

a. Not allowed
b. Allowed