# Problem Set - III

1. Four medical representatives R1, R2, R3 and R4 are to visit one doctor each on Thursday. The doctors are D1, D2, D3 and D4. R1 will not visit D1, and R2 will visit only D2 or D3. In how many ways can the visits be done?

2. Eight buildings in a residential complex are to be painted on their outsides in any one colour from among cream, blue, green, pink and white. The buildings are in a row. Two buildings can have the same colour but two adjacent buildings cannot. In how many ways can the buildings be painted?

3. There are 10 stations on a railway line. The number of different journey tickets that are required by the authorities is

4. Five people are to be arranged on five chairs for a photograph such that two people are always together. Find out the number of ways in which this can be done.

5. Five people are to be arranged on five chairs for a photograph such that three people among them do not want to sit next to each other. Find out the number of ways in which this can be done.

6. How many words can be formed by arranging the letters of the word HELPING?

7. There are 6 tasks and 6 persons. Task 1 cannot be assigned either to person 1 or to person 2; task 2 must be assigned to either person 3 or person 4. Every person is to be assigned one task. In how many ways can the assignment be done?

8. One red flag, three white flags and two blue flags are arranged in a line such that,
   (A) no two adjacent flags are of the same colour.
   (B) the flags at the two ends of the line are of different colours.
   In how many different ways can the flags be arranged?

9. Seven girls and five boys are to be seated around a circular table such that two of the girls want to sit next to each other. In how many ways can they be seated?

10. Five boys and five girls are to be arranged in a circle such that no two girls are next to each other. In how many ways can they be arranged?

11. N persons stand on the circumference of a circle at distinct points. Each possible pair of persons, not standing next to each other, sings a two-minute song one pair after the other. If the total time taken for singing is 28 minutes, what is N?

12. From a group of 5 men and 4 women, a committee having 2 men and 3 women is to be formed. In how many ways can this be done?

13. Out of a group of 5 men and 4 women, in how many ways can you form a committee of 5 people comprising at least 4 men?

14. A polygon has 104 diagonals. How many sides does it have?

15. If there are six distinct points on a plane, what is the maximum number of straight lines joining the points?

16. A man has 9 friends: 4 boys and 5 girls. In how many ways can he invite them, if there have to be exactly 3 girls in the invitees?

17. In how many ways can eight directors, the vice chairman and chairman of a firm be seated at a round table, if the chairman has to sit between the vice chairman and a director?

18. How many numbers can be formed from 1, 2, 3, 4, 5, without repetition, when the digit at the unit's place must be greater than that in the ten's place?

19. An intelligence agency forms a code of two distinct digits selected from 0, 1, 2, ....., 9 such that the first digit of the code is non-zero. The code, handwritten on a slip, can however potentially create confusion when read upside down — for example, the code 91 may appear as 16. How many codes are there for which no such confusion can arise?

20. What is the number of distinct terms in the expansion of $(a + b + c)^{20}$?

**Answers:**

1. 8, 2. $5 \times 4^7$, 3. 90, 4. 48, 5. 12, 6. 5040, 7. 144, 8. 6, 9. $10! \times 2!$, 10. $4! \times 5!$, 11. 7, 12. 40, 13. 21, 14. 16, 15. 15, 16. 160, 17. $2 \times 8!$, 18. 60, 19. 71, 20. 231