**CSE230: Discrete Mathematics**  
Practice Sheet 7: **Permutations and Combinations**

| Q1 | In a class, there are 27 boys and 14 girls. The teacher wants to select 1 boy and 1 girl to represent the class for a function. In how many ways can the teacher make this selection? |
| --- | --- |
| Q2 | (i) How many numbers are there between 99 and 1000 having 7 in the units place? (ii) How many numbers are there between 99 and 1000 having at least one of their digits 7? |
| Q3 | In how many ways can 5 children be arranged in a line such that (i) two particular children of them are always together (ii) two particular children of them are never together. |
| Q4 | How many rearrangements of the following words are possible?   1. **carrier**, **mississippi** 2. **betterment**, so that the vowels stay together. 3. **endeavour**, so that not all the vowels are together. 4. **TRIANGLE** so that no vowels are together. 5. **INTERMEDIATE** such that no two vowels come together |
| Q5 | In how many ways 3 mathematics books, 4 history books, 3 chemistry books and 2 biology books can be arranged on a shelf so that all books of the same subjects are together. |
| Q6 | A student has to answer 10 questions, choosing at least 4 from each of Parts A and B. If there are 6 questions in Part A and 7 in Part B, in how many ways can the student choose 10 questions? |
| Q7 | Three married couples are to be seated in a row having six seats in a cinema hall. If spouses are to be seated next to each other, in how many ways can they be seated? Find also the number of ways of their seating if all the ladies sit together. |
| Q8 | In a small village, there are 87 families, of which 52 families have at most 2 children. In a rural development programme 20 families are to be chosen for assistance, of which at least 18 families must have at most 2 children. In how many ways can the choice be made? |
| Q9 | A boy has 3 library tickets and 8 books of his interest in the library. Of these 8, he does not want to borrow Mathematics Part II, unless Mathematics Part I is also borrowed. In how many ways can he choose the three books to be borrowed? |
| Q10 | There are four bus routes between A and B; and three bus routes between B and C. A man can travel round-trip in number of ways by bus from A to C via B. If he does not want to use a bus route more than once, in how many ways can he make a round trip? |
| Q11 | How many committees of 4 members (2 men, 2 women) are possible if 5 men and 6 women are available? |
| Q12 | Ten different letters of the alphabet are given. How many 5-letter words can be formed using these letters such that at least one letter is repeated? |
| Q13 | How many signals can be sent using 6 flags of different colors, taking one or more at a time? |
| Q14 | In an examination with three multiple-choice questions, each having 4 options, in how many ways can a student fail to get all the answers correct? |
| Q15 | Eight chairs are numbered 1 to 8. Two women and 3 men wish to occupy one chair each. First the women choose the chairs from amongst the chairs 1 to 4 and then men select from the remaining chairs. Find the total number of possible arrangements. |
| Q16 | In how many ways can you arrange 5 boys and 8 girls in a line so that no two boys are next to each other? |
| Q17 | A candidate is required to answer 7 questions out of 12 questions, which are divided into two groups, each containing 6 questions. He is not permitted to attempt more than 5 questions from either group. Find the number of different ways of doing questions. |
| Q18 | We wish to select 6 persons from 8, but if the person A is chosen, then B must be chosen. In how many ways can selections be made? |
| Q19 | In how many ways can you divide 12 people into 3 teams A, B, C of equal members? |
| Q20 | There are 10 people named P1 , P2 , P3 , ... P10 . Out of 10 persons, 5 persons are to be arranged in a line such that in each arrangement P1must occur whereas P4 and P5 do not occur. Find the number of such possible arrangements. |
| Q21 | How many committees of five persons with a chairperson can be selected from 12 persons? |
| Q22 | Find the number of permutations of n distinct things taken r together, in which 3 particular things must occur together. |
| Q23 | 18 mice were placed in two experimental groups and one control group, with all groups equally large. In how many ways can the mice be placed into three groups? |
| Q24 | How many total words can be formed by selecting 2 vowels and 3 consonants from 4 vowels and 5 consonants? |
| Q25 | In how many ways can a football team of 11 players be selected from 16 players? How many of them will (i) include 2 particular players? (ii) exclude 2 particular players? |
| Q26 | A sports team of 11 students is to be constituted, choosing at least 5 from Class XI and at least 5 from Class XII. If there are 20 students in each of these classes, in how many ways can the team be constituted? |
| Q27 | A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has (i) no girls (ii) at least one boy and one girl (iii) at least three girls. |
| Q28 | A five-digit number divisible by 3 is to be formed using the digits 0,1,2,3,4,5 without repetitions. How many such numbers can be formed? |
| Q29 | In a room, everybody shakes hands with everybody else. The total number of handshakes is 66. How many people are in the room? |
| Q30 | How many triangles can be formed by choosing the vertices from a set of 12 points, seven of which lie on the same line? |
| Q31 | How many ways can a team of 11 players be selected from 22 players, always including 2 specific players and excluding 4 specific players? |
| Q32 | In a football championship, 153 matches were played. Each team played one match with every other team. How many teams participated? |
| Q33 | A committee of 6 members is to be chosen from 10 men and 7 women such that it contains at least 3 men and 2 women. If two particular women refuse to serve on the same committee, how many such committees can be formed? |
| Q34 | There are 3 books on Mathematics, 4 on Physics and 5 on English. How many different collections can be made such that each collection consists of :  (a) One book of each subject  (b) At least one book of each subject  (c) At least one book of English |
| Q35 | Five boys and five girls form a line. Find the number of ways of making the seating arrangement under the following condition:  (a) Boys and girls alternate  (b) No two girls sit together  (c) All the girls sit together  (d) All the girls are never together |
| Q36 | There are 10 professors and 20 lecturers out of whom a committee of 2 professors and 3 lecturers is to be formed. Find  (a) In how many ways committees can be formed ?  (b) In how many ways a particular professor is included?  (c) In how many ways a particular lecturer is included ?  (d) In how many ways a particular lecturer is excluded ? |
| Q37 | Using the digits 1, 2, 3, 4, 5, 6, 7, a number of 4 different digits is formed. Find  (a) how many numbers are formed?  (b) how many numbers are exactly divisible by 2?  (c) how many numbers are exactly divisible by 25?  (d) how many of these are exactly divisible by 4? |
| Q38 | How many words (with or without dictionary meaning) can be made from the letters of the word MONDAY, assuming that no letter is repeated, if  (a) 4 letters are used at a time  (b) All letters are used at a time  (c) All letters are used but the first is a vowel |