Chapter - 7

ASSIGNMENT

1 If $\frac{n!}{2!(n-2)!}$ and $\frac{n!}{4!(n-4)!}$ are in the ratio 2 : 1, Find the value of n.

2 Prove that : $\frac{(2n)!}{n!} = \{1.3.5 .... (2n - 1)\}\ 2^n$.

3 Prove that 33! is divisible by 2^{15}. What is the largest integer n such that 33! is divisible by 2^n?

4 Prove that $\frac{1}{9!}+\frac{1}{10!}+\frac{1}{11!}=\frac{122}{11!}$

5 If $\frac{1}{4!}+\frac{1}{5!}=\frac{x}{6!}$, find x.

6 In a monthly test, the teacher decides that there will be three questions, one from each of Exercise 7, 8 and 9 of the text book. If there are 12 questions in Exercise 7, 18 in Exercise 8 and 9 in Exercise 9, in how many ways can three questions be selected ?

7 There are 6 multiple choice questions in an examination. How many sequence of answers are possible, if the first three questions have 4 choices each and the next three have 5 each ?

8 How many numbers are there between 100 and 1000 such that at least one of their digits is 7 ?

9 How many three-digit numbers more than 600 can be formed by using the digits 2,3,4,6,7.

10 How many numbers divisible by 5 and lying between 4000 and 5000 can be formed from the digits 4,5, 6, 7 and 8.

11 From Goa to Bombay there are two roots; air, and sea. From Bombay to Delhi there are three routes; air, rail and road. From Goa to Delhi via Bombay, how many kinds of routes are there ?

12 How many A.P.'s with 10 terms are there whose first term is in the set {1, 2,3} and whose common difference is in the set {1,2,3,4,5} ?

13 A customer forgets a four-digit code for an Automatic Teller Machine (ATM) in a bank. However, he remembers that this code consists of digits 3,5,6 and 9. Find the largest possible number of trials necessary to obtain the correct code.

14 How many words can be formed with the letters of the word 'ORD1NATE' so that vowels occupy odd places ?

15 In how many ways can 5 children be arranged in a row such that
(i) two of them, Ram and Shyam, are always together ?
(ii) two of them, Ram and Shyam, are never together ?

16 The Principal wants to arrange 5 students on the platform such that the boy 'SALIM' occupies the second position and such that the girl, 'SITA' is always adjacent to the girl 'RITA'. How many such arrangements are possible ?

17 A tea party is arranged for 16 persons along two sides of a long table with 8 chairs on each side. Four persons wish to sit on one particular and two on the other side. In how many ways can they be seated ?

18 In how many ways can the letters of the word 'STRANGE' be arranged so that
(i) the vowels come together ? (ii) the vowels never come together ? and
(iii) the vowels occupy only the odd places ?

19 How many words can be formed out of the letters of the word, 'ORIENTAL', so that the vowels always occupy the odd places ?

20 How many words can be formed out of the letters of the word 'ARTICLE', so that vowels occupy even places ?

21 How many different words can be formed by using all the letters of the word 'ALLAHABAD' ?
(i) In how many of them vowels occupy the even positions ?
(ii) In how many of them both L do not come together ?

22 In how many ways can the letters of the word PERMUTATIONS be arranged if
(i) the words start with P end with S (ii) vowels are all together.

23 How many arrangements can be made with the letters of the word 'MATHEMATICS'? In how many of them vowels are together ?

24 The letters of the word 'RANDOM' are written in all possible orders and these words are written out as in a dictionary. Find the rank of the word 'RANDOM'.

25 If the letters of the word 'LATE' be permuted and the words so formed be arranged as in a dictionary, find the rank of the word LATE,

26 If the letters of the word 'MOTHER' are written in all possible orders and these words are written out as in a dictionary, find the rank of the word 'MOTHER'.

27 In how many ways can the letters of the word "INTERMEDIATE" be arranged so that:
(i) the vowels always occupy even places ?
(ii) the relative order of vowels and consonants do not alter ?

28 The letters of the word 'ZENITH' are written in all possible orders. How many words are possible if all these words are written out as in a dictionary ? What is the rank of the word 'ZENITH' ?

29 Write the expression ${}^{n}C_{r+1} + + {}^{n}C_{r-1} + 2 \times {}^{n}C_{r}$ in the simplest form.

30 If ${}^{n}P_{r} = 720$ and ${}^{n}C_{r} = 120$, find r.

31 If the ratio ${}^{2n}C_{3}$: ${}^{n}C_{3}$ is equal to 11: l, find n.

32 Prove that: ${}^{2n}C_{n} = \dfrac{2^{n}\{1.3.5...(2n-1)\}}{n!}$

33 Write the value of $\sum_{r=1}^{6} {}^{56-r}C_{3} + {}^{50}C_{4}$.

34 Evaluate ${}^{20}C_{5} + \sum_{r=2}^{5} {}^{25-r}C_{4}$.

35 If ${}^{n}C_{4}$, ${}^{n}C_{5}$ and ${}^{n}C_{6}$ are in A.P., then find n.

36 If $\alpha = {}^{m}C_{2}$, then find the value of ${}^{\alpha}C_{2}$.

37 A question paper has two parts. Part A and Part B, each containing 10 questions. If the student has to choose 8 from Part A and 5 from Part B, in how many ways can he choose the questions ?

38 In how many ways can a cricket eleven be chosen out of a batch of 15 players if (i) there is no restriction on the selection; (ii) a particular player is always chosen; (iii) a particular player is never chosen ?

39 How many diagonals are there in a polygon with n sides ?

40 A polygon has 44 diagonals. Find the number of its sides.

If m parallel lines in plane are intersected by a family of n parallel lines. Find the number of parallelograms formed.

41 There are 10 points in a plane, no three of which are in the same straight line, excepting 4 points, which are collinear. Find the (i) number of straight lines obtained from the pairs of these points; (ii) number of triangles that can be formed with the vertices as these points.

42 In how many ways can 7 plus (+) signs and 5 minus (-) signs be arranged in a row so that no two minus signs are together?

43 There are 10 professors and 20 students out of whom a committee of 2 professors and 3 students is to be formed. Find the number of ways in which this can be done. Further find in how many of these committees:
(i) a particular professor is included. (ii) a particular student is included.
(iii) a particular student is excluded.

44 We wish to select 6 persons from 8, but if the person A is chosen, then 6 must be chosen. In how many ways can the selection be made ?

45 In an examination, a question paper consists of 12 questions divided into two parts i.e., Part I and Part II, containing 5 and 7 questions, respectively. Astudent is required to attempt 8 questions in all, selecting at least 3 from each part. In how many ways can a student select the questions?

46 How many words can be formed by taking 4 letters at a time out of the letters of the word 'MATHEMATICS'.

47 How many four-letter words can be formed using the letter of the word ' INEFFECTIVE '?

48 Find the number of combinations and permu tations of 4 letters taken from **the** word 'EXAMINATION'.