

PERMUTATIONS AND COMBINATIONS

CM110701

1. If $\frac{{}^n P_2}{{}^n P_4}$ and $\frac{{}^n P_4}{{}^n P_2}$ are in the ratio 2 : 1, find the value of n.
2. Prove that 33^n is divisible by 2^{15} . What is the largest integer n such that 33^n is divisible by 2^n ?
3. Five persons entered the lift cabin on the ground floor of an 8-floor house. Suppose each of them can leave the cabin independently at any floor beginning with the first. Find the total number of ways in which each of the five persons can leave the cabin (i) at any one of the 7 floors (ii) at different floors.
4. A telegraph has 5 arms and each arm is capable of 4 distinct positions, including the position of rest. What is the total number of signals that can be made?
5. Find the total number of ways in which n-distinct objects can be put into two different boxes so that no box remains empty.
6. If P_m stands for ${}^m P_m$, then prove that $1 + 1.P_1 + 2.P_2 + 3.P_3 + \dots + n.P_n = (n + 1)!$.
7. Find the sum of all the numbers that can be formed with the digits 2, 3, 4, 5 taken all at a time.
8. The Principal wants to arrange 5 students on the platform such that the boy 'SALIM' occupies the second position and such that the girls, 'SITA' is always adjacent to the girl 'RITA'. How many such arrangements are possible?
9. How many four digit numbers divisible by 4 can be made with the digits 1, 2, 3, 4, 5 if the repetition of digits is not allowed?
10. Find the number of ways in which 5 boys and 5 girls be seated in a row so that
 - (i) No two girls may sit together
 - (ii) All the girls sit together and all the boys sit together
 - (iii) All the girls are never together
11. There are six periods in each working day of a school. In how many ways can one arrange 5 subjects such that each subject is allowed at least one period?
12. Prove that: ${}^{2n} C_n = \frac{2^n [1.3.5 \dots (2n - 1)]}{n!}$
13. If there are 12 persons in a party and if each two of them shake hands with each other, how many handshakes happen in the party?
14. A person wishes to make up as many different particles as he can out of his 20 friends such that each

- party consists of the same number of person. How many friends should he invite?
15. In how many ways can a cricket team be selected from a group of 25 players containing 10 batsmen, 8 bowlers, 5 all – rounders and 2 wicket keepers? Assume that the team of 11 players requires 5 batsmen, 3 all- rounder, 2 bowlers and 1 wicket keeper.
16. A boy has 3 library tickets and 8 books of his interest in the library. Of these 8, he does not want to borrow Chemistry Part II, unless Chemistry Part I is also borrowed. In how many ways can be chosen the three books to be borrowed?
17. A polygon has 44 diagonals. Find the number of its sides.
18. 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 point.
19. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?
20. How many four-letter words can be formed using the letter of the word 'INEFFECTIVE'?

