

## CHAPTER 7

## PERMUTATIONS AND COMBINATIONS

## IMPROVEMENT 2018

1. a) Find the number of words with or without meaning, which can be made by using all the letters of the word "GANGA". (1)
- b) If the words are written as in a dictionary, what will be the 26<sup>th</sup> word? (3)
- c) A group consists of 4 girls and 7 boys. In how many ways, can a team of 5 members can be selected if the team should have at least 3 girls? (2)

## MARCH 2018

2. a) Find  $n$  if;  $12 \times {}^{n-1}P_3 = 5 \times {}^{n+1}P_3$  (2)
- b) If  ${}^nP_r = 840$ ;  ${}^nC_r = 35$ , Find  $r$ . (1)
- c) English alphabet has 5 vowels and 21 consonants. How many 4 letter words with two different vowels and two different consonants can be formed without repetition of letters. (3)

## IMPROVEMENT 2017

3. a) How many three digit numbers can be formed by using the digits 1,2,3,4,5,6? (1)
- b) Find the number of arrangements of the letters of the word INDEPENDENCE. (2)
- c) In how many of these arrangements, do the vowels never occur together? (3)

OR

- a)  ${}^nC_2 = {}^nC_5$  then  $n = \dots\dots\dots$  (1)
- b) How many chords can be drawn through 21 points on a circle? (2)

- a) A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done if committee consists of at least 3 girls? (3)

## MARCH 2017

4. a) If  $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$ , then  $x$  is .....  
 i) 32                      ii) 16  
 iii) 64                    iv) 8 (1)
- b) Given 5 flags of different colours, how many different signals can be generated if each single requires the use of 2 flags one below the other? (2)
- c) Find  $r$  if;  ${}^5P_r = 2 \cdot {}^6P_{r-1}$  (3)

OR

- a) If  ${}^nC_9 = {}^nC_8$ , then  $n = \dots\dots\dots$   
 i) 9                              ii) 8  
 iii) 17                          iv) 1 (1)
- b) How many chords can be drawn through 12 points on a circle? (2)
- c) What is the number of ways of choosing 4 cards from a pack of 52 playing cards?  
 In how many of these:  
 i) Four cards are of the same suit?  
 ii) Cards are of the same colour? (3)

## IMPROVEMENT 2016

5. a) How many four digit numbers can be formed using the digits 9,8,7,6,5,4, if no digits are repeated?  
 i) 630                              ii) 603  
 iii) 306                            iv) 360 (1)
- b) In how many ways a committee of 3 persons can be formed from a group of 2 men and 3 women? (2)
- c) Find the value of  $n$ , if  ${}^{2n}C_3 = 11 \cdot {}^nC_3$  (3)

OR

- a)  ${}^{569}C_{569} = \dots\dots\dots$  (1)

- b) If  ${}^{2n}C_3 : {}^nC_3 = 12 : 1$ , then find  $n$  (2)  
 c) If the letters of the word EQUATION are arranged; find the number of arrangements in which no two consonants occur together? (3)

**MARCH 2016**

6. a) Write the value of  ${}^7C_5$ . (1)  
 b) Find the value of  $n$  if  $3 \cdot {}^nP_4 = 5^{(n-1)}P_4$  (2)  
 c) What is the number of ways of choosing four cards from a pack of 52 cards, provided all four cards belong to four different suits? (3)

**OR**

- a)  ${}^{29}C_{29} = \dots\dots\dots$  (1)  
 b) Find the value of  $n$  if  $12 \cdot {}^{(n-1)}P_3 = 5 \cdot {}^{(n+1)}P_3$  (2)  
 c) 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 at least one boy and girl? (3)

**IMPROVEMENT 2015**

7. a)  ${}^7P_7 = \dots\dots\dots$   
     i) 7                      ii)  $7!$   
     iii) 1                  iv)  $7^7$  (1)  
 b) Find the number of words that can be formed from the letters of the word 'MALAYALAM'. How many of these start with 'Y'? (2)  
 c) If  ${}^{2n}C_3 = 11 \cdot {}^nC_3$ , find 'n'. (3)

**OR**

- a)  ${}^nC_r + {}^nC_{r-1} = \dots\dots\dots$   
     i)  ${}^nC_{r+1}$                       ii)  ${}^{n+1}C_r$   
     iii)  ${}^{n-1}C_r$                       iv)  ${}^{n-1}C_{r-1}$  (1)  
 b) Prove that  ${}^{61}C_{57} - {}^{60}C_{56} = {}^{60}C_3$  (2)

- c) In how many ways can the letters of the word 'ARRANGE' be arranged such that two A's do not occur together? (3)

**MARCH 2015**

8. a)  $\frac{0!}{1!} = \dots\dots\dots$   
     i) 0              ii) 1              iii) 2              iv) 3 (1)  
 b) Find  $r$ , if  $5 \times 4P_r = 6 \times 5P_{r-1}$  (2)  
 c) Find the number of 8-letters arrangements that can be made from the letters of the word DAUGHTER so that all Vowels do not occur together. (3)

**OR**

- a)  ${}^nC_{n-1} = \dots\dots\dots$   
     i)  $n-1$               ii)  $n$               iii) 0              iv) 1 (1)  
 b) If  ${}^nC_9 = {}^nC_8$ , find  ${}^nC_2$  (2)  
 c) How many ways can a team of 5 persons be selected out of a group of 4 men and 7 women, if the team has at least one man and one woman? (3)

**IMPROVEMENT 2014**

9. a) Find the number of permutations of the letters of the word 'ALLAHABAD'. (2)  
 b) Find  $r$ , if  ${}^5P_r = 2 \cdot {}^6P_{r-1}$  (4)

**OR**

- a) If  ${}^nC_9 = {}^nC_8$  find 'n' and  ${}^nC_{17}$ . (3)  
 b) How many chords can be drawn through 23 points on a circle? (3)

**MARCH 2014**

10. a) In how many ways can the letters of the word, PERMUTATIONS be arranged if:  
     i) the words start with P and end with S? (2)  
     ii) there are always 4 letters between P and S? (2)  
 b) In how many ways can 5 girls and 3 boys be

seated in a row so that no two boys are together. (2)

- c) How many chords can be drawn through 21 points? (1)

**OR**

- a) What is the minimum numbers of ways of choosing 4 cards from a pack of 52 paying cards? In how many of these:
- are 4 cards of the same suit? (1)
  - do 4 cards belong to 4 different suits? (1)
- b) Find the number of permutations of the letters of the word ALLAHABAD. (1)
- c) How many 5 digit telephone numbers can be constructed using the digits 0 to 9 if each number starts with 67 and no digit appears more than once? (3)

### IMPROVEMENT 2013

11. a) The number of 3-digit numbers can be formed from the digits 1,2,3,4,5 assuming that repetition of the digits is not allowed is \_\_\_\_\_. (1)
- b) If  $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$ , find  $x$ . (2)
- c) How many words, with or without meaning, can be formed using all the letters of the word 'FRIDAY', using each letter exactly once? How many of them have first letter is a vowel? (3)

**OR**

- a)  ${}^nC_7 = {}^nC_5 \Rightarrow n =$  \_\_\_\_\_ (1)
- b) A bag contains 5 blue and 6 white balls. Determine the number of ways in which 3 blue and 4 white balls can be selected. (2)
- c) What is number of choosing 3 cards from a pack of 52 playing cards? In how many of these 3 cards of the same colour? (3)

### MARCH 2013

12. a) Find the value of  $n$  such that

$$3 {}^nP_4 = 5 {}^{n-1}P_4, n > 4 \quad (1)$$

- b) In how many ways can 5 students be seated on a bench? (2)
- c) Find the number of different 8-letter arrangements that can be made from the letters of the word, 'DAUGHTER' so that:
- All vowels occur together. (1)
  - All vowels do not occur together. (2)

**OR**

- a) Determine if  ${}^{2n}C_3 = 11 \cdot {}^nC_3$  (2)
- b) In how many ways can cricket of 11 players be selected from 15 players? (1)
- c) A bag contains 5 white, 6 red and 4 blue balls. Determine the number of ways in which 2 white, 3 red and 2 blue balls can be selected. (3)

### IMPROVEMENT 2012

13. i) Find the value of  $n$  if  ${}^nP_5 = 42 {}^nP_3, n > 4$ . (2)
- ii) How many words, with or without meaning, can be formed using all the letters of the word CHEMISTRY, using each letter exactly once? How many of them start with C and end with Y? (4)

**OR**

- i) If  ${}^{2n}C_3 = {}^nC_3 = 12:1$ , find  $n$  (2)
- ii) What is the total number of ways of cards? In how many of these four cards of the same suit? (4)

### MARCH 2012

14. a) Solve for the natural number  $n$ ; 12.  ${}^{(n-1)}P_3$  (3)
- b) in how many ways can 7 athletes be chosen out of 12? (1)
- c) The English alphabet has 5 vowels and 21 consonants. How many words with two different vowels and two different consonants can be formed without repetition of letters? (2)

**OR**

- a) Find  $r$  if  ${}^5P_r = {}^6P_{r-1}$  (3)

- b) If there are 12 persons in a party and each of them shake hands with all others, what is the total number of handshakes? (1)
- c) In how many ways a committee of 3 men and 2 women be selected out of 7 men and 5 women? (2)

**IMPROVEMENT 2011**

15. a) If the letters of the word EQUATION are arranged, find the number of arrangements in which no two consonants are adjacent. (2)
- b) How many values of 'r' will satisfy  ${}^{22}C_{r+2} = {}^{22}C_{2r-1}$ ? (2)
- c) In how many ways can a committee of 3 men and 2 women be formed from the group of 5 men and 4 women if Mr. A is always included and Mrs. B is never included? (2)

**OR**

- a) When letters of the word FATHER are arranged as in a dictionary find the position in which the given word comes. (2)
- b) Given that  ${}^nC_{11} = {}^nC_9$ , where 'n' is a natural number, find the value of 'r' making  ${}^nC_r$  the largest. (2)
- c) A polygon has 10 vertices lying on a circle. Find the number of its diagonals. (2)

**MARCH 2011**

16. i) Simplify  $\frac{{}^nP_4}{{}^{n-1}P_3}$  (2)
- ii) In how many different ways can the letters of the word HEXAGON be permuted? (2)
- iii) In how many ways can a team of 3 boys and 3 girls be selected from 5 boys and 4 girls? (2)

**OR**

- i) If  $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$ , then find x. (2)
- ii) How many 4-digit numbers are there with no digit repeated? (2)
- iii) If  ${}^nC_8 = {}^nC_2$ , then find  ${}^nC_3$  (2)

**IMPROVEMENT 2010**

17. a) If  ${}^4P_r = 6 \times {}^5P_{r-1}$  find 'r'. (2)
- b) How many 3 digit numbers can be formed with the digit 0,1,2,3 and 4? (2)
- c) In a Panchayath there are 10 Panchayath members. Ladies contested only in the 50% reserved constituency. If the post of president and Vice-president can be selected? (2)

**OR**

- a) Prove that  ${}^nC_r = {}^nC_{n-r}$ . (1)
- b) Twenty eight matches were played in a volley ball tournament. Each team playing one against each of others. How many teams were there? (2)
- c) If the letters of the word 'TUTOR' be permuted among themselves and arranged as in a dictionary, then find the position of the word TUTOR. (3)

**MARCH 2010**

18. i) Find the value of n such that  ${}^nP_5 = 42 {}^nP_3$  for  $n > 4$  (3)
- ii) A committee of 3 persons is to be constituted from a group of 2 men and 3 woman.
- a) In how many ways can this be done? (1)
- b) How many of these committees would consist of 1 man and 2 women? (2)

**OR**

- i) If  ${}^nC_2 : {}^{2n}C_1 = 3 : 2$ , find n (3)
- ii) a) Find the number of words that can be formed from the letters of the word MALAYALAM. (2)
- b) How many of these arrangements start with Y? (1)

**IMPROVEMENT 2009**

19. i) Find 'r' if  ${}^5P_r = {}^6P_{r-1}$ . (2)
- OR**
- How many 4 digit numbers are there with distinct digits? (2)
- ii) In how many ways can a team of 3 boys and 3 girls be selected from 5 boys and 4 girls? (2)

**OR**

If  ${}^{2n}C_3 : {}^nC_3 = 11:1$ , then find the value of 'n'.

**MARCH 2009**

20. a) Find n if  ${}^{n-1}P_3 : {}^nP_4 = 1:9$  (2)

**OR**

Find r, if  ${}^5P_r = {}^6P_{r-1}$

- b) A bag contains 5 black and 6 red balls.  
Determine the number of ways in which  
2 black and 3 red balls can be selected from  
the lot. (2)

**OR**

Determine the number of 5 card combination  
out of a deck of 52 cards if there is exactly one  
ace in each combination

**FEBRUARY 2008**

21. i)  ${}^{10}C_4 + {}^{10}C_5 = \dots\dots\dots$  (1)

- ii) How many words can be made from the letters?  
in the word MONDAY without repetitions if 4  
letters are used at a time? (3)

(2)

Success is the  
sum of all efforts,  
repeated Day in  
and Day out