



GOVERNMENT OF KARNATAKA
DEPARTMENT OF SCHOOL EDUCATION (PRE-UNIVERSITY)

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CHAPTERWISE MULTIPLE CHOICE QUESTIONS FOR COMPETATIVE EXAM

SUBJECT: MATHEMATICS – I PUC

NAME OF THE CHAPTER: PERMUTATIONS AND COMBINATIONS



Multiplication principle:

If an event can occur in m different ways following which another event can occur in n different ways, then total number of occurrence of the two events is $m \times n$.

Addition principle:

If an event can occur in m different ways and another event can occur in n different ways then number of occurrence of either of the events is $m+n$.

Permutations:

A permutation is an arrangement of objects in a definite order.

Permutation of n distinct objects

- Number of permutations of n different objects taken r at a time, where repetition is not allowed, is denoted by ${}^n P_r$ and ${}^n P_r = \frac{n!}{(n-r)!}$
- Number of permutations of n different objects taken r at a time, where repetition is allowed, is equal to n^r .

Permutations when the objects are not distinct:

The number of permutations of n objects of which p_1 are of one kind, p_2 are of second kind, ..., p_k are of k^{th} kind and rest, if any, are distinct is $\frac{n!}{p_1! p_2! \dots p_k!}$.

Combinations

A combination is a selection of some or all of a number of different objects where the order of selection is immaterial.

Number of combinations of n objects taken r at a time is denoted by ${}^n C_r$ and ${}^n C_r = \frac{n!}{(n-r)! r!}$

Some results:

- ✓ ${}^nC_r = {}^nC_{n-r}$
- ✓ ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$
- ✓ ${}^nC_a = {}^nC_b \Rightarrow a = b$ of $a + b = n$
- ✓ ${}^nC_r = \frac{n}{r} {}^{n-1}C_{r-1}$
- ✓ $\frac{{}^nC_r}{{}^nC_{r-1}} = \frac{n-(r-1)}{r}$

Circular Permutations

- The number of circular permutations of 'n' distinct object is $(n - 1)!$, if clock wise and anticlock wise order of arrangements are considered as distinct.
- If clock wise and Anticlockwise arrangements are not considered as distinct then the number of permutations is $\frac{1}{2}[(n - 1)!]$.

CLASSROOM CHALLENGE

1. Number of 3-digit numbers those can be formed from the digits 1, 2, 3, 4 and 5 if repetition of digits is not allowed is (E)
(A) 10 B) 120 C) 6 D) 60
2. 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? (E) CET-2017
A) 336 B) 337 C) 335 D) 338
3. The number of possible outcomes when a coin is tossed 5 times is (E)
A) 2 B) 10 C) 32 D) 16
4. The total number of 9 digit numbers which have all different digits is (A)
A) 10! B) 9! C) $9 \times 9!$ D) $10 \times 10!$
5. Total number of 10- digit numbers which can be formed by using the digits 1 and 2 are (A)
A) $10C_1 + 9C_2$ B) 2^{10} C) $10C_{12}$ D) 10!
6. The number of ways in which one can post 6 letters in 8 letter boxes is (A)
A) 48 B) 6^8 C) 8^6 D) 6!
7. Number of subsets of the set { 1, 2, 3, 4, 5, 6, 7, 8 } which contain the elements 5 and 7 is (A)
A) 64 B) 256 C) 24 D) 16

8. Number of words with or without meaning those can be formed using each letter of the word **COURAGE** exactly once is (E)
(A) 720 B) 120 C) 3240 D) 5040
9. A five digit number divisible by 3 is to be formed using the digits 0, 1, 2, 3, 4 and 5 without repetition. The number of ways this can be done is (A)
A) 216 B) 600 C) 240 D) 3125
10. Given 5 different green dyes, four different blue dyes and three different red dyes, the number of combinations of dyes which can be chosen taking at least one green and one blue dye is (D)
A) 3600 B) 3720 C) 3800 D) 3600
11. A boy has 4 shirts of brand-A, 5 shirts of brand-B and 3 other shirts. Without any condition on selection, number of ways he can select a shirt for a function is (D)
(A) 60 B) 27 C) 12 D) 5
12. If there are 4 paths to travel from Delhi to Kanpur, then the number of ways a person can travel from Delhi to Kanpur and come back to Delhi is (E)
A) 4 B) 8 C) 12 D) 16
13. Total number of 3-digit even numbers which can be formed by using the digits 0, 3, 4, 7 and 8 is (A)
A) 60 B) 75 C) 125 D) 18
14. Total number of new numbers which can be formed using each digit of the number 75683 exactly once is (E)
(A) 120 B) 59 C) 24 D) 119
15. If 8 persons are to address a meeting, then the number of ways in which a specified speaker is to speak before another specified speaker is (A)
A) 2520 B) 20160 C) 40320 D) 5040
16. Number of ways of arranging 8 flowers of different colours in a row of 5 spaces is (E)
A) 4030 B) 6720 C) 120 D) 40
17. The number of ways to arrange the letters of the word **VECTOR** with the vowels in alphabetical order is (E)
A) 120 B) 360 C) 720 D) 240

18. The number of integers greater than 6000 and less than 7000 which are divisible by 5 provided that no digit is repeated is (D)
A) 111 B) 112 C) 113 D) 114
19. The number of ways of arranging the letters of the word DANGER, so that no vowel occupies odd place is (D)
A) 36 B) 48 C) 144 D) 96
20. The sum of the digits in unit place of all the 4-digit numbers formed with the digits 3, 4, 5 and 6 taken all at a time is (A)
A) 432 B) 108 C) 36 D) 18
21. If the letters of the word KRISNA are arranged in all possible ways and these words are written out as in a dictionary, then the rank of the word KRISNA is (D)
A) 324 B) 341 C) 359 D) 360
22. If all permutations of the letters of the word MASK are arranged in the order as in dictionary without meaning, which one of the following is 19th word? (A) CET-2022
A) KAMS B) SAKM C) AKMS D) AMSK
23. Total number of 4-digit numbers which can be formed using the digits 1, 2, 3, 5 and 6 where digits can repeat is (E)
A) 625 B) 120 C) 24 D) 1024
24. The number of 5-digit telephone numbers having at least one of their digits repeated is (A)
A) 90000 B) 100000 C) 30240 D) 69760
25. Number of ways of rearranging the letters of the word CALCULUS is (E)
A) 40320 B) 120 C) 5040 D) 720
26. Number of permutations of the letters of the word RAMANUJAN such that the letters R and S are at the two ends is (A)
A) 1680 B) 3360 C) 840 D) 5040
27. Number of distinct permutations of the letters of the word HERSTEIN in which vowels lie together is (A)
A) 2160 B) 720 C) 1680 D) 5040
28. Number of ways of rearranging the letters of the word DIFFERENT is (E)
A) 90720 B) 82410 C) 6524 D) 5340

29. Number of distinct permutations of the word REFLEXIVE in which all E come together is (A)
A) 1680 B) 5040 C) 5200 D) 6310
30. If the different permutations of all the letters of the word EXAMINATION are listed as in a dictionary, the number of words in this list before the first word starting with E is (D)
A) 970200 B) 907200 C) 709200 D) 279000
31. Number of diagonals which can be drawn in a polygon of 12 sides is (E)
A) 66 B) 132 C) 54 D) 24
32. A man has 10 friends. In how many ways he can invite one or more of them to a party (A)
A) $10!$ B) 2^{10} C) $10! - 1$ D) $2^{10} - 1$
33. A polygon has 35 diagonals, then the number of its sides is (A)
A) 8 B) 9 C) 10 D) 11
34. Number of triangles those can be constructed with 8 points in a plane in which 4 points are collinear is (A)
A) 50 B) 54 C) 56 D) 60
35. Number of ways of selecting a team of 11 football players from a group of 15 players such that the team contains two particular players is (A)
A) 78 B) 2730 C) 1 D) 2728
36. The figures 4, 5, 6, 7 and 8 are written in every possible order. The number of numbers greater than 56000 is (A)
A) 72 B) 96 C) 90 D) 98
37. The number of ways a committee consisting of 3 men and two women can be constructed from 7 men and 5 women is (E)
A) 300 B) 330 C) 350 D) 380
38. Ten chairs are numbered as 1 to 10. Three women and two men wish to occupy one chair each. Women choose the chairs marked 1 to 6, and the men choose the chairs from the remaining four. The number of possible ways of arrangement is (A) CET-2024
A) ${}^6C_3 \times {}^4P_2$ B) ${}^6C_3 \times {}^4C_2$ C) ${}^6P_3 \times {}^4C_2$ D) ${}^6P_3 \times {}^4P_2$
39. The number of triangles can be formed by joining 12 points of which 7 points are collinear (E)
A) 220 B) 35 C) 185 D) 200

40. Total number of words formed by 2 vowels and 3 consonants taken from 4 vowels and 5 consonants is equal to (A)
 A) 60 B) 120 C) 7200 D) 720
41. The number of 4 digit numbers without repetition that can be formed using the digits 1, 2, 3, 4, 5, 6, 7 in which each number has two odd digits and two even digits is (D) CET-2020
 A) 450 B) 432 C) 454 D) 436
42. Number of ways of choosing 4 cards from a deck of 52 playing cards such that the cards are of different suits is (A)
 A) 28561 B) 20300 C) 13420 D) 598
43. In a touring cricket team there are 16 players in all including 5 bowlers and 2 wicket-keepers. How many teams of 11 players from these, can be chosen, so as to include three bowlers and one wicket-keeper (A)
 A) 650 B) 720 C) 750 D) 800
44. Number of ways of choosing 4 cards from a deck of 52 playing cards such that the cards are of any two suits is (D)
 A) 80330 B) 13478 C) 80350 D) 81120
45. A student is to answer 10 out of 13 questions in an examination such that he must choose at least 4 from first 5 questions. The number of choices available to him is (A)
 A) 140 B) 196 C) 280 D) 246
46. If $43C_{r-6} = 43C_{3r+1}$ then the value of rP_{r-1} is (E)
 A) 12! B) 11! C) 11. 11! D) 13!
47. If $nP_r = 840$ and $nC_r = 35$ then r is equal to (E)
 A) 3 B) 4 C) 5 D) 6
48. If ${}^nC_{12} = {}^nC_8$ then n is equal to (E) CET-2018
 A) 26 B) 12 C) 6 D) 20
49. If ${}^nP_4 = 24$. nC_5 , then the value of n is (E)
 A) 10 B) 15 C) 9 D) 5
50. ${}^{15}C_8 + {}^{15}C_9 - {}^{15}C_6 - {}^{15}C_7$ is equal to (E)
 A) 8 B) 6 C) 0 D) 15
51. 7 people were invited for a birthday party. The number of ways they and the host can be seated at a circular table is (E)
 A) 40320 B) 5040 C) 120 D) 720

52. 7 beads of different colours are threaded onto a bracelet. Number of arrangements is

(E)

A) 40320

B) 720

C) 5040

D) 360

CLASSROOM CHALLENGE

1	2	3	4	5	6	7	8	9	10
B	A	C	C	B	C	A	D	A	B
11	12	13	14	15	16	17	18	19	20
C	D	A	D	B	B	B	B	C	B
21	22	23	24	25	26	27	28	29	30
A	B	A	D	C	B	A	A	B	B
31	32	33	34	35	36	37	38	39	40
C	D	C	B	A	B	C	D	C	C
41	42	43	44	45	46	47	48	49	50
B	A	B	D	A	A	B	D	C	C
51	52								
B	D								