

Studentpad

JEE-MAIN MATHEMATICS PERMUTATIONS AND COMBINATIONS

2022-23

Time : 90 Min

Maths : Permutations and Combinations

Marks : 120

01) What is the maximum value of P such that

3^P divides $99 \times 97 \times 95 \times \dots \times 51$?

- A) 12
- B) 14
- C) 13
- D) 11

02) For $2 \leq r \leq n$, $\binom{n}{r} + 2\binom{n}{r-1} + \binom{n}{r-2}$ is equal

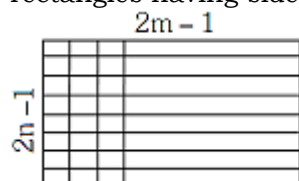
to

- A) $\binom{n+2}{r}$
- B) $2\binom{n+2}{r}$
- C) $2\binom{n+1}{r+1}$
- D) $\binom{n+1}{r-1}$

03) The value of ${}^{50}C_4 + \sum_{r=1}^6 {}^{56-r}C_3$ is

- A) ${}^{56}C_4$
- B) ${}^{56}C_3$
- C) ${}^{55}C_4$
- D) ${}^{55}C_3$

04) There is a rectangular sheet of dimension $(2m-1) \times (2n-1)$, (where $m > 0, n > 0$). It has been divided into square of unit area by drawing lines perpendicular to the sides. Find number of rectangles having sides of odd unit length



- A) m^2n^2
- B) 4^{m+n-2}
- C) $(m+n+1)^2$
- D) $mn(m+1)(n+1)$

05) How many words can be made from the letters of the word INSURANCE, if all vowels come together?

- A) 12780
- B) 18270
- C) 17280
- D) None of these

06) Seven people leave their bags outside temple and while returning after worshipping the deity, picked one bags each at random. Calculate in how many ways at least one end at most three of them get their correct bags?

- A) ${}^7C_3 \cdot 9 + {}^7C_5 \cdot 44 + {}^7C_1 \cdot 265$
- B) ${}^7C_6 \cdot 265 + {}^7C_5 \cdot 9 + {}^7C_7 \cdot 44$
- C) ${}^7C_5 \cdot 9 + {}^7C_2 \cdot 44 + {}^7C_1 \cdot 265$
- D) None of these

07) If n is number of necklaces which can be formed using 17 identical pearls and 2 identical diamonds and similarly, m is number of necklace which can be formed using 17 identical pearls and different diamonds, then

- A) $n = m = 18$
- B) $n = m = 9$
- C) $n = 9, m = 18$
- D) None of these

08) In a polygon no three diagonals are concurrent. If the total number of points of intersection of diagonal interior to the polygon be 70 then what is the number of diagonals of the polygon?

- A) 28
- B) 20
- C) 8
- D) None of these

09) If ${}^nP_r = 720 {}^nC_r$, then r is equal to

- A) 7
- B) 6
- C) 5
- D) 4

10) How many numbers lying between 999 and 10000 can be formed with the help of the digit 0,2,3,6,7,8 when the digits are not to be repeated

- A) 400
- B) 300
- C) 200
- D) 100

11) A box contains two white balls, three black balls and four red balls. In how many ways can three balls be drawn from the box if at least one black ball is to be included in the draw?

- A) 64
- B) 46
- C) 45
- D) None of these

12) The product of any r consecutive natural numbers is always divisible by

- A) r^2
 B) $r!$
 C) r^n
 D) None of these

13) The number of 4 digit numbers that can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7 so that each number contain digit 1 is

- A) 480
 B) 1225
 C) 1252
 D) 1522

14) In a plane there are 37 straight lines of which 13 pass through the point A and 11 pass through the point B. Besides no three lines pass through one point, no line passes through both points A and B and no two are parallel. Then the number of intersection points the lines have is equal to

- A) 728
 B) 601
 C) 535
 D) None of these

15) Number of ways of selection of 8 letters from 24 letters of which 8 are a, 8 are b and the rest unlike, is given by

- A) $10 \cdot 2^7$
 B) $8 \cdot 2^8$
 C) 2^7
 D) None of these

16) If $\alpha = {}^m C_2$, then ${}^\alpha C_2 = ?$

- A) ${}^{m+1} C_4$
 B) ${}^{m-1} C_4$
 C) $3 \times {}^{m+2} C_4$
 D) $3 \times {}^{m+1} C_4$

17) Out of 5 apples, 10 mangoes and 15 oranges, any 15 fruits are distributed among two persons. The total number of ways of distribution are

- A) 36
 B) 60
 C) 66
 D) None of these

18) Identify the number of 4- digit numbers that can be made with the digits 1, 2, 3, 4 and 5, in which at least two digits are identical.

- A) 600
 B) 505
 C) $4^5 - 5!$
 D) None of these

19) If $P(n, r) = 1680$ and $C(n, r) = 70$, then

- $69n + r! =$
 A) 625
 B) 576
 C) 256
 D) 128

20) The number of words which can be made out of the letters of the word MOBILE when consonants always occupy odd places is

- A) 720
 B) 36
 C) 30
 D) 20

21) What is the number of 4 -digit numbers that can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7 so that each number contains digit 1?

- A) 1252
 B) 1225
 C) 1522
 D) 480

22) A parallelogram is cut by two sets of m lines parallel to its sides. The number of parallelograms thus formed is

- A) $\left({}^{m+2} C_2\right)^2$
 B) $\left({}^m C_2\right)^2$
 C) $\left({}^{m+1} C_2\right)^2$
 D) None of these

23) The number of ways in which four letters of the word 'MATHEMATICS' can be arranged is given by

- A) 2454
 B) 1680
 C) 192
 D) 136

24) Let S be the set of all triangles in the xy -plane, each having one vertex at the origin and the other two vertices lie on coordinate axes with integral coordinates. If each triangle in S has area 50 sq. units, then what is the number of elements in the set S ?

- A) 36
 B) 9
 C) 18
 D) 32

25) Calculate the number of ways of choosing 3 squares from a chess board so that they have exactly one common vertex.

- A) 198
 B) 196
 C) 195
 D) 197

26) Eight chairs are numbered 1 to 8. Two women and three men wish to occupy one chair each. First the women choose the chairs from amongst the chairs marked 1 to 4 and then the men select the chairs from amongst the remaining. What is the number of possible arrangements?

- A) ${}^4 C_2 + {}^4 P_3$
 B) ${}^4 P_2 \times {}^4 P_3$
 C) ${}^6 C_3 \times {}^4 C_2$
 D) None of these

27) What is the number of different numbers that can be formed by using all the digits 1, 2, 3, 4, 3, 2, 1 so that odd digits always occupy the odd places?

28) What is the number of numbers greater than 1000 but not greater than 4000 that can be formed with the digits 0, 1, 2, 3, 4 repetition of digits being allowed?

29) Estimate the number of 5 digit numbers which are divisible by 4, with digits from the set {1, 2, 3, 4, 5} and the repetition of digits is allowed.

30) Find out how many ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order.

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