**Permutation and Combination**

**Choose the most appropriate option (a, b, c or d).**

Q 1. If nCr-1 = 56, nCr = 28 and nCr+1 = 8 then r is equal to

(a) 8 (b) 6 (c) 5 (d) none of these

Q 2. The value of 20C31 + is equal to

(a) 51C20 (b) 2.50C20 (c) 2.45C15 (d) none of these

Q 3. In a group of boys, the number of arrangements of 4 boys is 12 times the number of arrangements of 2 boys. The number of boys in the group is

(a) 10 (b) 8 (c) 6 (d) none of these

Q 4. The value of is

(a) 11P11 (b) 11P11 – 1 (c) 11P11 + 1 (d) none of these

Q 5. From a group of persons the number of ways of selecting 5 persons is equal to that of 8 persons. The number of persons in the group is

(a) 13 (b) 40 (c) 18 (d) 21

Q 6. The number of distinct rational numbers x such that 0 < x < 1 and x = , where p, q ∈ {1, 2, 3, 4, 5, 6}, is

(a) 15 (b) 13 (c) 12 (d) 11

Q 7. The total number of 9-digit numbers of different digits is

(a) 10(9!) (b) 8(9!) (c) 9(9!) (d) none of these

Q 8. The number of 6-digit numbers that can be made with the digits 0, 1, 2, 3, 4 and 5 so that even digits occupy odd places, is

(a) 24 (b) 36 (c) 48 (d) none of these

Q 9. The number of ways in which 6 men can be arranged in a row so that three particular men are consecutive, is

(a) 4P4 (b) 4P4 × 3P3 (c) 3P3 × 3P3 (d) none of these

Q 10. Seven different lectures are to deliver lectures in seven periods of a class on a particular day. A, B and C are three of the lectures. The number of ways in which a routine for the day can be made such that A delivers his lecture before B, and B before C, is

(a) 420 (b) 120 (c) 210 (d) none of these

Q 11. The total number of 5-digit numbers of different digits in which the digit in the middle is the largest is

(a)  (b) 33(3!) (c) 30(3!) (d) none of these

Q 12. A 5-digit number divisible by 3 is to be formed using the digits 0, 1, 2, 3, 4 and 5 without repetition. The total number of ways in which this can be done is

(a) 216 (b) 600 (c) 240 (d) 3125

Q 13. Let A = {x | x is a prime number and x < 30}. The number of different rational numbers whose numerator and denominator belong to A is

(a) 90 (b) 180 (c) 91 (d) none of these

Q 14. The total number of ways in which six ‘+’ and four ‘−’ signs can be arranged in a line such that no two ‘−’ signs occur together is

(a)  (b)  (c) 35 (d) none of these

Q 15. The total number of words that can be made by writing the letters of the word PARAMETER so that no vowel is between two consonants is

(a) 1440 (b) 1800 (c) 2160 (d) none of these

Q 16. The number of numbers of four different digits that can be formed from the digits of the number 12356 such that the numbers are divisible by 4, is

(a) 36 (b) 48 (c) 12 (d) 24

Q 17. Let S be the set of all functions from the set A to the set A. If n(A) = k then n(S) is

(a) k! (b) kk (c) 2k – 1 (d) 2k

Q 18. Let A be the set of 4-digit numbers a1a2a3a4 where a1 > a2 > a3 > a4 then n(A) is equal to

(a) 126 (b) 84 (c) 210 (d) none of these

Q 19. The number of numbers divisible by 3 that can be formed by four different even digits is

(a) 18 (b) 36 (c) 0 (d) none of these

Q 20. The number of 5-digit even number that can be made with the digit 0, 1, 2 and 3 is

(a) 384 (b) 192 (c) 768 (d) none of these

Q 21. The number of 4-digit numbers that can be made with the digit 1, 2, 3, 4 and 5 in which at least two digits are identical, is

(a) 45 − 5! (b) 505 (c) 600 (d) none of these

Q 22. The number of words that can be made by rearranging the letters of the word APURBA so that vowels and consonants alternate is

(a) 18 (b) 35 (c) 36 (d) none of these

Q 23. The number of words that can be made by writing down the letters of the word CALCULATE such that each word starts and ends with a constant, is

(a)  (b)  (c) 2(7!) (d) none of these

Q 24. The number of numbers of 9 different nonzero digits such that all the digits in the first four places are less than the digit in the middle and all the digits in the last four places are greater than that in the middle is

(a) 2(4!) (b) (4!)2 (c) 8! (d) none of these

Q 25. In the decimal system of numeration the number of 6-digit numbers in which the digit in any place is greater than the digit to the left of it is

(a) 210 (b) 84 (c) 126 (d) none of these

Q 26. The number of 5-digit numbers in which no two consecutive digits are identical is

(a) 92 × 83 (b)

Q 27. In the decimal system of numeration the number of 6-digit numbers in which the sum of the digits is divisible by 5 is

(a) 180000 (b) 540000 (c) 5 × 105 (d) none of these

Q 28. The sum of all the numbers of four different digits that can be made by using the digits 0, 1, 2 and 3 is

(a) 26664 (b) 39996 (c) 38664 (d) none of these

Q 29. A teacher takes 3 children from her class to the zoo at a time as often as she can, but she does not take the same three children to the zoo more than once. She finds that she goes to the zoo 84 times more than a particular child goes to the zoo. The number of children in her class is

(a) 12 (b) 10 (c) 60 (d) none of these

Q 30. ABCD is a convex quadrilateral. 3, 4, 5 and 6 points are marked on the sides AB, CD and DA respectively. The number of triangles with vertices on different sides is

(a) 270 (b) 220 (c) 282 (d) none of these

Q 31. There are 10 points in a plane of which no three points are collinear and 4 points are concyclic. The number of different circles that can be drawn through at least 3 points of these points is

(a) 116 (b) 120 (c) 117 (d) none of these

Q 32. In a polygon the number of diagonals is 54. The number of sides of the polygon is

(a) 10 (b) 12 (c) 9 (d) none of these

Q 33. In a polygon no three diagonals are concurrent. If the total number of points of intersection of diagonals interior to the polygon be 70 then the number of diagonals of polygon is

(a) 20 (b) 28 (c) 8 (d) none of these

Q 34. n lines are drawn in a plane such that no two of them are parallel and no three of them are concurrent. The number of different points at which these lines will cut is

(a)  (b) n(n -1) (c) n2 (d) none of these

Q 35. The number of triangles that can be formed with 10 points as vertices, n of them being collinear, is 110. Then n is

(a) 3 (b) 4 (c) 5 (d) 6

Q 36. There are three coplanar parallel lines. If any p points are taken on each of the lines, the maximum number of triangles with vertices at these points is

(a) 3p2(p – 1) + 1 (b) 3p2(p – 1) (c) p2(4p – 3) (d) none of these

Q 37. Two teams are to play a series of 5 matches between them. A match ends in a win or loss or draw for a team. A number of people forecast the result of each match and no two people make the same forecast for the series of matches. The smallest group of people in which one person forecasts correctly for all the matches will contain n people, where n is

(a) 81 (b) 243 (c) 486 (d) none of these

Q 38. A bag contains 3 black, 4 white and 2 red balls, all the balls being different. The number of selections of at most 6 balls containing balls of all the colours is

(a) 42(4!) (b) 26 × 4! (c) (26 – 1)(4!) (d) none of these

Q 39. In a room there are 12 bulbs of the same wattage, each having a separate switch. The number of ways to light the room with different amounts of illumination is

(a) 122 – 1 (b) 212 (c) 212 – 1 (d) none of these

Q 40. In an examination of 9 papers a candidate has to pass in more papers than the number of papers in which he fails in order to be successful. The number of ways in which he can be unsuccessful is

(a) 255 (b) 256 (c) 193 (d) 319

Q 41. The number of 5-digit numbers that can be made using the digits 1 and 2 and in which at least one digit is different, is

(a) 30 (b) 31 (c) 32 (d) none of these

Q 42. In a club electron the number contestants is one more than the number of maximum candidates for which a voter can vote. If the total number of ways in which a voter can be 62 then the number of candidates is

(a) 7 (b) 5 (c) 6 (d) none of these

Q 43. The total number of selections of at most n things from (2n + 1) different things is 63. Then the value of n is

(a) 3 (b) 2 (c) 4 (d) none of these

Q 44. Let 1 ≤ m < n ≤ p. The number of subsets of the set A = {1, 2, 3,….., p} having m, n as the least and the greatest elements respectively, is

(a) 2n-m-1 – 1 (b) 2n-m-1 (c) 2n-m (d) none of these

Q 45. The number of ways in which n different prizes can be distributed among m(<n) persons if each is entitled to receive at most n – 1 prizes, is

(a) nm – n (b) mn (c) mn (d) none of these

Q 46. The number of possible outcomes in a throw of n ordinary dice in which at least one of the dice shows an odd number is

(a) 6n – 1 (b) 3n – 1 (c) 6n – 3n (d) none of these

Q 47. The number of different 6-digit numbers that can be formed using the three digits 0, 1 and 2 is

(a) 36 (b) 2 × 35 (c) 35 (d) none of these

Q 48. The number of different matrices that can be formed with elements 0, 1, 2 or 3 each matrix having 4 elements, is

(a) 3 × 24 (b) 2 × 44 (c) 3 × 44 (d) none of these

Q 49. Let A be a set of n(≥3) distinct elements. The number of triplets (x, y, z) of the elements of A in which at least two coordinates are equal is

(a) nP3 (b) n3 – nP3 (c) 3n2 – 2n (d) 3n2(n – 1)

Q 50. The number of different pairs of word () that can be made with the letters of the word STATICS is

(a) 828 (b) 1260 (c) 396 (d) none of these

Q 51. Total number of 6-digit numbers in which all the odd digits and only odd digits appear, is

(a)  (b) 6! (c)  (d) none of these

Q 52. The number of divisors of the form 4n + 2 (n ≥ 0) of the integer 240 is

(a) 4 (b) 8 (c) 10 (d) 3

Q 53. In the next World Cup of cricket there will be 12 teams, divided equally in two groups. Teams of each group will play a match against each other. From each group 3 top teams will quality for the next round. In this round each team will play against others once. Four top teams of this round will qualify for the semifinal round, where each team will play against the others once. Two top teams of this round will go to the final round, where they will play the best of three matches. The minimum number of matches in the next World Cup will be

(a) 54 (b) 53 (c) 38 (d) none of these

Q 54. The number of different ways in which 8 persons can stand in a row so that between two particular person A and B there are always two persons, is

(a) 60(5!) (b) 15(4!) × (5!) (c) 4! × 5! (d) none of these

Q 55. Four couples (husband and wife) decide to form a committee of four members. The number of different committees that can be formed in which no couple finds a place is

(a) 10 (b) 12 (c) 14 (d) 16

Q 56. From 4 gentlemen and 6 ladies a committee of five is to be selected. The number of ways in which the committee can be formed so that gentlemen are in majority is

(a) 66 (b) 156 (c) 60 (d) none of these

Q 57. There are 20 questions in a question paper. If no two students solve the same combination of questions but solve equal number of questions then the maximum number of students who appeared in the examination is

(a) 20C9 (b) 20C11 (c) 20C10 (d) none of these

Q 58. Nine hundred distinct n-digit positive numbers are to be formed using only the digits 2, 5 and 7. The smallest value of n for which this is possible is

(a) 6 (b) 7 (c) 8 (d) 9

Q 59. The total number of integral solutions for (x, y, z) such that xyz = 24 is

(a) 36 (b) 90 (c) 120 (d) none of these

Q 60. The number of ways in which the letters of the word ARTICLE can be rearranged so that the even places are always occupied by consonants is

(a) 576 (b) 4C3 × (4!) (c) 2(4!) (d) none of these

Q 61. A cabinet of ministers consists of 11 ministers, one minister being the chief minister. A meeting is to be held in a room having a round table and 11 chairs round it, one of them being meant for the chairman. The number of ways in which the ministers can take their chairs, the chief minister occupying the chairman’s place, is

(a)  (b) 9! (c) 10! (d) none of these

Q 62. The number of ways in which a couple can sit around a table with 6 guests if the couple take consecutive seats is

(a) 1440 (b) 720 (c) 5040 (d) none of these

Q 63. The number of ways in which 20 different pearls of two colours can be set alternately on a necklace, there being 10 pearls of each colour, is

(a) 9! × 10! (b) 5(9!)2 (c) (9!)2 (d) none of these

Q 64. If r > p > q, the number of different selections of p + q things taking r at a time where p things are identical and q other things are identical, is

(a) p + q – r (b) p + q – r + 1 (c) r – p – q + 1 (d) none of these

Q 65. There are 4 mangoes, 3 apples, 2 oranges and 1 each of 3 other verieties of fruits. The number of ways of selecting at least one fruit of each king is

(a) 10! (b) 9! (c) 4! (d) none of these

Q 66. The number of proper divisors of 2p . 6q . 15r is

(a) (p + q + 1)(q + r + 1)(r + 1) (b) (p + q + 1)(q + r + 1)(r + 1) – 2

(c) (p + q)(q + r)r – 2 (d) none of these

Q 67. The number of proper divisors of 1800 which are also divisible by 10, is

(a) 18 (b) 34 (c) 27 (d) none of these

Q 68. The number of odd proper divisors of 3p . 6m . 21n is

(a) (p + 1)(m + 1)(n + 1) – 2 (b) (p + m + n + 1)(n + 1) – 1

(c) (p + 1)(m + 1)(n + 1) – 1 (d) none of these

Q 69. The number of even proper divisors of 1008 is

(a) 23 (b) 24 (c) 22 (d) none of these

Q 70. In a test there were n questions. In the test 2n-i students gave wrong answers to i questions where i = 1, 2, 3,….., n. If the total number of wrong answers given is 2047 then n is

(a) 12 (b) 11 (c) 10 (d) none of these

Q 71. The number of ways to give 16 different things to three persons A, B, C so that B gets 1 more than A and C gets 2 more than B, is

(a)  (b) 4! 5! 7! (c)  (d) none of these

Q 72. The number of ways to distribute 32 different things equally among 4 persons is

(a)  (b)  (c)  (d) none of these

Q 73. If 3n different things can be equally distributed among 3 persons in k ways then the number of ways to divide the 3n things in 3 equal groups is

(a) k × 3! (b)  (c) (3!)k (d) none of these

Q 74. In a packet there are m different books, n different pens and p different pencils. The number of selections of at least one article of each type from the packet is

(a) 2m+n+p – 1 (b) (m + 1)(n + 1)(p + 1) −1

(c) 2m+n+p (d) none of these

Q 75. The number of 6-digit numbers that can be made with the digits 1, 2, 3 and 4 and having exactly two pairs of digits is

(a) 480 (b) 540 (c) 1080 (d) none of these

Q 76. The number of words of four letters containing equal number of vowels and consonants, repetition being allowed, is

(a) 1052 (b) 210 × 243 (c) 105 × 243 (d) none of these

Q 77. The number of ways in which 6 different balls can be put in two boxes of different sizes so that no box remains empty is

(a) 62 (b) 64 (c) 36 (d) none of these

Q 78. A shopkeeper selling three varieties of perfumes and he has a large number of bottles of the same size of each variety in his stock. There are 5 places in a row in his showcase. The number of different ways of displaying the three varieties of perfumes in the show case is

(a) 6 (b) 50 (c) 150 (d) none of these

Q 79. The number of arrangements of the letters of the word BHARAT taking 3 at a time is

(a) 72 (b) 120 (c) 14 (d) none of these

Q 80. The number of ways to fill each of the four cells of the table with a distinct natural number such that the sum of the number is 10 and the sums of the numbers placed diagonally are equal, is

(a) 2! × 2! (b) 4!

(c) 2(4!) (d) none of these

Q 81. In the figure, two 4-digit numbers are to be formed by filling the places with digits. The number of different ways in which the places can be filled by digits so that the sum of the numbers formed is also a 4-digit number and in no place the addition is with carrying, is

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(a) 554 (b) 220 (c) 454 (d) none of these

Q 82. The number of positive integral solutions of x + y + z = n, n ∈ N, n ≥ 3, is

(a) n-1C2 (b) n-1P2 (c) n(n – 1) (d) none of these

Q 83. The number of non-negative integral solutions of a + b + c + d = n, n ∈ N, is

(a) n+3P2 (b)  (c) n-1Cn-4(d) none of these

Q 84. The number of points (x, y, z) in space, whose each coordinate is a negative integer such that x + y + z + 12 = 0, is

(a) 385 (b) 55 (c) 110 (d) none of these

Q 85. If a, b, c are three natural number in AP and a + b + c = 21 then the possible number of values of the ordered triplet (a, b, c) is

(a) 15 (b) 14 (c) 13 (d) none of these

Q 86. If a, b, c, d are odd natural number such that a + b + c + d = 20 then the number of values of the ordered quadruplet (a, b, c, d) is

(a) 165 (b) 455 (c) 310 (d) none of these

Q 87. If x, y, z are integers and x ≥ 0, y ≥ 1, z ≥ 2, x + y + z = 15 then the number of values of the ordered triplet (x, y, z) is

(a) 91 (b) 455 (c) 17C15 (d) none of these

Q 88. If a, b, c are positive integers such that a + b + c ≤ 8 then the number of possible values of the ordered triplet (a, b, c) is

(a) 84 (b) 56 (c) 83 (d) none of these

Q 89. The number of different ways of distributing 10 marks among 3 questions, each question carrying at least 1 mark, is

(a) 72 (b) 71 (c) 36 (d) none of these

Q 90. The number of ways to give away 20 apples to 3 boys, each boy receiving at least 4 apples, is

(a) 10C8 (b) 90 (c) 22C20 (d) none of these

Q 91. The position vector of a point P is , where x ∈ N, y ∈ N, z ∈ N and . If , the number of possible positions of P is

(a) 36 (b) 72 (c) 66 (d) none of these

**Choose the correct options. One or more options may be coorect.**

Q 92. If P = n(n2 – 12)(n2 – 22)(n2 – 32) …. (n2 – r2), n > r, n ∈ N, then P is divisible by

(a) (2r + 2)! (b) (2r – 1)! (c) (2r + 1)! (d) none of these

Q 93. If n+5Pn+1 = . n+3Pnthen value of n is

(a) 7 (b) 8 (c) 6 (d) 5

Q 94. If nC4, nC5 and nC6 are in AP then n is

(a) 8 (b) 9 (c) 14 (d) 7

Q 95. The product of r consecutive integers is divisible by

(a) r (b)  (c) r! (d) none of these

Q 96. There are 10 bags B1, B2, B3,….., B10, which contain 21, 22, ….., 30 different articles respectively. The total number of ways to bring out 10 articles from a bag is

(a) 31C20 – 21C10 (b) 31C21 (c) 31C20 (d) none of these

Q 97. If the number of arrangements of n – 1 things taken from n different things is k times the number of arrangements of n – 1 thing taken from n things in which two things are identical then value of k is

(a)  (b) 2 (c) 4 (d) none of these

Q 98. Kanchan has 10 friends among whom two are married to each other. She wishes to invite 5 of them for a party. If the married couple refuse to attend separately then the number of different ways in which she can invite friends is

(a) 8C5 (b) 2 × 8C3 (c) 10C5 − 2 × 8C4 (d) none of these

Q 99. In a plane there are two families of lines y = x + r, y = -x + r, where r ∈ {0, 1, 2, 3, 4}. The number of squares of diagonals of the length 2 formed by the lines is

(a) 9 (b) 16 (c) 25 (d) none of these

Q 100. There are n seats round a table numbered 1, 2, 3, …., n. The number of ways in which m(≤n) persons can take seats is

(a) nPm (b) nCm × (m – 1)! (c) n-1Pm-1 (d) nCm × m!

Q 101. Let and let be a variable vector such that are positive integers. If ≤ 12 then the number of values of is

(a) 12C9 –1 (b) 12C3 (c) 12C9 (d) none of these

Q 102. The total number of ways in which a beggar can be given at least one rupee from four 25-paisa coins, three 50-paisa coins and 2 one-rupee coins, is

(a) 54 (b) 53 (c) 51 (d) none of these

Q 103. For the equation x + y + z + w = 19, the number of positive integral solutions is equal to

(a) the number of ways in which 15 identical things can be distributed among 4 persons

(b) the number of ways in which 19 identical things can be distributed among 4 persons

(c) coefficient of x19 in (x0 + x1 + x2 + ….. + x19)4 (b) coefficient of x19 in (x + x2 + x3 +…..+ x19)4

**1b 2a 3c 4b 5a 6d 7c 8a 9b 10d**

**11d 12a 13c 14c 15b 16a 17b 18c 19b 20a**

**21b 22c 23a 24b 25b 26c 27a 28c 29b 30d**

**31c 32b 33a 34a 35c 36c 37b 38a 39c 40b**

**41a 42c 43a 44b 45d 46c 47b 48c 49c 50b**

**51a 52a 53b 54a 55d 56a 57c 58b 59c 60a**

**61c 62a 63b 64b 65c 66b 67a 68b 69a 70b**

**71a 72b 73b 74a 75c 76b 77a 78c 79a 80d**

**81d 82a 83b 84b 85c 86a 87a 88b 89c 90a**

**91a 92bc 93ac 94cd 95abc 96a 97b 98bc 99a 100ad**

**101bc 102a 103ad**