

Permutations & Combinations

◆ Arrangements

1. The number of ways in which 8 persons can be stand in the row so that between two particular persons A and B there are always two persons is _____
 (A) $20 \times 4! \times 6p_2$ (B) $5 \times 4! \times 6p_2$ (C) $6p_2 \times 4! \times 4$ (D) None
2. 10 persons are sitting in row the number of ways of selecting 4 persons so that no two of them are consecutive is _____
 (A) 10_{C_3} (B) 10_{C_2} (C) 7_{C_4} (D) 7_{C_2}
3. Ten persons, amongst whom A, B and C to speak at a function the number of ways in which it can be done, if A wants to speak before B and B wants to before C is _____
 (A) $\frac{10!}{3!}$ (B) $3! \cdot 7!$ (C) 10_{C_3} (D) None
4. Find the number of ways in which 9 speakers $\{S_1, S_2, S_3, \dots, S_9\}$ can address an assembly such that
 (A) S_1 and S_2 speak together is $8! \cdot 2!$ ways
 (B) S_1 speaks just before S_2 is $8!$ ways
 (C) S_1 speaks before S_2 is 9P_7
 (D) S_1 speaks before S_2 and S_2 before S_3 is 9P_6
5. The number of ways of different words that can be formed using all the letters of the word "SHASHANK" such that in any word vowels are separated by atleast two consonants is
 (A) 2700 (B) 3600 (C) $\frac{8 \times 6!}{3!2!} \times 4$ (D) $8! \cdot \frac{3!}{2}$
6. There are 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 the chairs marked from 1 to 4 and then the man select the chairs from the remaining, then the number of ways of arrangements is _____
 (A) $4_{C_2} \cdot 2! \cdot 6p_3$ (B) $4p_2 \cdot 6p_2$ (C) $4p_2 \cdot 6p_4$ (D) None
7. The letters of the word "RANDOM" are arranged in all possible ways, such that the number of arrangements in which these are exactly two letters between R and D is ____
 (A) $4p_2 \times 3!$ (B) $4_{C_2} \cdot 3!$ (C) $6p_2 \times 3!$ (D) $6_{C_3} \cdot 2!$
8. There are 9 candidates for an examination out of which 3 are appearing in mathematics and remaining 6 are appearing in different subjects. The number of ways they can be seated in a row so that no two mathematics candidates are together is
 (A) $6p_3 \cdot 7!$ (B) $6! \times 7p_3$ (C) $8p_3 \cdot 9!$ (D) None

9. In how many ways can 5 plus (+) signs and 5 minus (-) signs be arranged in a row so that
 (A) If all -ve signs are together is 6 ways
 (B) If all +ve signs are together and -ve signs are together is 2 ways
 (C) If no two -ve signs are together is ways
 (D) None of these
10. Eighteen guests have to be seated half on each side of a long table four particular guests desire to sit on one particular side and three on the other side. The number of sitting arrangements is
 (A) ${}^9C_4 \cdot {}^9C_3 \cdot 12!$ (B) $9p_4 \cdot 9p_3 \cdot 11!$ (C) $18p_4 \cdot 14p_3 \cdot 11!$ (D) None
11. The number of ways in which 4 married couples can be seated such that four persons are on left side and four are on right side of a long table and no wife in front of her husband and same gender persons do not sit opposite to each other is
 (A) 1144 (B) $144/4$ (C) 782 (D) $({}^{2C_1})^4 \cdot 4!$
12. Nine boys and 3 girls are to be seated in 2 vans each having numbered seat 3 in the front and 4 at the back. The number of ways of seating arrangements, if the girls should sit together in back rows on adjacent seats is
 (A) $7!$ (B) $12!$ (C) $12p_7$ (D) $12C_3 \times 6p_2$
13. A boat is to be manned by 8 men, four on stroke and four on row side the number of ways in which they can be arranged from a group of 12 men of whom 3 can row on stroke side only is _____
 (A) $14 \times 9!$ (B) $13 \times 8!$ (C) 180 (D) $12 \times 9!$
14. Nine chairs in a row are to be occupied by six students and professors α , β and γ these three professors arrive before six students and decide to choose their chairs so that each professor will be between two students. In how many ways can professors α, β, γ choose their seats before students arrived is _____
 (A) 60 (B) 80 (C) 55 (D) 45
15. Find the number of ways in which 15 peoples (including 5 senior citizens) can be seated on 10 chairs arranged in a row. So that all senior citizens are always occupying the chair is
 (A) ${}^{10}P_5 \cdot {}^{10}P_5 \cdot 5!$ ways (B) ${}^{10}P_5 \cdot {}^9P_5 \cdot 4!$ ways (C) ${}^9P_5 \cdot {}^9P_5 \cdot 4!$ ways (D) none of these
16. How many four digit numbers can be formed using the digits 1,2,3,4,5. Such that at least one of the digit is repeated
 (A) $4^5 - 4!$ (B) $5^4 - 5!$ (C) $5^4 - 4!$ (D) None
17. 10 different letters of an alphabetical are given words with five letters formed from the given letters. The number of words which have at least one letter is repeated

(A) $10^5 - 10p_5$ (B) $5^{10} - 10p_5$ (C) $10p_5 - 10$ (D) None

18. The number of ways 3 distinct prizes be given to four boys such that no boy gets all the prizes is

(A) $4^3 - 4$ (B) $3^4 - 3$ (C) $3^4 - 4$ (D) $4^3 - 3$

19. The number of ways 10 different prizes can be distributed among 6 people so that every person almost 9 prizes is

(A) $6^{10} - 6$ (B) $10^6 - 6$ (C) $6^6 - 10$ (D) $10^{10} - 6$

◆ Problems in Digits

20. The number of integers between 1 and 10000 with atleast one 8 and atleast one 9 as digits is _____

(A) 974 (B) 984 (C) 994 (D) 894

21. The number of 7 digit numbers whose sum of the digits is 61 is _____

(A) 28 (B) 30 (C) 32 (D) 36

22. The number of ways of selecting 3 elements subsets of the set $\{1, 2, 3, \dots, 25\}$ such that the elements form a G.P with integer common ratio is

(A) 10 (B) 11 (C) 12 (D) 14

23. If a, b, c be three natural numbers in A.P $a + b + c = 30$, then possible number of value of a, b, c is/are

(A) 19 (B) 20 (C) 18 (D) 21

24. The number of ways in which three distinct numbers can be selected from the set $\{3, 3^2, 3^3, \dots, 3^{100}, 3^{101}\}$. So that they form a G.P is

(A) 2500 (B) 2101 (C) 2601 (D) 1000

25. The number of ways two distinct natural numbers can be selected which are less than or equal to 100 and differ by atmost 10 is

(A) $100_{C_2} - 90_{C_2}$ (B) $100_{C_2} - 92_{C_2}$ (C) $100_{C_2} - 98_{C_2}$ (D) None of them

26. Number of five digit integers, with sum of the digits equal to 43 are

(A) 16 (B) 15 (C) 10 (D) 12

27. The total number of three digit numbers the sum of whose digits is even is equal to

(A) 450 (B) 425 (C) 445 (D) 435

28. The number of integers that can be formed by using all digits from $\{1, 2, 3, 4, 3, 2, 1\}$, so that odd digits occupy odd places is

(A) 18 (B) 20 (C) 22 (D) 24

29. The number of 4 digit numbers that can be formed by using the digits $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, such that the least digit used is 4, where repetition of digits is allowed.

(A) 617 (B) 671 (C) 716 (D) 761

30. How many numbers between 100 and 1000 are there such that atleast one these digit is 7
 (A) 252 (B) 250 (C) 253 (D) 254
31. How many numbers are there between 100 and 1000, such that every digit is either 2 or 9
 (A) 8 (B) 12 (C) 10 (D) 9
32. The number of six digit number in which digits are in ascending order must be
 (A) 9_{C_6} (B) 9_{C_5} (C) 9_{C_8} (D) 9_{C_7}
33. The number of integers from 1 to 10^5 which contain exactly one 3, exactly one 4 and exactly one 5 must be
 (A) 2940 (B) 2490 (C) 2094 (D) 2409
34. How many integers between 1 and 1000000 have the sum of the digits 18 is ____
 (A) 25927 (B) 50002 (C) 35002 (D) 26927
35. The number of six digit numbers in which exactly 2 digits are even must be
 (A) 14×5^6 (B) 17×5^6 (C) 21×5^6 (D) 18×5^6
36. How many numbers greater than a million can be formed by using digits {0,1,2,2,3,3,3} is
 (A) 340 (B) 360 (C) 380 (D) 375
37. How many seven digit even numbers less than 3000000 can be formed by using digits {1,2,2,3,6,7,7} is ____
 (A) 210 (B) 310 (C) 215 (D) 315
38. The number of four digit numbers greater than 4321 that can be formed from the digits 0,1,2,3,4,5 with repetition of digits is
 (A) 310 (B) 360 (C) 300 (D) 330
39. The number of three digit numbers of the form $x > y > z$ is
 (A) 130 (B) 120 (C) 100 (D) 450
40. The total number of six digit numbers $x_1x_2x_3x_4x_5x_6$ having the property that $x_1 < x_2 \leq x_3 < x_4 < x_5 \leq x_6$, is equal to
 (A) 10_{C_6} (B) 12_{C_6} (C) 11_{C_6} (D) None of these
41. The number of 3 digit numbers in the form not xyz such that $x < y$ and $z \leq y$ is
 (A) 276 (B) 275 (C) 245 (D) 242
42. The number of triplets (x, y, z) of positive integers satisfying $2^x + 2^y + 2^z = 2336$ is
 (A) 6 ways (B) 9 ways (C) $6!$ ways (D) $9!$ ways
43. Let A be the set of 4 digit number $a_1a_2a_3a_4$ where $a_1 > a_2 > a_3 > a_4$ then $n(A)$ is =
 (A) 136 (B) 84 (C) 210 (D) None
44. In how many ways can three numbers be selected from the numbers {1,2,3,4,...,300} such that their sum is divisible by 3 is

(A) 100_{C_3} (B) $(100_{C_1})^3 + 3 \cdot 100_{C_3}$ (C) $(100_{C_3})^3$ (D) None

45. The numbers x and y are selected simultaneously from the set $\{1,2,3,4,\dots,30\}$. The number of ways in which the selection can be made so that $x^2 - y^2$ is divisible by 3 is
 (A) 235 (B) 105 (C) 115 (D) 215
46. Two numbers 'a' and 'b' are to be chosen from the set $\{1,2,3,\dots,3n\}$ with repetition allowed. The number of ways of selecting integers such that $|a^2 - b^2|$ is divisible by 3 is
 (A) $5n^2$ (B) $3n^2$ (C) $3n_{C_1}$ (D) $(3n_{C_1})^2$
47. A five digit number divisible by 3 is to be formed by using the digits 0,1,2,3,4,5, without repetition. The number of ways this can be done is
 (A) 216 (B) 220 (C) 214 (D) 215
48. Find the number of 5, digit numbers divisible by 4 using digits 1,2,3,4,5,6,7,8. When with repetition is
 (A) 8192 (B) 8193 (C) 8319 (D) 8913
49. The number of four digit numbers that can be made with the digits $\{1,2,3,4,5\}$. Which are divisible by 5 and in which at least two digits are identical is ____
 (A) 108 (B) 101 (C) 102 (D) 107
50. The number of all four digit number which are divisible by 4 that can be formed the digits $\{1,2,3,4,5\}$ is
 (A) 125 (B) 95 (C) 105 (D) 135
51. A five digit number is formed by the digits $\{1,2,3,4,5\}$ without repetition, the number of the numbers. Thus formed which are divisible by 4 is ____
 (A) 24 (B) 30 (C) 44 (D) 36
52. If a seven digit number made up of all distinct digits 8,7,6,4,2. x and y is divisible by 3. Then minimum of $x + y$ is
 (A) 3 (B) 1 (C) 2 (D) 4
53. The number of 4 digit number that can be formed by using the digits 1,2,3,4,5,6 that are divisible by 3, when repetition allowed is
 (A) 342 (B) 243 (C) 432 (D) 324
54. A five digit number divisible by 3 is to be formed using the digits $\{0,1,2,3,4,5\}$ without repetition of digits, the total number of ways in which this can be done
 (A) 24 (B) 30 (C) 216 (D) 35
55. A five digit number divisible by 6 using digits $\{0,1,2,3,4,5\}$, without repetition of digits. The total number of ways in which this can be done
 (A) 108 (B) 110 (C) 109 (D) 107
56. The number of six digits numbers that can be made with the digits 1,2,3 and 4 and having exactly two pairs of digits is ____

- (A) 1080 (B) 1040 (C) 1020 (D) 1060
57. The number of different 7 digit numbers that can be written only the three digits 1, 2 and 3 with condition that the digit 2 occurs twice in each number is
 (A) $7_{C_2} \cdot 2^5$ (B) $7_{C_3} \cdot 2^5$ (C) $7_{C_4} \cdot 3^5$ (D) None
58. The total number of three digit numbers, the sum of whose digits is even is EQUAL to
 (A) 450 (B) 500 (C) 1500 (D) 300
59. The total number of 5 digit numbers of different digits in which the digit in the middle is the largest is
 (A) $\sum_{n=4}^9 n_{P_4}$ (B) $33(3!)$ (C) $30(3!)$ (D) $\sum_{n=4}^9 (n_{P_4} - {}^{n-1}P_3)$
60. The number of times the digit 5 will be written while listing the integers from 1 to 1000 is
 (A) 270 (B) 330 (C) 300 (D) 290

◆ Circular Permutations

61. The number of ways four boys can be seated around table in four chairs of different colours is _____
 (A) 6 (B) 24 (C) 12 (D) 23
62. How many ways 5 boys and 4 girls can be seated at a round table if choose correct option(s)
 (A) There is no restrictions – 8!
 (B) All the girls sit together $4!.5!$
 (C) All the girls do not sit together $4!.{}^5P_4$
 (D) No two girls sit together $8! - 4!.5!$
63. Six persons A,B,C,D,E,F are to be seated at a circular table. The number of ways this can be done if A must have either B or C on his right and 13 must have either C or D on his right is
 (A) $\frac{3! 3!}{2}$ (B) 36 (C) 38 (D) $4! 3!$
64. Five persons A, B, C, D and E are to be seated in a circular arrangement, if each of them is given a hat of one of the three colours red, blue and green, then the number of ways of distributing the hats such that the person seated in adjacent seat gets different coloured hats is
 (A) 20 (B) 30 (C) 22 (D) 32
65. The number of ways in which five boys and three girls sit around a table such that there is a girls by the side of every boy is _____
 (A) $5!.3!$ (B) 1720 (C) $4! 3!$ (D) $6! 5!$

66. The number of ways in which 6 men and 3 ladies be seated round table so that every man may have a lady by his side is ____
 (A) 1480 (B) $5!.2!.3!$ (C) 720 (D) 1080
67. 3 boys and 3 girls are to be seated a round table in a circle. Among them the
 Boys X : does not want girl neighbor
 Girl Y : does not want any boy neighbor
 How many such arrangements are possible
 (A) 4 (B) 6 (C) 3 (D) 2
68. A and B stand in a ring with 10 other persons such that the number of ways arrange there are just three persons between A and B stands is ____
 (A) $10_{C_3}.7!$ (B) $10_{C_3}.3! \times 7! \times 2!$ (C) $10_{C_3}.7!$ (D) $10p_3.7!$
69. 20 persons are to be seated around circular table, out of these 20 two are brothers then the number of arrangements in which there will be atleast three persons between the brothers is ____
 (A) $13 \times 18!$ (B) $19 \times 13!$ (C) $18 \times 13!$ (D) None
70. There are two Indian couples, two American couples and one unmarried (Pakistan) person, such that the number of ways in which they can sit around a circular table. Such that an Indian wife and An American wife are always on either side of the unmarried person is ____
 (A) 5760 (B) 5660 (C) 5680 (D) 5690
71. A host invites 20 persons for a party the number of ways they can be seated at a circular table. Such that two particular persons be seated on either side of the host is
 (A) $19 \times 2!$ (B) $18 \times 2!$ (C) $20!$ (D) $19 \times 3!$
72. The number of ways of painting the six faces of a cube with six different given colours is
 (A) 30 (B) $6!$ (C) $\frac{6!}{2}$ (D) $5! \cdot 2!$
73. There are four girls and five boys of different ages two of girls younger than all boys and the other two girls are older than all boys. The number of ways in which all of them can be seated a circular table so that neither the two younger girls at together nor the two older girls sit together is ____ ways
 (A) 23040 (B) 2040 (C) 2430 (D) None
74. There are 20 boys seated around a circle. The number of ways to select four boy such that be odd number of boys left over between any two consecutively selected boys is equal to
 (A) 420 (B) 360 (C) 480 (D) 540

75. The number of ways in which five boys and five girls can be seated on a circle alternately if a particular B_1 and G_1 are never adjacent to each other in any arrangement is
 (A) 1780 (B) $(4!)^2 \cdot 3_{C_1}$ (C) 1760 (D) $(4!) \cdot 4_{C_1}$
76. 'n' different things are arranged in a circle. In how many ways can three objects be selected if
 (A) All the three objects are consecutive is 'n' ways
 (B) Atleast two of the objects are consecutive is $n(n-3)$ ways
 (C) no. two objects are consecutive is ${}^nC_3 - n(n-3)$ ways
 (D) None of these
77. There are 20 points $\{A_1, A_2, \dots, A_{20}\}$ on a circle. The number of ways of selecting 4 points such that there are atleast two points in between any two selected points is
 (A) $20 \cdot 11_{C_5}$ (B) $20 \times \frac{11}{3}$ (C) $\frac{20 \cdot 11_{C_3}}{4}$ (D) None
78. Five persons A, B, C, D and E are in a circular arrangement. If each of them is given a hat of one of the three colors Red, blue and green then the number of ways of distributing the hats such that the persons seated in adjacent seats get different colored hats is
 (A) 30 (B) 40 (C) 20 (D) 50
79. The 10 student have same doubt on mathematics. Mr. solman called them in discussion asked them to sitdown around a circular table. Which is surrounded by 13 chairs Mr. solman told that has adjacent seat should not remain empty. The number of ways in which the students can sit around a table if solman also on sit around.
 (A) ${}^9P_2 \times {}^7P_8$ (B) ${}^6P_2 \times {}^4P_8$ (C) ${}^{10}P_2 \times {}^9P_8$ (D) ${}^{10}P_2 \times {}^8P_8$
80. There are 10 stations on a circular path A train has to stop at 3 stations such that no two stations are adjacent. The number of such selection must be
 (A) 50 (B) 84 (C) 126 (D) None

◆ **Selection of Different Objects**

81. The number of ways one or more digits can be selected from the following $\{1, 1, 1, 1, 2, 2, 2, 2, 3, 3, 3, 4, 4, 5, 6, 7\}$ is ____
 (A) 2861 (B) 2879 (C) 3670 (D) 1292
82. The number of ways selecting of balls from given 5 different green balls, 4 different blue and 3 different red balls, such that taking atleast one green ball and one blue ball is _____

- (A) 3720 (B) 3740 (C) 3750 (D) 3760
83. How many combinations can be made up of 3 Hens, 4 Ducks and 2 Geese so that each combination has hens, ducks and geese (Birds of same kind all different)
- (A) 215 (B) 315 (C) 120 (D) None
84. The number of all possible selections of one or more questions from 10 given questions, each question having an alternate is
- (A) $2^{10} - 1$ (B) $3^{10} - 1$ (C) $10^{10} - 10$ (D) $10^{10} - 1$
85. How many combinations you can make from 5 pairs of identical shoes out of which 2 pairs are brown and the remaining 3 pairs blocks?
- (A) 12 (B) 315 (C) 120 (D) 16
87. The number of ways in which 4 distinct balls can be put into 4 boxes labeled a, b, c, d. So that exactly one box remains empty is
- (A) 144 (B) 132 (C) 124 (D) 154
88. The number of ways in which 10 different toys can be distributed to 8 children so that each child gets at least one toy is
- (A) $840 \times 3!$ (B) $960 \times 8!$ (C) $10^8 + 10$ (D) None
89. A box contains two white balls, three black balls and four red balls. The number of ways in which three balls can be drawn from the box so that at least one of the balls is black.
- (A) 74 (B) 84 (C) 64 (D) 24
90. The number of ways of distributing 10 identical balls in 3 boxes so that no box contains more than four balls and less than 2 balls is
- (A) 6 (B) 8 (C) 12 (D) 10
91. The number of ways in which 5 identical balls can be kept in 10 identical boxes, if not more than one can go into a box is
- (A) 1 (B) 2 (C) 3 (D) 4
92. In how many ways in which 30 marks can be allotted to 8 questions if each question carries at least 2 marks is
- (A) ${}^{21}C_7$ (B) ${}^{28}C_3$ (C) ${}^{30}C_8$ (D) ${}^{21}C_2$
93. There are 'n' identical balls and 'n' children such that. The number of ways distributing the balls to children so that exactly two of them do not get any ball is _____
- (A) $n_{C_2} \cdot {}^{n-1}C_{n-3}$ (B) ${}^{n-2}C_{n-1}$ (C) $n!(n-1)!$ (D) None
94. The number of ways in which 15 identical balls can be distributed among four persons so that each of them gets at least two balls is equal to
- (A) 15_{C_6} (B) 10_{C_3} (C) 9_{C_4} (D) 15_{C_4}

95. The number of ways of distributing 3 identical physics books and 3 identical mathematics books among three students such that each student gets at least one book is
 (A) 55 (B) 65 (C) 45 (D) 35
96. There are seven cards each of a different color and seven envelopes of the same seven colors. The number of ways in which the cards can be put in the envelopes, such that exactly four of the cards go into the envelopes of the right colors is
 (A) 35 (B) 70 (C) 24 (D) 140
97. Let $f(h, k)$ denote the number of ways in which k identical balls can be colored with n colours so that there is at least one ball of each color then $f(2n, n)$ must be equal to
 (A) ${}^{2n}C_n$ (B) ${}^{2n-1}C_{n-1}$ (C) ${}^{2n-1}C_n$ (D) None
98. Find the number of ways of distributing 20 (twenty) "One rupee coins" among 5 beggars when
 (A) At least one coin to each beggars is ${}^{19}C_4$
 (B) Any number of coin can be given to beggars (No. condition) is ${}^{24}C_4$
 (C) Each begger wants even number of coins is ${}^{14}C_4$
 (D) No one gets less than 3 coins is 9C_4

◆ Integral Solutions

99. The number of integral solutions of the equation $x + y + z + t = 20$, $x \geq 1, y \geq 2, z \geq 3, t \geq 4$ is
 (A) ${}^{13}C_{10}$ (B) ${}^{13}C_9$ (C) ${}^{13}C_3$ (D) None
100. The number of non integral solutions of the equation $x + 2y + z = 20$ is, $x, y, z \geq 0$
 (A) 121 (B) 120 (C) 129 (D) 130
101. The number of positive unequal integral solutions of the equation $x_1 + x_2 + x_3 = 14$, is
 (A) 10 (B) 12 (C) 13 (D) 11
102. The number of positive integer solutions to the equation $(x_1 + x_2 + x_3)(y_1 + y_2 + y_3 + y_4) = 77$ is
 (A) $9_{C_2} \cdot 14_{C_3} + 13_{C_2} \cdot 11_{C_3}$ (B) $(9_{C_2} \cdot 14_{C_3})^2$ (C) $6_{C_2} \cdot 10_{C_3} + 10_{C_2} \cdot 6_{C_3}$ (D) None of these
103. Let 'a' be a factor of 120, then the number of positive integral solutions of $x_1 x_2 x_3 = a$ is
 (A) 220 (B) 320 (C) 420 (D) 120
104. The number of positive integral solutions of the equation $x_1 x_2 x_3 = 120$ is
 (A) 90 (B) 96 (C) 98 (D) 78
105. The number of positive integral solutions of the equation $x_1 x_2 x_3 = 3000$ is
 (A) 300 (B) 333 (C) 332 (D) 330

106. If $x + 2y + 3z = n$ and x, y, z are positive integers. Then the number of ordered triplets (x, y, z) satisfying above equation is
 (A) ${}^nC_{n-6}$ (B) ${}^nC_{n-3}$ (C) ${}^{n+2}C_{n-3}$ (D) None
107. The number of integral solutions of the equation $x + y + z + w = 20$ if $x \geq 1, y \geq 2, z \geq 3, w \geq 4$, is
 (A) 286 (B) 78 (C) 715 (D) 1001
108. The number of non-negative integral solutions of $x + y + z + 4t = 20$
 (A) 536 (B) 436 (C) 540 (D) 340
109. The number of integral solutions of equation $x + y + z + t = 29, x > 0, z > 2, y > 1, t \geq 0$ is

 (A) 26_{C_3} (B) 26_{C_4} (C) 26_{C_5} (D) $26_{C_{11}}$
110. The number of non negative integral solutions of $x_1 + x_2 + x_3 + x_4 \leq n, n$ is a +ve integer is
 (A) $n + 4_{C_4}$ (B) $n + 1_{C_3}$ (C) $n + 2_{C_2}$ (D) 0
111. The number of integers x, y, z, t such that $x + y + z + t = 20$ and $x, y, z, t \geq -1$ is
 (A) 27_{C_3} (B) 24_{C_3} (C) 25_{C_4} (D) 24_{C_6}
112. The number of negative integral solutions (x, y) of the equation $x + y + 14 = 0$ is
 (A) 13_{C_1} (B) 14_{C_2} (C) 16_{C_2} (D) 15_{C_3}
113. The number of integral solutions of the equation $2x + 2y + z = 20, x \geq 0, y \geq 0, z \geq 0$; is
 (A) 66 (B) 60 (C) 56 (D) 52
114. The number of non negative integral solutions to the system of equations $a_1 + a_2 + a_3 + a_4 + a_5 = 25, a_1 + a_2 + a_3 = 10$ is _____
 (A) 1056 (B) 1036 (C) 1025 (D) 1026
115. The number of ordered triplets of positive integers which satisfy the inequality $15 \leq x + y + z \leq 45$ is
 (A) 45_{C_3} (B) 15_{C_3} (C) $15_{C_{11}}$ (D) $45_{C_3} - 14_{C_3}$
116. The number of positive integral solutions of $x + y + z = n, n \in \mathbb{N}, N \geq 3$ is
 (A) $n - 1_{C_2}$ (B) $n - 1p_2$ (C) $n(n - 1)$ (D) None
117. 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
118. Five persons are there each one possesses 4 coins of denominations one rupee, two rupee, five rupee, ten rupee. Each person drops one coin in an empty box. The number of ways in which they can drop so that the box possess atleast one coin of each kind is

- (A) 240 (B) 60 (C) 260 (D) 230
119. The number of functions f from the set $A = \{0,1,2\}$ into the set $B = \{0,1,2,3,4,5,6,7\}$ such that $f(i) \leq f(j)$ for $i < j$ and $J \in A$ is
- (A) 8_{C_3} (B) 10_{C_3} (C) $8_{C_3} + 10_{C_3}$ (D) $8_{C_3} + 2(8_{C_2})$
120. Out of 5 apples 10 mangoes and 15 oranges, the number of ways of distributing 15 fruits each to two persons is
- (A) 56 (B) 64 (C) 66 (D) 72
121. The number of ways of selecting 10 balls from the unlimited number of red, green, white and yellow balls, if selections must include 2 red and 3 yellow balls, is
- (A) 112 (B) 56 (C) 48 (D) 96
122. The number of ways of distributing 3 identical white balls and 3 identical black balls in 3 boxes is
- (A) 3^3 (B) 3^6 (C) 100 (D) 6^3
123. A bag contain 2 apples, 3 oranges, 4 bananas, the number of ways in which 3 fruits can be selected if atleast one banana is always in the selection, is (Assume fruits of same species to be like)
- (A) 6 (B) 8 (C) 12 (D) 15
124. How many combinations are their of the letters a, b, c, d if b and d can be used only once each, c can be used twice atleast is
- (A) 14 (B) 12 (C) 16 (D) 18
125. The number of ways in which 25 identical things be distributed among five persons if each gets odd number of things is
- (A) 14_{C_4} (B) 25_{C_4} (C) 14_{C_3} (D) 25_{C_5}
126. The number of ways to give away 20 apples to 3 boys each boy receiving 4 apples atleast 4 apples is
- (A) 10_{C_2} (B) 17_{C_2} (C) 18_{C_3} (D) 10_{C_7}
127. The number of ways selecting 10 balls out of an unlimited number of white, red, blue and green balls is ____
- (A) 186 (B) 286 (C) 360 (D) 270
128. The number of ways in which 15 identical blankets can be distributed among six beggars such that everyone gets atleast one blanket and two particular beggars gets equal blankets and other three particular beggars gets equal blankets is _
- (A) 12 (B) 13 (C) 11 (D) 14
129. A man goes for an examination in which there 4 are e papers with a maximum of 10 marks for each paper the number of ways of getting 20 marks on the whole is _
- (A) 891 (B) 892 (C) 890 (D) 893

130. In how many ways can a party of 6 men be selected out of 10 Hindus, 8 Muslims and 6 Christians. If the party consists of at least one person of each religions. Find the number of ways of selection (consider only one religion of the person)
 (A) 10 (B) 20 (C) 30 (D) None of these
131. How many ways can 10 persons take seats in a row of 24 fixed seats so that no two persons take consecutive sets is
 (A) $15_{C_{10}} \times 30!$ (B) $15_{C_{10}} \cdot 10!$ (C) $15_{C_{11}} \cdot 10!$ (D) $15_{C_{12}} \cdot 10!$
132. The number of combinations and the number of permutations of the letters of the word PARALLEL, taken four at a time is
 (A) 286 (B) 282 (C) 360 (D) 362
133. The number of selections of four letters from the letters of the word "ASSASSINATION" is
 (A) 72 (B) 82 (C) 92 (D) 102
134. The number of 4 letters words that can be formed by using the letters of word "RAMANA" is
 (A) 72 (B) 62 (C) 52 (D) 42
135. The number of words that can be formed using the letters of the word "LIVELIHOOD" if each word contains three letters is
 (A) 392 (B) 264 (C) 366 (D) 382
136. The number of integers which lie between the numbers 786 and 999786, if the sum of their digits is 25
 (A) 53260 (B) 53262 (C) 53270 (D) None of these
137. 100 different objects are arranged in row. In how many ways can 3 objects be selected so that no two objects are consecutive is
 (A) ${}^{98}C_5$ (B) ${}^{98}C_2$ (C) ${}^{98}C_4$ (D) ${}^{98}C_3$
138. The number of ways in which two different numbers between 1 to 100 can be choosen such that the difference between them is atmost 10 is
 (A) $100! - {}^{90}C_2$ (B) ${}^{100}C_2 - {}^{90}C_2$ (C) ${}^{98}C_2 - {}^{90}C_2$ (D) None of these
139. How many integers between 10^2 and 10^5 have the sum their digits equal to 14
 (A) 5405 (B) 4405 (C) 3405 (D) 2405
140. 12 seats are to be occupied 4 people then the number of possible arrangements if
 (A) No two persons sit side by side is 9C_4
 (B) There should be atleast two empty seats between any two persons is 9C_4
 (C) Each person has exactly one neighbor is $4! \times {}^9C_4$
 (D) None of these
141. The number of ways 6 letters can be placed in 6 envelopes such that
 (A) No letter is placed in its corresponding envelopes is 265

- (B) Atleast 4 letters are placed in correct envelopes is 16
 (C) Atmost 3 letters are placed in wrong envelopes is 56
 (D) None of these

142. A person writes letters to his 5 friends and addresses the corresponding envelopes. The number of ways in which the letters can be placed in the envelop. So that atleast two of them are in the wrong envelopes is
 (A) 119 (B) 118 (C) 116 (D) 114
143. The number of arrangements of all the digit of 1,2,3,4,5 such that atleast 3 digits will not come in its position is
 (A) 104 (B) 108 (C) 110 (D) 112
144. Six cards, six envelopes are numbered {1,2,3,4,5,6} and cards are to placed in the envelope so that each envelope contain exactly one card and no card is placed in the envelope baring the same number more over the number one is placed always in the envelope number two. Then the number of ways it can be done is
 (A) 53 (B) 54 (C) 66 (D) 68
145. The number of ways that all the letters of the word "SWORD" can be arranged such that no letter is in its original position is
 (A) 55 (B) 44 (C) 45 (D) 35

(OR)

There are five balls of different colours and five boxes of same as those of balls. Find the number of ways in which the balls, one in each box could be placed such that no balls goes to box of its own colour?

- (A) 55 (B) 44 (C) 45 (D) 35
146. There are 4 couples in how many ways can couple dance be arranged such that no husband dance with his wife?
 (A) 9! (B) 9 (C) 8! (D) 8

(OR)

There are four balls of different colours and 4 boxes of colours same as those of the balls. The number of ways in which the balls, one each in a box could be placed such that a ball does not go to box of its own colour is

- (A) 9! (B) 9 (C) 8! (D) 8
147. $A = \{x_1, x_2, x_3, x_4, x_5\}$, $B = \{y_1, y_2, y_3, y_4, y_5\}$ then the number of one. One mapping from A to B such that $f(x_i) \neq y_i$, $i = 1, 2, 3, 4, 5$ is
 (A) 255 (B) 275 (C) 375 (D) 755
148. $f: A \rightarrow A$ be an invertible functions where $A = \{1, 2, 3, 4, 5, 6\}$. The number of these functions in which at least these elements have self image is
 (A) 52 (B) 56 (C) 54 (D) 58

149. The number of ways the number 18900 can be split in two factors which are relative prime is
 (A) 4 (B) 8 (C) 6 (D) 12

◆ Divisors

150. The number of ways the number $(1001)^{33} \times (999)^{22}$ can be resolved into two co prime factors.
 (A) 22 (B) 14 (C) 18 (D) 16
151. Consider the number $n = 2^4 \cdot 3^3 \cdot 5^2 \cdot 7$, then
 (A) The number of non trivial positive integral divisors is 118
 (B) The number of positive divisors of n which are even is 96
 (C) The number of positive divisors of n which are divisible by 6 is 72
 (D) The number of ways in which n can be expressed as the product of two positive integers is 60
152. The product of positive divisors of $5!$ is $2^a \cdot 3^b \cdot 5^c$ then the value of $a+b+c =$
 (A) 30 (B) 40 (C) 50 (D) 60
153. The number of divisors of 453600 which are of the form $8n+4$, ($n \in \mathbb{N}$) is
 (A) 30 (B) 40 (C) 60 (D) 50
154. The number of divisors of 240 which are of the form $4n+2$ ($n \in \mathbb{N}$) is
 (A) 4 (B) 6 (C) 3 (D) 2
155. The number of divisors of $2^2 \cdot 3^3 \cdot 5^3 \cdot 7^5$ of the form $2n+1$, $n \in \mathbb{N}$ is
 (A) 96 (B) 95 (C) 98 (D) 94
156. Number of divisors of the number $N = {}^{2000}C_1 + 2 \cdot {}^{2000}C_2 + 3 \cdot {}^{2000}C_3 + \dots + 2000 \cdot {}^{2000}C_{2000}$ is ____
 (A) 2003 (B) 8016 (C) 1603 (D) 8014
157. Let $x_1, x_2, x_3, \dots, x_k$ are total divisors of positive integers n ____
 If $\sum_{i=1}^k x_i = 93$ and $\sum_{i=1}^k \frac{1}{x_i} = \frac{93}{50}$ then the value of k is
 (A) 2 (B) 4 (C) 8 (D) 6
158. Let N be the number of '7' digit numbers the sum of whose digit is even, then number of positive divisors of N is ____
 (A) 126 (B) 127 (C) 128 (D) 130
159. The smallest positive integer n with '24' divisors (Where 1 and n are also considered as divisors of n) is ____
 (A) 240 (B) 360 (C) 420 (D) 320
160. The number of order pairs (x, y) such that LCM of x and y is 2120. x, y are positive integers is
 (A) 315 (B) 324 (C) 336 (D) 345

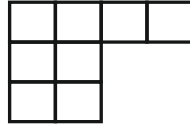
161. If N denotes set all positive integers and if $f : N \rightarrow N$ is defined by $f(n) =$ the sum of positive divisors of n then $f(2^k \cdot 3)$, where 'k' is a positive integer is
 (A) $4(2^{k+1} - 1)$ (B) $4(2^{k+1} - 3)$ (C) $4(2^k + 3)$ (D) $4(2^k - 5)$
162. If n and $2^n - 1$ are prime number then the sum of all the divisors of $(2^n - 1)2^{n-1}$ is
 (A) $2^n(2^n - 1)$ (B) $2(2^n - 2)$ (C) $2^{n+1}(2^{n+1} - 1)$ (D) None
163. The sum of all divisors of 1340 whose unit digit is 0 is ____
 (A) 1200 (B) 2400 (C) 1100 (D) 1300
164. A positive integer n is of the form $n = 2^\alpha 3^\beta$ where $\alpha \geq 1, \beta \geq 1$. If n has 12 positive divisors and $2n$ has 15 positive divisors, then the numbers of positive divisors of $3n$ is ____
 (A) 16 (B) 18 (C) 14 (D) 12
165. If r, s, t are prime numbers and P, Q are positive integers such that their L.C.M of P, Q is $r^2 t^4 s^2$, then the number of ordered pairs of (P, Q) is ____
 (A) 225 (B) 325 (C) 275 (D) 375
166. Let the product of all the divisors of 1440 be P . If P is divisible by 24^x . Then the maximum value of 'x' is ____
 (A) 30 (B) 40 (C) 50 (D) 55
167. The number of ways of in which 8100 can be split in two factors which are relatively prime is
 (A) 4 (B) 8 (C) 3 (D) 2
168. The number of divisors of 189000 which have exactly four factors (including 1 and the number it self) is ____
 (A) 8 (B) 9 (C) 12 (D) 6
169. Number of pairs of positive integers (P, Q) whose LCM (least common multiple) is 8100 is 'k' then the number of ways of expressing k as a product of two coprime numbers is
 (A) 2 (B) 4 (C) 6 (D) 3
170. In how many ways 8100 can be resolved into product of two factors
 (A) 16 (B) 18 (C) 21 (D) 23
171. In how many ways the number 10800 can be resolved as a product of two factors.
 (A) 32 (B) 30 (C) 18 (D) 18
172. The number of positive integers pairs (x, y) such that $\frac{1}{x} + \frac{1}{y} = \frac{1}{2007}$, $x < y$ is
 (A) 5 (B) 6 (C) 7 (D) 8
173. The exponent of 12 in $50!$ is
 (A) 14 (B) 22 (C) 21 (D) 12
174. Exponent of 7 in ${}^{100}C_{50}$ is

- (A) 0 (B) 1 (C) 2 (D) 3

175. The number of zeros at the end of $(100!)^{100!}$ is

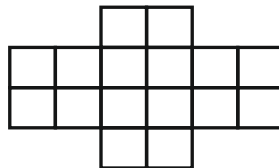
- (A) $100! \times 22$ (B) $100! \times 24$ (C) $99! \times 24$ (D) $100!$

176. The number of different ways the letters of the word 'VECTOR' can be placed in 8 boxes given below such that no row remains empty is equal to



- (A) 26 (B) $26 \times 6!$ (C) $6!$ (D) $2! \times 6!$

177. $14 \cdot x^5$ have to be placed in the squares of the figure given below such that each row contains atleast one x. In how many ways can this be done?



- (A) 118 (B) 120 (C) 140 (D) 122

178. In an even n . sided polygon, the sides are painted blue and red alternatively the vertices of the polygon are joined to form triangles with one side in common with the polygon. Then the number of such triangles with one blue side

- (A) $\frac{n}{2}(n-4)$ (B) $n(n-4)$ (C) $2n(n-4)$ (D) None

◆ **Principal of Exclusion & Inclusion**

179. The number of arrangements of the letters of the word "ORACLE" such that neither 'O' follows 'A' nor A follows E, nor E follows 'O' is

- (A) 542 (B) 432 (C) 642 (D) $6!$

180. The number of arrangements of the letters of the word "PROBLEMANIC" taking all the letters such that neither P is in the beginning nor C is at the end nor M is in the middle is

- (A) $8!(746)$ (B) $8!(446)$ (C) $8! 6!$ (D) None

181. Find number of n -digit numbers which contain digits 2 and 7 but not contain digits 0,1,8,9

- (A) 160 (B) 170 (C) 180 (D) none of these

182. The number of 11-lettered word that can be formed using all the letters of the word EXAMINATION, if alike letters are never adjacent is

- (A) $6^n - 5^n - 5^n + 4^n$ (B) $6^n + 5^n - 5^n + 4^n$ (C) $6^n + 5^n - 5^n - 4^n$ (D) None of these

183. The number of permutations of the 8 letters 'AABBCCDD' taken all at a time, such that no two adjacent letters are alike is

- (A) 860 (B) 864 (C) 862 (D) 866

184. The number of permutations of letters {a, b, c, d, e, f, g} taken all together if neither 'cad' nor 'beg' pattern appear is _____
 (A) $7! - 2 \cdot 5! + 3!$ (B) $7! - 5 \cdot 2! + 3!$ (C) $7! + 5 \cdot 2! + 2!$ (D) none of these

◆ **Geometrical Applications**

185. The maximum number of points into which 4 circles and 4 straight lines intersect is
 (A) 26 (B) 50 (C) 56 (D) 72
186. There are n points in a plane of which no three are in a straight line except 'm' which are all in a straight line. Then the number of different quadrilaterals, that can be formed with the given points as vertices, is
 (A) ${}^nC_4 - {}^mC_3 \cdot {}^{n-m+1}C_1 - {}^mC_4$ (B) ${}^nC_4 + {}^nC_3 \cdot {}^nC_1$
 (C) ${}^nC_4 - {}^mC_3 \cdot {}^{n-m}C_1 - {}^mC_4$ (D) None of these
187. Two lines intersect at O points $A_1 A_2 A_3 \dots A_n$ are taken on one of them and $B_1 B_2 B_3 \dots B_n$ on the other; The number of triangle that can be drawn with the help of these $(2n + 1)$ points is
 (A) n (B) n^2 (C) n^3 (D) n^4
188. There are three coplanar parallel lines. If any n points are taken on each of the lines. The maximum number of triangles with vertices at these points is
 (A) $3n^2(n-1)+1$ (B) $3n^2(n-1)$ (C) $n^2(4n-3)$ (D) None
189. ABCD is a convex quadrilateral 3, 4, 5 & 6 points are marked on the slides. AB, BC, CD and DA respectively. The number of triangles with vertices of different slides is____
 (A) 270 (B) 220 (C) 282 (D) None
190. There 10 points in a plane of which no three points are collinear but 4 points are concyclic. The number of different circles that can be drawn through at least 3 points of these point is
 (A) 116 (B) 120 (C) 117 (D) None
191. The number of ways five different rings can be wearing among four fingers is
 (A) 4^5 (B) 5^4 (C) $5! \cdot 4$ (D) None
192. The number of ways in which six different rings can be arranged on four fingers is ____
 (A) $\frac{9!}{3!}$ ways (B) $\frac{9!}{3}$ (C) 4^5 (D) 5^4
193. The number of way three different rings can be worn in four fingers with atmost one ring in each finger is
 (A) 20 (B) 24 (C) 22 (D) 26
194. The number of ways five different rings can be worn four finger with atleast one ring in each finger is _____
 (A) 480 (B) 4^5 (C) 5^4 (D) $5C_4 \cdot 4!$

195. The number of ways five rings can be put on four fingers with at least one ring on each fingers is
 (A) 980 ways (B) 480 ways (C) 4^5 (D) None
196. The number ways of putting five different rings on four fingers on the left hand. (ignoring the difference in the size of rings and fingers) is ____
 (A) $\frac{8!}{3!}$ (B) $8!$ (C) 4^5 (D) 5^4
197. A urn has 5 pairs of shoes. The number of ways four shoes can be drawn such that there will be no complete pair is
 (A) 80 (B) 60 (C) 64 (D) 54
198. The number of ways of selecting 6 shoes from 8 pairs of shoes so that exact two pairs of shoes are formed is
 (A) 1680 (B) 1440 (C) 1620 (D) 1420
199. '2n' teams participate in a football tournament 'n' matches will be played in the first round so that each team plays exactly one game in the first round. The number of ways in which this can be possible, is ____
 (A) $\frac{(2n)!}{2^n n!}$ (B) ${}^{2n}C_n \cdot 2!$ (C) ${}^{(2n-1)}C_2 \cdot {}^n C_2$ (D) None
200. A person predicts the out come of 20 cricket matches results win, loss of draw total number of ways in which he can make the predictions so that exactly 10 predictions are correct is equal to
 (A) ${}^{20}C_{10} \cdot 2^{10}$ (B) ${}^{20}C_2 \cdot 2^{10}$ (C) 2^9 (D) ${}^{20}C_{10} \cdot 2^9$
201. The number of ways in which a lawn tennis mixed double game be made from seven married couples if no husband and wife play in the game is
 (A) 480 (B) 420 (C) 460 (D) 440
202. The number of ways a mixed double game can be arranged from amongst 9 couples if no husband and wife play in the same is
 (A) 1512 (B) 1540 (C) 1440 (D) 1448
203. The number of different signals which can be given from 6 flags of different colours taking one or more at time is
 (A) 1958 (B) 1956 (C) 16 (D) 64
204. There are n married couples at a party. Each person shakes hand with every person other than her or his spouse. The total number of hand shakes must be
 (A) ${}^{2n}C_n - n$ (B) ${}^{2n}C_n - (n-1)$ (C) $2n(n-1)$ (D) ${}^{2n}C_2$
205. A letter lock consists of 3 rings marked with 15 different letters, then number of ways in which it is possible to make unsuccessful attempts to open the lock is
 (A) $15^3 - 1$ (B) $3^{15} - 1$ (C) $3^{15} - 3$ (D) $15^3 - 3$

206. Sanjay has 10 friends among whom two are married to each other. He wishes to invite 5 of the them for a party. If the married couple refuse to attend separately then the number of different ways in which he can invite five friends is
 (A) $10_{C_5} - 2 \times 8_{C_4}$ (B) $2 \times 8_{C_3}$ (C) 8_{C_5} (D) None of these
207. The matrices of order 3×3 are formed by using the elements -3, -2, -1, 0, 1, 2, 3 then
 (A) The number of 3×3 matrices having trace 0 is 37×76
 (B) The number of 3×3 matrices formed is 7^9
 (C) The number of 3×3 skew symmetric matrices is 7^3
 (D) The number of 3×3 symmetric matrices is 7^6

Key:

- | | | | |
|------------|------------|----------|-----------|
| 1. (A) | 2. (C) | 3. (A) | 4. (ABCD) |
| 5. (A) | 6. (A) | 7. (A) | 8. (A) |
| 9. (ABC) | 10. (B) | 11. (B) | 12. (B) |
| 13. (A) | 14. (A) | 15. (A) | 16. (B) |
| 17. (B) | 18. (A) | 19. (A) | 20. (A) |
| 21. (A) | 22. (A) | 23. (A) | 24. (A) |
| 25. (A) | 26. (B) | 27. (A) | 28. (A) |
| 29. (B) | 30. (A) | 31. (A) | 32. (A) |
| 33. (A) | 34. (A) | 35. (A) | 36. (B) |
| 37. (A) | 38. (A) | 39. (B) | 40. (C) |
| 41. (A) | 42. (A) | 43. (C) | 44. (B) |
| 45. (A) | 46. (A) | 47. (A) | 48. (A) |
| 49. (B) | 50. (A) | 51. (A) | 52. (A) |
| 53. (C) | 54. (C) | 55. (A) | 56. (A) |
| 57. (A) | 58. (A) | 59. (D) | 60. (C) |
| 61. (B) | 62. (ABCD) | 63. (A) | 64. (B) |
| 65. (A) | 66. (B) | 67. (A) | 68. (B) |
| 69. (A) | 70. (A) | 71. (B) | 72. (A) |
| 73. (A) | 74. (A) | 75. (B) | 76. (ABC) |
| 77. (C) | 78. (A) | 79. (D) | 80. (A) |
| 81. (B) | 82. (A) | 83. (B) | 84. (B) |
| 85. (A) | 87. (A) | 88. (B) | 89. (C) |
| 90. (A) | 91. (A) | 92. (A) | 93. (A) |
| 94. (B) | 95. (A) | 96. (B) | 97. (C) |
| 98. (ABCD) | 99. (A) | 100. (A) | 101. (A) |
| 102. (A) | 103. (B) | 104. (A) | 105. (A) |
| 106. (D) | 107. (A) | 108. (A) | 109. (A) |
| 110. (A) | 111. (A) | 112. (A) | 113. (A) |
| 114. (A) | 115. (D) | 116. (A) | 117. (B) |

- | | | | |
|----------|-------------|------------|------------|
| 118. (A) | 119. (B) | 120. (A) | 121. (B) |
| 122. (C) | 123. (A) | 124. (B) | 125. (A) |
| 126. (A) | 127. (B) | 128. (A) | 129. (A) |
| 130. (A) | 131. (B) | 132. (A) | 133. (A) |
| 134. (A) | 135. (B) | 136. (B) | 137. (D) |
| 138. (B) | 139. (C) | 140. (ABC) | 141. (ABC) |
| 142. (A) | 143. (A) | 144. (A) | 145. (B) |
| 146. (B) | 147. (D) | 148. (B) | 149. (B) |
| 150. (D) | 151. (ABCD) | 152. (B) | 153. (A) |
| 154. (A) | 155. (B) | 156. (B) | 157. (D) |
| 158. (A) | 159. (B) | 160. (A) | 161. (A) |
| 162. (A) | 163. (B) | 164. (A) | 165. (A) |
| 166. (A) | 167. (A) | 168. (B) | 169. (A) |
| 170. (D) | 171. (B) | 172. (C) | 173. (B) |
| 174. (A) | 175. (B) | 176. (B) | 177. (A) |
| 178. (A) | 179. (B) | 180. (A) | 181. (D) |
| 182. (A) | 183. (B) | 184. (A) | 185. (B) |
| 186. (C) | 187. (C) | 188. (C) | 189. (D) |
| 190. (C) | 191. (A) | 192. (A) | 193. (B) |
| 194. (A) | 195. (A) | 196. (A) | 197. (A) |
| 198. (A) | 199. (A) | 200. (A) | 201. (B) |
| 202. (A) | 203. (B) | 204. (C) | 205. (A) |
| 206. (A) | 207. (ABCD) | | |

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