kd education academy (9582701166

Time : 10 Hour | **STD 11 Maths** | **Total Marks : 330**

kd90+ ch- 6 permutations and combinations

*** Choose the right answer from the given options. [1 Marks Each]** **[112]**

1. Find the number of rectangles and squares in an 8 by 8 chess board respectively.
   (A) 296, 204 (B) 1092, 204 (C) 204, 1092 (D) 204, 1296
2. The number of ways in which 6 men add 5 women can dine at a round table, if no two women are to sit together, is given by:
   (A) 30 (B) 5! × 5! (C) 5! × 4! (D) 7! × 5!
3. There are 6 letters and 6 directed envelopes.Find the number of ways in which all letters are put in the wrong envelopes.
   (A) 260 (B) 265 (C) 270 (D) 275
4. The number of different ways in which 8 persons can stand in a row so that between two particular persons A and B there are always two persons, is:
   (A) 60 × 5! (B) 15 × 4! × 5! (C) 4! × 5! (D) None of these.
5. The number of ways in which four particular persons A, B, C, D, and six more persons can stand in a queue so that A always stands before B B, before C and C before D, is:
   (A) $7!4!$ (B) $10! - 7!4!$ (C) $\frac{10!}{4!}$ (D) None of these
6. The number of ways to arrange the letters of the word CHEESE are:
   (A) 120 (B) 240 (C) 720 (D) 6
7. Seven different lecturers are to deliver lectures in seven periods of a class on a particular day. A B, and C are three of the lecturers.The umber 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) 840
8. The greatest number that can be formed by the digits 7, 0, 9, 8, 6, 3
   (A) 9, 87, 360 (B) 9, 87, 063 (C) 9, 87, 630 (D) 9, 87, 603
9. If ${}^{20}\mathrm{C}_{\mathrm{r}} = {}^{20}\mathrm{C}_{\mathrm{r-10}}$ is then ${}^{18}\mathrm{C}_{\mathrm{r}}$ equal to:
   (A) 4896 (B) 816 (C) 1632 (D) None of these.
10. The number of words that can be formed out of the letters of the word "ARTICLE" so that vowels occupy even places is:
    (A) 574 (B) 36 (C) 754 (D) 144

11. The number of permutations of n different things taking r at a time when 3 particular things are to be included is:

(A) ${}^{n-3}P_{r-3}$ (B) ${}^{n-3}P_{r}$ (C) ${}^{n}P_{r-3}$ (D) $r!\ {}^{n-3}C_{r-3}$

12. The number of ways in which 10 different diamonds can be arranged to form a necklace, is:

(A) 181440 (B) 161400 (C) 261960 (D) None of these

13. A garrison of nn men had enough food to last for 30 days. After 10 days, 50 more men joined them. If the food now lasted for 1616 days, what is the value of n?

(A) 200 (B) 240 (C) 280 (D) 320

14. If in a group of n distinct objects, the number of arrangements of 4 objects is 12 times the number of arrangements of 2 objects, then the number of objects is:

(A) 10 (B) 8 (C) 6 (D) None of these

15. 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:

(A) 324 (B) 341 (C) 359 (D) None of these

16. The total number of 9 digit numbers of different digits is:

(A) 99! (B) 9! (C) 8 × 9! (D) 9 × 9!

17. Permutation relates to the act of arranging all the members of a set into some sequence or order.

(A) True (B) False

(C) Can be true or false. (D) Can not say.

18. Amy and Adam are making boxes of truffles to give out as wedding favors. They have an unlimited supply of 5 different types of truffles. If each box holds 2 truffles of different types, how many different boxes can they make?

(A) 12 (B) 10 (C) 15 (D) 20

19. If ${}^{5}P_{r} = {}^{26}p_{r} - 1$, then the value of r is:

(A) 10 (B) 3 (C) 0 (D) None of these

20. Choose the correct answer.
The number of ways in which we can choose a committee from four men and six women so that the committee includes at least two men and exactly twice as many women as men is.

(A) 94 (B) 126 (C) 128 (D) None

21. Let Tn denote the number of triangles which can be formed using the vertices of a regular polygon of n sides.If $T_{n+1} - T_{n} = 21$, then n equals:

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

22. If ${}^{15}C_{3r} = {}^{15}C_{r+3}$, is then equal to:
(A) 5 (B) 4 (C) 3 (D) 2

23. Three persons enter a railway compartment. If there are 5 seats vacant, in how many ways can they take these seats?
(A) 60 (B) 20 (C) 15 (D) 125

24. 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:
(A) 336 (B) 337 (C) 335 (D) None of these

25. How many ways can 6 coins be chosen from 20, one rupees coins, 10 fifty paise coins, 7 twenty paise coins:
(A) 28 (B) 56 (C) ${}^{37}C_6$ (D) 38

26. The value of $({}^7C_0 + {}^7C_1) + ({}^7C_1 + {}^7C_3) + \ldots\ldots + ({}^7C_6 + {}^7C_7)$ is:
(A) $2^7 - 1$ (B) $2^8 - 2$ (C) $2^8 - 1$ (D) 2^8

27. The number of ways in which 6 men can be arranged in a row so that three particular men are consecutive, is:
(A) 4! × 3! (B) 4! (C) 3! × 3! (D) None of these

28. From a committee of 8 persons, in how many ways can we choose a chairman and a vice - chairman assuming one person cannot hold more than one position:
(A) 54 (B) 55 (C) 52 (D) 56

29. Factorial of negative numbers is always greater than 1:
(A) True (B) False (C) Either (D) Neither

30. If ${}^{n+1}C_3 = 2\,{}^nC_2$, then the value of n is:
(A) 3 (B) 4 (C) 5 (D) 6

31. If ${}^{20}C_r = {}^{20}C_{r+4}$ is then ${}^rC_3$ equal to:
(A) 54 (B) 56 (C) 58 (D) none of these.

32. Choose the correct answer.
The number of 5-digit telephone numbers having atleast one of their digits repeated is.
(A) 90,000 (B) 10,000 (C) 30,240 (D) 69,760

33. The number of different signals which can be given from 6 flags of different colours taking one or more at a time, is:
(A) 1958 (B) 1956 (C) 16 (D) 64

34. The number of 6 - digit numbers can be formed from the digits 0, 1, 3, 5, 7 and 9 which are divisible by 10 and no digit is repeated are:

(A) 110 (B) 120 (C) 130 (D) 140

35. There are 4 parcels and 5 post offices.In how many ways can 4 parcels be got registered:

(A) 20 (B) 4^5 (C) 5^4 (D) $5^4 - 4^5$

36. Arranging people, digits, numbers, alphabets, letters, and colours are example of:

(A) Combination (B) Permutation (C) Sets (D) Lists

37. If ${}^{n}P_5 = 60\ {}^{n-1}P_3$, the value of n is:

(A) 6 (B) 10 (C) 12 (D) 16

38. ${}^{x}C_7 - {}^{x}C_5 = 0$, then x =:

(A) 7 (B) 5 (C) 12 (D) 10

39. Out of 100 students 50 fail in English and 30 in Maths. If 12 students fail in both English and Maths, then the number of students passing both the subjects is:

(A) 26 (B) 28 (C) 30 (D) 32

40. Six boys and six girls sit along a line alternately in x ways and along a circle (again alternatively in y ways), then:

(A) x = y (B) y = 12x (C) x = 10y (D) x = 12y

41. There are 15 points in a plane, no two of which are in a straight line except 4, all of which are in a straight line.The number of triangle that can be formed by using these 15 points is:

(A) ${}^{15}C_3$ (B) 490 (C) 451 (D) 415

42. An automobile dealer provides motorcycles and scooters in three body patterns and 4 different colors each. The number of choices open to a customer is:

(A) ${}^{5}C_3$ (B) ${}^{4}C_3$ (C) 4 × 3 (D) 4 × 3 × 2

43. If a secretary and a joint secretary are to be selected from acommittee of 11 members, then in how many ways can they be selected:

(A) 110 (B) 55 (C) 22 (D) 11

44. A group of 1200 persons consisting of captains and soldiers is travelling in a train. For every 15 soldiers there is one captain. The number of captains in the group is:

(A) 85 (B) 80 (C) 75 (D) 70

45. Choose the correct answer.
Total number of words formed by 2 vowels and 3 consonants taken from 4 vowels and 5 consonants is equal to.

(A) 60 (B) 120 (C) 7200 (D) 72

46. Six identical coins are arranged in a row.The number of ways in which the number of tails is equal to the number of heads is:

(A) 20 (B) 9 (C) 120 (D) 40

47. 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

48. A car driver knows four different routes from Delhi to Amritsar. From Amritsar to Pathankot, he knows three different routes and from Pathankot to Jammu he knows two different routes. How many routes does he know from Delhi to Jammu?

(A) 4 (B) 8 (C) 12 (D) 24

49. There are mn letters and n post boxes.The number of ways in which these letters can be posted is:

(A) $(\mathrm{mn})^{\mathrm{n}}$ (B) $(\mathrm{mn})^{\mathrm{m}}$ (C) m^{mn} (D) n^{mn}

50. In how many ways a committee consisting of 5 men and 3 women, can be chosen from 9 men and 12 women:

(A) 10258 (B) 16870 (C) 27720 (D) 38982

51. Total number of four digit odd numbers that can be formed using 0, 1, 2, 3, 5, 7 (using repetition allowed) are:

(A) 216 (B) 375 (C) 400 (D) 720

52. It is required to seat 5 men and 4 women in a row so that the women occupy the even places.The number of ways such arrangements are possible are

(A) 8820 (B) 2880 (C) 2088 (D) 2808

53. The number of ways in which the letters of the word ARTICLE can be arranged so that even places are always occupied by consonants is:

(A) 576 (B) ${}^4C_3 \times 4!$ (C) $2 \times 4!$ (D) None of these.

54. The number of rectangles that you can find on a chess board is:

(A) 1442 (B) 1296 (C) 1256 (D) None of these

55. The number of five-digit telephone numbers having at least one of their digits repeated is:

(A) 90000. (B) 100000. (C) 30240. (D) 69760

56. There are 44 candidates for a Natural science scholarship, 22 for a Classical and 66 for a Mathematical scholarship, then find the no.of ways one of these scholarship can be awarded is:

(A) 6 (B) 10 (C) 48 (D) 12

57. In a crossword puzzle, 20 words are to be guessed of which 88 words have each an alternative solution also.The number of possible solutions will be:

(A) ${}^{20}\mathrm{P}_8$ (B) ${}^{20}\mathrm{C}_8$ (C) 515 (D) 256

58. In a chess tournament each of six players will play every other player exactly once. How many matches will be played during the tournament?

(A) 36 (B) 30 (C) 15 (D) 12

59. How many 3 - letter words with or without meaning, can be formed out of the letters of the word, LOGARITHMS, if repetition of letters is not allowed:

(A) 720 (B) 420 (C) None of these (D) 5040

60. The number of ways in which the letters of the word 'CONSTANT' can be arranged without changing the relative positions of the vowels and consonants is.

(A) 360 (B) 256 (C) 444 (D) None of these.

61. In a class there are 18 boys who are over 160 cm tall If these constitute three-fourths of the boys and the total number of boys is tow-third of the total number of students in the class what is the number of girls in the class?

(A) 6 (B) 12 (C) 18 (D) 24

62. A letter lock contains 5 rings each marked with for different letters.The number of all possible unsuccessful attempts to open the lock is:

(A) 625 (B) 1024 (C) 624 (D) 1023 b

63. The number of six letter words that can be formed using the letters of the word "ASSIST" in which S's alternate with other letters is:

(A) 12 (B) 24 (C) 18 (D) None of these.

64. A person wishes to make up as many different parties as he can out of 20 friends. Each party consists of the same number of friends. How many should be invited at a time:

(A) 8 (B) 9 (C) 10 (D) 11

65. Given 11 points, of which 5 lie on one circle, other than these 5, no 4 lie on one circle. Then the number of circles that can be drawn so that each contains at least 3 of the given points is:

(A) 216 (B) 156 (C) 172 (D) None of these.

66. Total number of words formed by 2 vowels and 3 consonants taken from 4 vowels and 5 consonants is equal to:

(A) 60 (B) 120 (C) 7200 (D) None of these.

67. In how many ways 8 distinct toys can be distributed among 5 children?

(A) ${}^{8}\mathrm{P}_5$ (B) ${}^{5}\mathrm{P}_8$ (C) 5^8 (D) 8^5

68. On the occasion of Deepawali festival, each student of a class sends greeting cards to the others.If there are 20 students in the class, then the total number of greeting cards exchanged by the students is:

(A) $^{20}C_2$ (B) $2.\ ^{20}C_2$ (C) $2.\ ^{20}P_2$ (D) None of these

69. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of exactly 3 girls:

(A) 540 (B) 405 (C) 504 (D) None of these

70. Choose the correct answer.
The number of parallelograms that can be formed from a set of four parallel lines intersecting another set of three parallel lines is.

(A) 6 (B) 18 (C) 12 (D) 9

71. If a represents the number of permutations of (x + 2) things taken together b represents the number of permutation of 11 things taken together out of x things, and c represents the number of permutation of(x – 11)things taken together so that a = 182, bc = then x is equal to:

(A) 15 (B) 12 (C) 10 (D) 18

72. If $^{n}C_{15} = {}^{n}C_6$ then the value of $^{n}C_{21}$ is:

(A) 0 (B) 1 (C) 21 (D) None of these

73. If $^{20}C_{3r+1} = {}^{20}C_{r-1}$, is then r equal to:

(A) 10 (B) 11 (C) 19 (D) 12

74. If $C_0 + C_1 + C_2 + ... + C_n = 256$, then $^{2n}C_2$ is equal to:

(A) 56 (B) 120 (C) 28 (D) 91

75. How many numbers greater than 10 lacs be formed from 2, 3, 0, 3, 4, 2, 3?

(A) 420 (B) 360 (C) 400 (D) 300

76. 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.

77. There were two women participants in a chess tournament.The number of games the men played between themselves exceeded by 52 the number of games they played with women.If each player played one game with each other, the number of men in the tournament, was:

(A) 10 (B) 11 (C) 12 (D) 13

78. How many numbers of 4 - digits can be formed by using the digits 1, 2, 3, 4, 5, 6, 7 if atleast one digit is repeated:

(A) $^{7}P_4$ (B) 7^4 (C) $7^4 - {}^{7}p_4$ (D) None of these

79. There are 12 points in a plane. The number of the straight lines joining any two of them when 3 of them are collinear is:

(A) 62 (B) 63 (C) 64 (D) 65

80. A bag contains 3 black, 4 white and 2 red balls, all the ballsbeing different.Number of selections of atmost 6 balls containing balls of all the colours is:

(A) 1008 (B) 1080 (C) 1204 (D) 1130

81. Match the terms given in Column-I with the terms given in Column-II and choose the correct option from the codes given below.

	Column-I		Column-II
(A)	If $P(n,4) = 20.P(n,2)$ then the value of n is	(1)	28
(B)	${}^{5}p_{r} = {}^{26}p_{r-1}$	(2)	4
(C)	${}^{5}p_{r} = {}^{6}p_{r-1}$	(3)	7
(D)	Value of $\frac{8!}{6!\times 2!}$ is	(4)	3

Codes

ABCD

(A) 4321 (B) 3412 (C) 4231 (D) 3421

82. If ${}^{n}C_{9} = {}^{n}C_{8}$, what is the value of ${}^{n}C_{17}$

(A) 1 (B) 0 (C) 3 (D) 17

83. If ${}^{n+1}C_{3} = 2.{}^{n}C_{2}$, then n:

(A) 3 (B) 4 (C) 5 (D) 6

84. The number of ways in which four letters of the word MATHEMATICS can be arranged is given by:

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

85. Arrange the given words in the sequence in which they occur in the dictionary and then choose the correct sequence.

1.Page 2.Pagan 3.Palisade 4.Pageant 5.Palate

(A) 1, 4, 2, 3, 5 (B) 2, 4, 1, 3, 5 (C) 2, 1, 4, 5, 3 (D) 1, 4, 2, 5, 3

86. The total number of 9 - digit numbers which have all different digits is:

(A) 10! (B) 9! (C) 99x! (D) 10x, 10!

87. At the end of a business conference, the ten people present all shake hands with each other once. How many handshakes will there be altogether?

(A) 20 (B) 45 (C) 55 (D) 90

88. There are 10 true - false questions in an examination.These questions can be answered in:

(A) 20 ways. (B) 100 ways. (C) 512 ways. (D) 1024 ways.

89. There are 15 points in a plane, no two of which are in a straight line except 4, all of which are in a straight line.The number of triangle that can be formed by using these 15 points is:

(A) $^{15}C_3$ (B) 490 (C) 451 (D) 415

90. There are 'm' copies each of 'n' different books in a university library. The number of ways in which one or more than one book can be selected is:

(A) $m^n - 1$ (B) $(m + 1)^n - 1$ (C) $(m + 1)^n - m^n$ (D) $(m + 1)^n - m$

91. Choose the correct answer.
A five digit number divisible by 3 is to be formed using the numbers 0, 1, 2, 3, 4 and 5 without repetitions. The total number of ways this can be done is.

(A) 216 (B) 600 (C) 240 (D) 3125

92. Choose the correct answer.
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.

(A) 3600 (B) 3720 (C) 3800 (D) 3600

93. The letters of the word RACHIT are written in all possible manner and words are written as in dictionary. The rank of word RACHIT is:

(A) 365 (B) 702 (C) 481 (D) 480

94. $^5C_1 + {}^5C_2 + {}^5C_3 + {}^5C_4 + {}^5C_5$ is equal to:

(A) 30 (B) 31 (C) 32 (D) 33

95. There are 13 players of cricket, out of which 4 are bowlers. In how many ways a team of eleven be selected from them so as to include at least two bowlers?

(A) 72 (B) 78 (C) 42 (D) None of these.

96. A lady gives a dinner party for six guests. The number of ways in which they may be selected from among ten friends if two of the friends will not attend the party together is:

(A) 112 (B) 140 (C) 164 (D) None of these.

97. If $= {}^{43}C_{r-6} = {}^{43}C_{3r+1}$, then the value of r is is:

(A) 12 (B) 8 (C) 6 (D) 10

98. A dictionary is printed consisting of 7 lettered words only that can be made with a letter of the word $CRICKET$. If the words are printed at the alphabetical order, as in an ordinary dictionary, then the number of word before the word $CRICKET$ is

(A) 530 (B) 480 (C) 531 (D) 481

99. The number of positive integral solutions of $abc = 30$ is

(A) 30 (B) 27 (C) 8 (D) None of these

100. 12 persons are to be arranged to a round table. If two particular persons among them are not to be side by side, the total number of arrangements is

(A) $9(10\,!)$ (B) $2(10\,!)$ (C) $45(8\,!)$ (D) $10\,!$

101. There are $(n+1)$ white and $(n+1)$ black balls each set numbered 1 to $n+1$. The number of ways in which the balls can be arranged in a row so that the adjacent balls are of different colours is

(A) $(2n+2)\,!$ (B) $(2n+2)\,!\times 2$ (C) $(n+1)\,!\times 2$ (D) $2\{(n+1)\,!\}^2$

102. How many words can be made out from the letters of the word $INDEPENDENCE$, in which vowels always come together

(A) 16800 (B) 16630 (C) 1663200 (D) None of these

103. The number of ways in which the letters of the word $ARRANGE$ can be arranged such that both R do not come together is

(A) 360 (B) 900 (C) 1260 (D) 1620

104. If ${}^{56}P_{r+6}:{}^{54}P_{r+3}=30800:1$, then $r=$

(A) 31 (B) 41 (C) 51 (D) None of these

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

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

106. The number of ways in which the letters of the word $TRIANGLE$ can be arranged such that two vowels do not occur together is

(A) 1200 (B) 2400 (C) 14400 (D) None of these

107. The letters of the word $MODESTY$ are written in all possible orders and these words are written out as in a dictionary, then the rank of the word $MODESTY$ is

(A) 5040 (B) 720 (C) 1681 (D) 2520

108. Four dice (six faced) are rolled. The number of possible outcomes in which at least one die shows 2 is

(A) 1296 (B) 625 (C) 671 (D) None of these

109. The number of ways in which 9 persons can be divided into three equal groups is

(A) 1680 (B) 840 (C) 560 (D) 280

110. We are to form different words with the letters of the word $INTEGER$. Let m_1 be the number of words in which I and N are never together and m_2 be the number of words which begin with I and end with R, then m_1/m_2 is equal to

(A) 30 (B) 60 (C) 90 (D) 180

111. 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

(A) 324 (B) 341 (C) 359 (D) None of these

112. How many words can be made from the letters of the word $INSURANCE$, if all vowels come together

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

*** Given section consists of questions of 2 marks each.** **[40]**

113. How many 3-digit even numbers can be formed, from the digits 1, 2, 3, 4, 5, 6 if the digits can be repeated?

114. Find the number of 4-digit numbers that can be formed using the digits 1, 2, 3, 4, 5 if no digit is repeated. How many of these will be even?

115. From a committee of 8 persons in how many ways can we choose a chairman and a vice chairman assuming one person cannot hold more than one position?

116. Determine n if ${}^{2n}C_3 : {}^{n}C_2 = 12 : 1$

117. Determine n if ${}^{2n}C_3 \ : \ {}^{n}C_3 = 11 : 1$

118. In how many ways can a student choose a programme of 5 courses if 9 courses are available and 2 specific courses are compulsory for every student?

119. In how many ways can the letters of the word ASSASSINATION be arranged so that all the S's are together?

120. How many 2 digit even numbers can be formed from the digits 1, 2, 3, 4, 5 if the digits can be repeated?

121. Find the number of different signals that can be generated by arranging at least 2 flags in order (one below the other) on a vertical staff, if five different flags are available.

122. If $\frac{1}{8!} + \frac{1}{9!} = \frac{x}{10!}$, find x.

123. How many numbers lying between 100 and 1000 can be formed with the digits 0, 1, 2, 3, 4, 5, if the repetition of the digits is not allowed?

124. Find the number of different 8-letter arrangement that can be made from the letters of the word DAUGHTER so that all vowels occur together.

125. In how many ways can 4 red, 3 yellow and 2 green discs be arranged in a row if the discs of the same colour are indistinguishable?

126. If ${}^{n}C_9 = {}^{n}C_8$, find ${}^{n}C_{17}$

127. A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?

128. From among the 36 teachers in a school, one principal and one vice-principal are to be appointed. In how many ways can this be done?

129. In a class there are 27 boys and 14 girls. The teacher wants to select 1 boy and 1 girl to represent the class in a function. In how many ways can the teacher make this selection?

130. There are four parcels and five post-offices. In how many different ways can the parcels be sent by registered post?

131. Compute:

$\frac{11!-10!}{9!}$

132. Evaluate the following:

${}^{8}\mathrm{P}_{3}$

*** Given section consists of questions of 3 marks each.** **[90]**

133. If the different permutations of all the letter of the word EXAMINATION are listed as in a dictionary, how many words are there in this list before the first word starting with E?

134. In an examination a question paper consist of 12 questions divided into two parts i.e. part I and part II containing 5 and 7 questions, respectively. A student is required to attempt 8 questions in all, selecting at least 3 from each part. In how many ways can a student select the questions?

135. From a class of 25 students, 10 are to be chosen for an excursion party. There are 3 students who decide that either all of them, will join or none of them will join. In how many ways can the excursion party be chosen?

136. Find: r, if $5\ {}^{4}P_{r} = 6\ {}^{5}P_{r-1}$

137. How many words, with or without meaning, each of 3 vowels and 2 consonants can be formed from the letters of the word INVOLUTE?

138. In how many ways can the letters of the word ASSASSINATION be arranged so that all the S's are together?

139. prove that:

$\frac{n!}{(n-r)!r!} + \frac{n!}{(n-r+1)!(r-1)!} = \frac{(n+1)!}{r(n-r+1)!}$

140. How many 3-digit even number can be made using the digits 1, 2, 3, 4, 5, 6, 7, if no digits is repeated?

141. How many natural numbers not exceeding 4321 can be formed with the digits 1, 2, 3 and 4, if the digits can repeat?

142. How many words can be formed with the letters of the word 'PARALLEL' so that all L's do not come together?

143. Find the total number of ways in which six '+' and four '−' signs can be arranged in a line such that no two '−' signs occur together.

144. In how many ways can three jobs I, II and III be assigned to three persons A, B and C if one person is assigned only one job and all are capable of doing each job?

145. m men and n women are to be seated in a row so that no two women sit together, if m > n then show that the number of ways in which they can be seated as $\frac{m!(m+1)!(m-n+1)!}{m!(m+1)!(m-n+1)!}$

146. How many different words can be formed with the letters of word 'SUNDAY'? How many of the words begin with N? How many begin with N and end in Y?

147. How many words can be formed from the letters of the word 'SERIES' which start with S and end with S?

148. In how many ways can the letters of the word 'ARRANGE' be arranged so that the two R's are never together?

149. If $\frac{(2n!)}{3!(2n-3)!}$ and $\frac{n!}{2!(2n-2)!}$ are in the ratio 44 : 3 find n.

150. Find the number of diagonals of:
    ii. A hexagon.
    iii. A polygon of 16 sides.

151. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of:
    i. Exactly 3 girls?
    ii. At least 3 girls?
    iii. At most 3 girls?

152. If $^{15}C_{3r} = {}^{15}C_{r+3}$, Find r.

153. If $^{15}C_r : {}^{15}C_{r-1}, = 11 : 5,$ Find r.

154. There are 10 points in a plane of which 4 are collinear. How many different straight lines can be drawn by joining these points.

155. A business man hosts a dinner to 21 guests. He is having 2 round tables which can accommodate 15 and 6 persons each. In how many ways can he arrange the guests?

156. For all positive integers n, show that $^{2n}C_n + {}^{2n}C_{n-1} = \frac{1}{2}\left({}^{2n+2}C_{n+1}\right).$

157. If $^{2n}C_3 : {}^{n}C_2 = 44 : 3,$ find n.

158. In a certain city, all telephone numbers have six digits, the first two digits always being 41 or 42 or 46 or 62 or 64. How many telephone numbers have all six digits distinct?

159. A sports team of 11 students is to be constituted, choosing at least 5 from Class XI and atleast 5 from Class XII. If there are 20 students in each of these classes, in how many ways can the team be constituted?

160. 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.
    i. No girls.
    ii. At least one boy and one girl.
    iii. At least three girls.

161. If ${}^{n}C_{r-1} = 36$, ${}^{n}C_{r} = 84$ and ${}^{n}C_{r+1} = 126$, then find ${}^{r}C_{2}$.

[**Hint:** Form equation using $\frac{{}^{n}C_{r}}{{}^{n}C_{r+1}}$ and $\frac{{}^{n}C_{r}}{{}^{n}C_{r-1}}$ to find the value of r.]

162. How many automobile license plates can be made if each plate contains two different letters followed by three different digits?

*** Given section consists of questions of 5 marks each.** **[80]**

163. Find the number of words formed by permuting all the letters of the following words:
INDEPENDENCE.

164. Find the number of words formed by permuting all the letters of the following words:
EXERCISES.

165. Find the number of words formed by permuting all the letters of the following words:
INDIA.

166. The letters of the word 'ZENITH' are written in all possible orders. How many words are possible if all these words are written out as in a dictionary? What is the rank of the word 'ZENITH'?

167. In how many ways can the letters of the word "INTERMEDIATE" be arranged so that:
    i. The vowels always occupy even places?
    ii. The relative order of vowels and consonants do not alter?

168. In how many ways can 4 red, 3 yellow and 2 green discs be arranged in a row if the discs of the same colour are indistinguishable?

169. 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.

170. How many words can be formed by taking 4 letters at a time from the letters of the word 'MORADABAD'?

171. A parallelogram is cut by two sets of m lines parallel to its sides. Find the number of parallelograms thus formed.

172. A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?

173. In how many ways can one select a circket team of eleven from17 players in which only 5 persons can bowl if each cricket team of 11 must include exactly 4 bowlers?

174. Evaluate $^{20}C_5 + \sum_{r=2}^{5} {}^{25-x}C_4$.

175. From 4 officers and 8 jawans in how many ways can 6 be chosen:
   i. To include exactly one officer.
   ii. To include at least one officer?

176. If $\alpha = {}^{m}C_2$, then find the value of ${}^{\alpha}C_2$.

177. Find the number of positive integers greater than 6000 and less than 7000 which are divisible by 5, provided that no digit is to be repeated.

178. Match each item given under the column C_1 to its correct answer given under the column C_2.

Five boys and five girls form a line. Find the number of ways of making the seating arrangement under the following condition:

	C_1		C_2
(a)	Boys and girls alternate.	(i)	5! × 6!
(b)	No two girls sit together.	(ii)	10! – 5! 6!
(c)	All the girls sit together.	(iii)	$(5!)^2 + (5!)^2$
(d)	All the girls are never together.	(iv)	2! 5! 5!

*** Case study based questions** **[8]**

179. Five students Ajay, Shyam, Yojana, Rahul and Akansha are sitting in a playground in a line.

Based on the above information, answer the following questions.

(i) Total number of ways of sitting arrangement of five students is
   (a) 120 (b) 60 (c) 24 (d) None of these

(ii) Total number of arrangement of sitting, if Ajay and Yojana sit together, is

(a) 60 (b) 48 (c) 72 (d) 120

(iii) Total number of arrangement 'Yojana and Rahul sitting at extreme position' is

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

(iv) Total number of arrangement, if shyam is sitting in the middle, is

(a) 24 (b) 12 (c) 6 (d) 36

(v) Total number of arrangement sitting Yojana and Rahul not sit together, is

(a) 72 (b) 120 (c) 60 (d) 144

180. Republic day is a national holiday of India. It honours the date on which the constitution of India came into effect on 26 January 1950 replacing the Government of India Act (1935) as the governing document of India and thus, turning the nation into a newly formed republic.

Answer the following question, which are based on the word "REPUBLIC".

(i) Find the number of arrangements of the letters of the word 'REPUBLIC'.

(a) 40300 (b) 30420 (c) 40320 (d) 40400

(ii) How many arrangements start with a vowel?

(a) 12015 (b) 15120 (c) 12018 (d) 15100

(iii) Which concept is used for finding the arrangements start with a vowel?

(a) Permutation (b) FPM (c) Combination (d) FPA

(iv) If the number of arrangements of the letters of the word 'REPUBLIC' is abcde, the (a + b + $\mathbf{c}+\mathbf{d}+\mathbf{e}$) is

(a) 10 (b) 9 (c) 8 (d) 15

(v) If the number of arrangements start with a vowel is abcde, then $(\mathbf{a}+\mathbf{b})-(\mathbf{d}+\mathbf{e})$ is

(a) 2 (b) 3 (c) 4 (d) 5

----- When we strive to become better than we are, everything around us becomes better too -----