29. PERMUTATIONS

1. Find the number of different garlands that can be prepared using 6 different coloured flowers

[AP EAMCET 17-09-20_Shift-1]

1. 120
2. 60
3. 119
4. 59

2. Letters of the word 'GOVIND' are permuted and arranged as in a dictionary then the number of words that appear after the word 'GOVIND' is

[AP EAMCET 17-09-20_Shift-2]

1. 519
2. 510
3. 506
4. 511

3. The number of different words that can be formed from the letters of the world "INTERMEDIATE" such that two vowels never come together, is

[AP EAMCET 18-09-20_Shift-1]

1. $\frac{6!}{2!}\times\frac{7!}{2!3!}$
2. $\frac{5!}{2!}\times\frac{6!}{3!}$
3. $6!\times\frac{7!}{2!3!}$
4. $\frac{6!}{2!}\times\frac{6!}{2!3!}$

4. $\frac{10001\times100!}{2\times1!+5\times2!+10\times3!+.....+10001\times100!}=$

[AP EAMCET 18-09-20_Shift-2]

1. $\frac{1001}{1100}$
2. $\frac{10001}{10100}$
3. $\frac{101}{110}$
4. $\frac{100001}{101000}$

5. ${}^{n}P_4=1680$, then n =

[AP EAMCET 21-09-20_Shift-1]

1. 6
2. 12
3. 10
4. 8

6. All the words that can be formed using alphabets A, H, L, U, R are written as in dictionary (no alphabet is repeated). Then the rank of the word RAHUL is **[AP EAMCET 21-09-20_Shift-1]**

1. 70
2. 71
3. 73
4. 74

7. A number lock has 3 rings and each ring has 8 digits. total number of different ways in which 3 rings can be rotated is

[AP EAMCET 21-09-20_Shift-2]

1. 3^8
2. 8^3
3. 3×8
4. $8p_3$

8. Find the number of ways of arranging 6 red balls and 6 black balls in a row such that no two black balls are together

[AP EAMCET 22-09-20_Shift-1]

1. $6!\times6!$
2. $7!\times6!$
3. $2\times6!\times6!$
4. $8\times6!\times6!$

9. If the letters of the word "ASSASSINATION" are arranged at random in a row, then the probability that no two A's come together is equal to

[AP EAMCET 22-09-20_Shift-1]

1. $\frac{25}{26}$
2. $\frac{23}{26}$
3. $\frac{15}{26}$
4. $\frac{17}{26}$

10. If the number of all possible permutations of the letters of the word MATHEMATICS in which the repeated letters are not together is 982(X),then X=

[TS EAMCET 09-09-20_Shift-1]

1. 5040
2. 14400
3. 21600
4. 86400

11. There are 10 red and 5 yellow roses of different sizes. If x is the number of garlands that can be formed with all these flowers so that no two yellow roses come together and y is the number of garlands formed with all these flowers so that all the red roses coming together, then $\frac{2(x-y)}{10!}=$

[TS EAMCET 09-09-20_Shift-1]

1. $\frac{9!}{5!}-5!$
2. $(11)^2.(4!)$
3. $10!-6!$
4. $6!\times(5!-2)$

12. Five boys and five girls are writing an examination in a hall in which 5 benches are arranged in a row and only two students are to be seated on every bench at either of its ends. If the seating arrangement is to be such that no two boys or no two girls sit together as neighbours (a student should not have a student of same gender either on left or right; immediate front or back),then the total number of such arrangements is

[TS EAMCET 09-09-20_Shift-2]

1. 28800
2. 14400
3. 240
4. 480

13. The total number of three digit and five digit integers which can be formed by using the digits 0,1,2,3,4,5 but using each digit not more than once in each number is **[TS EAMCET 10-09-20_Shift-1]**

1. 100
2. 600
3. 700
4. 800

14. If x and y represent the number of arrangements of the letters of word ATRAPATRAM such that (i) all A's are together and (ii) no two A's are together respectively, then x + y =

[TS EAMCET 10-09-20_Shift-2]

1. $\frac{10!}{4!2!2!}$
2. $\frac{7!\times 15}{2!2!4!}$
3. $\frac{6!}{2!2!}\times 42$
4. $\frac{7!}{2!2!}+\frac{6!{}^{7}P_{4}}{2!2!}$

15. Numbers between 1 and 10,000 are formed using the digits 2 and 3 only once and the digit 4 twice. If the numbers thus formed are arranged in increasing order and x, y represent the ranks of 4324 and 324 respectively then x – y =

[TS EAMCET 10-09-20_Shift-2]

1. 17
2. 31
3. 14
4. 16

16. If 3 sisters and 8 other girls are together playing a game, then the number of ways in which all the girls are seated around a circle such that the three sisters are not seated together, is

[TS EAMCET 11-09-20_Shift-1]

1. 11!×8
2. 8!×504
3. 7!×210
4. 8!×84

17. For $n=1,2,3,.....,50$, let

$$A=\left\{a_n / a_n=\begin{cases}(-1)^{\frac{n}{2}}\left(\frac{n}{2}\right), & \text{if } n \text{ is even}\\ (-1)^{\frac{n-1}{2}}\left(\frac{n-1}{2}\right), & \text{if } n \text{ is odd}\end{cases}\right\}$$ and B is the set of all distinct elements of A. The of permutations all the elements of set B such that even integers are in increasing order, is

[TS EAMCET 11-09-20_Shift-2]

1. $\frac{26!}{12!}$
2. $\frac{49!}{12!13!}$
3. $\frac{50!}{24!26!}$
4. $\frac{26!}{13!12!}$

18. If α represents the number of arrangements of p men and q women in a row such that all men are together and β represents the number of circular arrangements of the same people with the same condition, then $\alpha:\beta$ is

[TS EAMCET 11-09-20_Shift-2]

1. $(q+1)p!:1$
2. $(q+1):1$
3. $1:p!$
4. $p!:q!$

19. If a person has 3 coins of different denominations, the number of different sums can be formed is

[AP EAMCET 19-08-2021_Shift-1]

1. 3
2. 7
3. 8
4. 3!

20. There are 7 identical white balls and 3 identical black balls. The number of distinguishable arrangements in a row of all the balls. So that no two black balls are adjacent is___

[AP EAMCET 19-08-2021_Shift-1]

1. 120
2. 89.(8!)
3. 56
4. 42×5^4

21. The number of ways of distributing eight identical rings to three different girls so that every girl gets at least one ring is

[AP EAMCET 19-08-2021_Shift-1]

1. 21
2. 120
3. ${}^{8}P_{3}$
4. ${}^{8}P_{3}-6$

22. For $1\le r\le n, \frac{1}{r+1}\left\{{}^{n}P_{r+1}-{}^{(n-1)}P_{r+1}\right\}$ is equal to

[AP EAMCET 19-08-2021_Shift-2]

1. ${}^{n}P_{n}$
2. ${}^{n-1}P_{r}$
3. ${}^{n}P_{n+1}$
4. 0

23. In how many ways 4 balls can be picked from 6 black and 4 green colored balls such that at least one black ball is selected?

[AP EAMCET 19-08-2021_Shift-2]

1. 212
2. 210
3. 209
4. 15

24. In how many can 9 examination papers be arranged so that the best and worst papers are never together?

[AP EAMCET 19-08-2021_Shift-2]

1. 9!–2!×7!
2. 9!–2!×8!
3. 9!–8!
4. 9!–7!

25. The value of ${}^6P_4 + 4 \cdot {}^6P_3$ is_____

[AP EAMCET 20-08-2021_Shift-1]

1. 5040
2. 2520
3. 840
4. 720

26. The number of ways in which 3 boys and 2 girls can sit on a bench so that no two boys are adjacent is____

[AP EAMCET 20-08-2021_Shift-1]

1. 6
2. 10
3. 12
4. 32

27 In how many ways can 5 balls be placed in 4 tins if any number of balls can be placed in any tin?

[AP EAMCET 20-08-2021_Shift-1]

1. ${}^5P_4$
2. ${}^5C_4$
3. 4^5
4. 5^4

28. If a set A has m elements and set B has n elements and the number of injections from A to B is 2520. Then m is equal to

[AP EAMCET 23-08-2021_Shift-1]

1. 2
2. 7
3. 6
4. 5

29. The number of ways in which 6 men and 5 women can dine at a round table, if no two women are to sit together is

[AP EAMCET 23-08-2021_Shift-1]

1. $6! \times 5!$
2. 30
3. $5! \times 4!$
4. $7! \times 5!$

30. In how many ways can the letters of the word MAXIMA be arranged such that all vowels are together and all consonants are together?

[AP EAMCET 23-08-2021_Shift-1]

1. 18
2. 30
3. 36
4. 42

31. The value of ${}^7P_3 - 3\left({}^6P_2\right)$ is equal to

[AP EAMCET 25-08-2021_Shift-1]

1. ${}^7P_2$
2. 60
3. ${}^6P_3$
4. 240

32. In an examination, a student has to write exams in 8 different subjects. He is declared fail if he fails in at least one subject. The number of ways in which he can fail is ____

[AP EAMCET 25-08-2021_Shift-2]

1. 127
2. 256
3. 255
4. 7

33. If $8 \cdot {}^7P_r = 7 \cdot {}^8P_{r-1}$, what is the value of 'r'?

[AP EAMCET 25-08-2021_Shift-2]

1. 3 & 4
2. 2 & 5
3. 4 & 5
4. No solution (No such 'r' exists)

34. 7 relatives of a man comprises 4 ladies and 3 gentlemen. His wife also has 7 relatives –3 of them are ladies and 4 are gentlemen. In how many ways can they invite a dinner party of 3 ladies and 3 gentlemen so that there are 3 of man's relative and 3 of wife's relative?

[AP EAMCET 25-08-2021_Shift-2]

1. 485
2. 500
3. 486
4. 102

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

[AP EAMCET 23-08-2021_Shift-1]

1. 20
2. 36
3. 30
4. 720

36. The number of distinct positive integers can be formed using 0, 1, 2, 3 where each integer used at most once is equal to

[AP EAMCET 23-08-2021_Shift-1]

1. 84
2. 64
3. 48
4. 36

37. If there are 5 letters written to 5 different people and 5 envelopes addressed to them, then the number of ways in which these letters can be arranged so that no letter goes into its corresponding envelope is

[TS EAMCET 04-08-2021_Shift-2]

1. 9
2. 24
3. 44
4. 119

38. If ${}^{22}P_{r+1} : {}^{20}P_{r+2} = 11 : 52$ then $r =$

[TS EAMCET 04-08-2021_Shift-1]

1. 3
2. 5
3. 7
4. 9

39. If $0 < r < s < n$ and ${}^nP_r = {}^nP_s$, then $r + s =$

[TS EAMCET 05-08-2021_Shift-1]

1. $2n-2$
2. $2n-1$
3. 2
4. 1

40. the number of five digit numbers greater than 50000 that can be formed by using all the digits 0,1,3,5,9 only once is

[TS EAMCET 05-08-2021_Shift-2]

1. 24
2. 48
3. 150
4. 30

41. Seven scientists $S_1, S_2, ...S_7$ are invited to deliver one lecture each in a conference. The number of ways all the seven lectures can be arranged such that the lecture of S_1 is prior to that of S_3 and the lecture of S_3 is prior to that of S_7 is

[TS EAMCET 06-08-2021_Shift-2]

1. 35
2. 840
3. 720
4. 210

42. By using the non-zero digits, the number of 5 digit numbers that can be formed so that each number has largest digit in its middle place and the digits in the number are different is

[TS EAMCET 06-08-2021_Shift-1]

1. $\sum_{r=4}^{9} {}^{r}P_4$
2. $\sum_{r=4}^{8} {}^{r}P_4 - \sum_{r=4}^{8} {}^{r}P_3$
3. $\sum_{r=4}^{8} {}^{r}P_3$
4. $\sum_{r=4}^{8} {}^{r}P_4$

43. T_m denotes the number of triangles that can be formed with the vertices of a regular polygon of m sides. If $T_{m+1} - T_m = 15$, then m =

[TS EAMCET 06-08-2021_Shift-1]

1. 3
2. 6
3. 9
4. 12

44. The total number of permutations of n different things taken not more than r at a time. When each thing may be repeated any number of times is

[AP EAMCET 04-07-2022_Shift-1]

1. $= \frac{n\left(n^{r+1}-1\right)}{n-1}$
2. $\frac{n^{r+1}-1}{n-1}$
3. $\frac{n\left(n^{r}-1\right)}{n-1}$
4. $\frac{\left(n^{r}-1\right)}{n-1}$

45. If a set A has m elements and the set B has n elements, then the number of injections from A to B is

[AP EAMCET 04-07-2022_Shift-2]

1. ${}^{n}C_m$ *if* $n \geq m$
2. ${}^{n}P_m$ *if* $n \geq m$
3. 0 *if* $n \geq m$
4. $m.{}^{n}C_m$ *if* $n \geq m$

46. In how many ways can the letters of the word "MULTIPLE" be arranged keeping the position of the vowels fixed ?

[AP EAMCET 04-07-2022_Shift-2]

1. 60
2. 360
3. 600
4. 300

47. Number of four digit numbers that can be formed using all the digits except zero such that every number has exactly 2 distinct digits in it is **[AP EAMCET 06-07-2022_Shift-1]**

1. 189
2. 216
3. 288
4. 504

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

[AP EAMCET 06-07-2022_Shift-1]

1. 120
2. 21600
3. 720
4. 3600

49. The number of ways of distributing 500 dissimilar boxes equally among '50' persons is

[AP EAMCET 06-07-2022_Shift-1]

1. $500!/(10!)^{50}.50!$
2. $500!/(50!)^{10}.10!$
3. $500!/(50!)^{10}$
4. $500!/(10!)^{50}$

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

[AP EAMCET 06-07-2022_Shift-2]

1. 10!
2. 10!/3!2!2!
3. 9!/3!2!21
4. 9!

51. The number of number between2000 and 5000 that can be formed with the digits 0.1,2,3,4(repetition of digits not allowed) and are multiple of 3 is

[AP EAMCET 06-07-2022_Shift-2]

1. 48
2. 30
3. 24
4. 32

52. How many numbers between 10 and 10,000 can be formed by using the digits 1,2,3,4,5, if no digit is repeated in any number?

[AP EAMCET 06-07-2022_Shift-2]

1. 200
2. 775
3. 60
4. 120

53. The English alphabet has 5 vowels and 21 consonants. How many words with two different vowels and two different consonants can be formed from the alphabet?

[AP EAMCET 07-07-2022_Shift-2]

1. $2100\times 2!$
2. $210\times 2!$
3. $210\times 4!$
4. $2100\times 4!$

54. If $^{n}P_{r} = {}^{(n-1)}P_{r} + x.{}^{(n-1)}P_{(r-1)}\ \forall n, r \in N \text{ and } r \le n$, then $x =$

[AP EAMCET 07-07-2022_Shift-2]

1. (n+1)
2. (r+1)
3. n
4. r

55. The sum of all possible numbers that can be formed by using the digits 2,3,5,7 without repetition of digits is

[AP EAMCET 07-07-2022_Shift-2]

1. $17\times\frac{10^4-1}{9}$
2. $33\times 34\times 101$
3. $6\times\frac{10^3-1}{9}$
4. $33\times 35\times 1001$

56. What is the rank of the word "MOTHER" when all possible words are formed using all its letters and arranged as in a dictionary?

[AP EAMCET 08-07-2022_Shift-1]

1. 308
2. 309
3. 291
4. 307

57. The number of 3 – digit odd numbers divisible by 3 that can be formed using the digits 1,2,3,4,5,6, when repletion is not allowed is

[TS EAMCET 18-07-2022_Shift-1]

1. 18
2. 21
3. 24
4. 36

58. a, b, c are three particular speakers among the 10 speakers of a meeting. The number of ways of arranging all the 10 speakers on the dias in a row so that all the three speakers a, b, c do not sit together is

[TS EAMCET 18-07-2022_Shift-2]

1. 714 (7!)
2. 89 (8!)
3. 719 (7!)
4. 84(8!)

59. The number of ways of arranging the letters of the word LINEAR so that the letters N and R do not come together and E and A come together is

[TS EAMCET 19-07-2022_Shift-2]

1. 80
2. 60
3. 10
4. 144

60. Let a, b, c $\in \mathbb{N}$ and a+b+c = 5. Let L, M be the least and greatest values of $2^a3^b5^c$ respectively. Then M−L =

[TS EAMCET 20-07-2022_Shift-1]

1. $2.3^2.5.7$
2. $2^2.3.5.7$
3. $2.3^2.5^2.7^0$
4. $2^0.3.5^3.7^0$

61. The number of natural numbers less than 10000 which are divisible by 5 and that no digit is repeated in the same number is

[15th May 2023 Shift 1]

1. 802
2. 602
3. 702
4. 1106

62. The number of six digit natural numbers that can be formed with the digits 2,3,4,0,5,6,7,8 is

[15th May 2023 Shift 2]

1. 7×2^{12}
2. 7×2^{9}
3. 7×2^{6}
4. 7×2^{15}

63. If 2^n divides 16! And 2^{n+1} does not divide 16!, then n =

[16th May 2023 Shift 1]

1. 14
2. 15
3. 16
4. 17

64. If a seven digit number formed with distinct digit 4,6,9,5,3,x and y is divisible by 3,then the number of such ordered pairs (x, y) is

[16th May 2023 Shift 1]

1. 7
2. 8
3. 9
4. 10

65. The number of arrangements of the letters of the word A R R A N G E M E N T in which two Es' do not occur adjacently is

[16th May 2023 Shift 2]

1. $\frac{9}{8}(10)!$
2. $\frac{9}{4}(10)!$
3. $\frac{9}{16}(10)!$
4. $\frac{9}{32}(10)!$

66. The number of words that can be formed using the letters of the word V O W E L so that vowels remains always together is

[16th May 2023 Shift 2]

1. 60
2. 48
3. 36
4. 45

67. The number of all four digit numbers which begin with 4 and end with either zero or five is **[17th May 2023 Shift 1]**

1. 200
2. 64
3. 256
4. 32

68. The number of arrangements of the word K A N G A R O O in which A's do not appear together is **[17th May 2023 Shift 2]**

1. 2520
2. 3780
3. 7650
4. 7560

69. If $A=\{(a,b):4a=5b;a,b\in\{1,2,3,.....30\}\}$ then the number of such ordered pairs (a,b) is

[17th May 2023 Shift 2]

1. 4
2. 6
3. 8
4. 10

70. A question paper has two sections A and B in which section-A has 8 questions and section-B has 6 questions. A student has to answer a total of 10 questions, choosing atleast 4 questions fromsection-A and atleast3 questions from section-B. Then the number of ways a student can answer that paper is

[18th May 2023 Shift 2]

1. 800
2. 820
3. 840
4. 986

71. If 5 dice are rolled simultaneously, then the number of ways of getting a total of seven of the numbers appear on their faces is

[18th May 2023 Shift 2]

1. 12
2. 15
3. 20
4. 25

72. The numbers of positive even divisors of 6300 is **[18th May 2023 Shift 2]**

1. 30
2. 24
3. 18
4. 36

73. The number of natural numbers less than 500 in which no two digits are repeated is

[19th May 2023 Shift 1]

1. 374
2. 376
3. 378
4. 380

74. The number of ways of arranging all the letters of the word "SUNITHA" so that the vowels always occupy the first, middle and last places is

[12TH MAY 2023 SHIFT-1]

1. 5040
2. 24
3. 3
4. 144

75. The number of all four digit numbers that can be formed with the digits 0, 1, 2, 3, 4, 5 when the repetition of the digits is not allowed, is

[12TH MAY 2023 SHIFT-1]

1. 360
2. 600
3. 240
4. 300

76. The number of four digit numbers that can be formed using the digits 1, 2, 3, 4, 5, 6, 7 which are divisible by 4, when the repetition of any digit is not allowed, is

[12TH MAY 2023 SHIFT-1]

1. 100
2. 200
3. 300
4. 400

77. The total number of all those 3-digit number in which the sum of all digits in each of them is 10, is **[12TH MAY 2023 SHIFT -2]**

1. 54
2. 55
3. 56
4. 58

78. All the letters of the word 'MOTHER' are written in all possible ways and strings of letters (with or without meanings) so formed are written as in a dictionary order. Then the position of the word 'THROEM' is

[12TH MAY 2023 SHIFT -2]

1. 642
2. 648
3. 647
4. 646

79. If n, r are two positive integers such that $1 \le r < n$, then

$${}^{n}P_{r+1} + r^2\,{}^{n-1}P_{r-1} + (r+1)^{n-1}P_r + r^{n-1}p_{r-1} =$$

[13TH MAY 2023 SHIFT-1]

1. ${}^{n+2}P_{r+2}$
2. ${}^{n+2}P_{r+1}$
3. $(n+1)!$
4. ${}^{n+1}P_{r+1}$

80. The number of ways in which n boys and n girls can be arranged in a row such that all the boys are together and all the girls are also together is equal to

[13TH MAY 2023 SHIFT-1]

1.The number of ways in which n boys and n girls can be arranged in a row

2.The number of ways in which n boys and n girls can be arranged in a row such that all the girls are together

3.The number of ways in which n boys and n girls can be arranged in a row such that no two girls are together

4.The number of ways in which n boys and n girls can be arranged in a row such that no two girls are together and no two boys are together

81. Among the positive divisors of the number 12600, if n_1 is the number of divisors which are multiples of 3 and n_2 is the number of divisors which are multiples of 14, then $n_1 + n_2 =$

[13TH MAY 2023 SHIFT-1]

1. 75
2. 57
3. 51
4. 33

82. All the letters of the word ' INDEED' are taken and permuted in all possible ways to form distinct 6 letter strings (words with or without meaning). If they are listed in dictionary order, then the rank position of the string ' NIDDEE' is

[EAPCET 13-05-23 SHIFT-2]

1. 349
2. 325
3. 163
4. 175

83. All possible 5 digit numbers each having 5 distinct digits are formed using the digits 1,2,3,5,6,8. Among then, the number of numbers which are divisible by 3 but not by 6 is

[EAPCET 13-05-23 SHIFT-2]

1. 120
2. 72
3. 48
4. 240

KEY

1)	2	**2)**	3	**3)**	4	**4)**	2	**5)**	4
6)	4	**7)**	2	**8)**	2	**9)**	3	**10)**	1
11)	1	**12)**	1	**13)**	3	**14)**	3	**15)**	1
16)	4	**17)**	1	**18)**	2	**19)**	2	**20)**	3
21)	1	**22)**	2	**23)**	3	**24)**	2	**25)**	3
26)	3	**27)**	3	**28)**	4	**29)**	1	**30)**	1
31)	3	**32)**	3	**33)**	4	**34)**	1	**35)**	2
36)	3	**37)**	3	**38)**	3	**39)**	2	**40)**	2
41)	2	**42)**	4	**43)**	2	**44)**	3	**45)**	2
46)	2	**47)**	4	**48)**	4	**49)**	4	**50)**	2
51)	2	**52)**	1	**53)**	4	**54)**	4	**55)**	2
56)	2	**57)**	3	**58)**	4	**59)**	4	**60)**	1
61)	4	**62)**	4	**63)**	2	**64)**	2	**65)**	3
66)	2	**67)**	1	**68)**	4	**69)**	2	**70)**	4
71)	2	**72)**	4	**73)**	3	**74)**	4	**75)**	4
76)	2	**77)**	1	**78)**	3	**79)**	4	**80)**	4
81)	1	**82)**	4	**83)**	3				

SOLUTIONS

1. Use $\frac{(n-1)!}{2}$ *here* $n=6$

2. Rank of the word GOVIND
Alphabetical order D G I N O V
G O V I N D
D G I N O V
$=1(5!)+3(4!)+3(3!)+1(2!)+1(1!)+1$
$=214$
The no. of words that appear after the word GOVIND = no. of ways of arrange given word – rank of given word
$6!-214=720-214=506$

3. Conceptual

4. $2\times1!+5\times2!+10\times3!+.....+10001\times100!$
$=\sum_{r=1}^{100}(r^2+1)r!=\sum_{r=1}^{100}(r^2+r-r+1)r!$
$=\sum_{r=1}^{100}(r(r+1)-1(r-1))r!$
$=\sum_{r=1}^{100}(r(r+1)!-(r-1)r!)=100\times101!$
$\text{Given}=\frac{10001\times100!}{100\times101!}=\frac{10001\times100!}{100\times101\times100!}=\frac{10001}{10100}$

5. ${}^{n}P_4=8\times7\times6\times5$
$n=8, r=4$

6. 4 1 2 5 3
R A H U L
4! 3! 2! 1! 0!
$=3(4!)+0(3!)+0(2!)+1(1!)+0!$
$=72+0+0+1+1=74$

7. $8\times8\times8$, each ring can be set in 8 different ways.
Hence total ways = 8^3

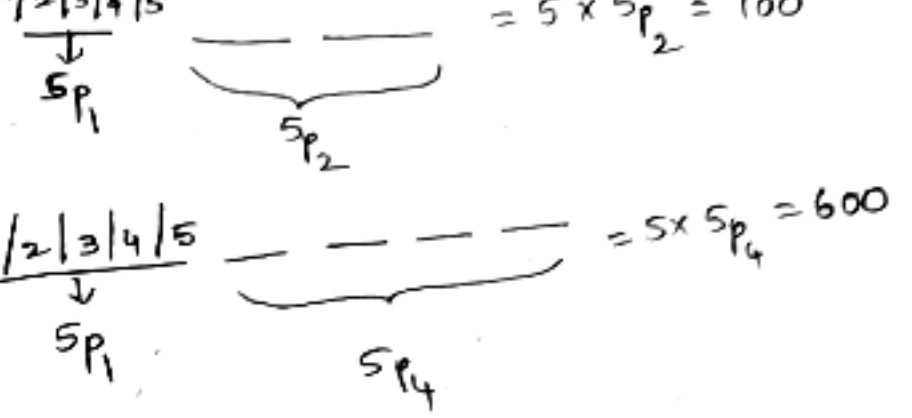
8. $\_R\_R\_R\_R\_R\_R\_$
$6!\times7_{P_6}=6!\times7!$

9. Conceptual

10. Total permutations – Repeated letters come together permutations
$=\frac{11!}{(2!)^3}-8!=982\times7!=982\times5040$

11. $x=\frac{9!}{2}\times{}^{10}p_5$, $y=\frac{5!}{2}\times10!$
$=\frac{10!\times9\times8\times7\times6}{2}$, $y=\frac{10!5!}{2}$
$\frac{2}{10!}(x-y)=\frac{2}{10!}\left(\frac{10!(9.8.7.6-5!)}{2}\right)=\frac{9!}{5!}-5!$

12. Total no. of arrangements $=5!5!2=28800$

13. 

Required number of ways =700

14. $x=\frac{7!}{2!2!}.\frac{4!}{4!}$
$y=\frac{6!}{2!2!}.\frac{{}^{7}P_4}{4!}$
$x+y=\frac{6!}{2!2!}.(42)$

15. $-\quad\rightarrow\frac{4}{2!}=2$
$--\quad\rightarrow\frac{{}^{4}P_2}{2!}=6$
$---\quad\rightarrow\frac{{}^{4}P_3}{2!}=12$
$\underline{2}---\rightarrow\frac{3!}{2!}=3$
$\underline{3}---\rightarrow\frac{3!}{2!}=3$
$\underline{42}--\rightarrow2!=2$
$\underline{43}\underline{24}\rightarrow\quad=1$
total $=29$
$-\quad\rightarrow3$
$--\quad\rightarrow{}^{3}P_2=6$
$\underline{2}--\rightarrow2$
$\underline{32}\underline{4}\rightarrow1$
total 12
$\therefore x-y=29-12=17.$

16. Required = total permutations
– (3 sisters come together permutations)
$=(11-1)!-(8!\times 3!)$
$=10!-(8!\times 3!)=8!\times 84$

17. $A_n=\left\{\begin{matrix} a_n/a_n=(-1)^{\frac{n}{2}}.\frac{n}{2},\ n\ is\ even \\ =(-1)^{\frac{n+1}{2}}.\frac{n-1}{2},\ n\ is\ odd \end{matrix}\right\}$

$A_1=0, A_2=-1, A_3=-1, \ldots A_{48}=24, A_{49}=24, A_{50}=-25$

$B=\{0,-1,2,-3,4,-5,6,\ldots..,-23,24,-25\}$

Total we have 26 numbers and 12 are even numbers 12 even numbers treat as identities

then the no. of. Arrangements $=\frac{(26)!}{(12)!}$

18. $\alpha=(q+1)!\,p!,\ \ \beta=q!\,p!$

$\frac{\alpha}{\beta}=\frac{(q+1).q!\,p!}{q!\,p!}=\frac{q+1}{1}$

19. No. of different sum
= Total – (Same denomination sum) $=2^3-1$

20. 1st arrange 7 identical white balls $=\frac{7!}{7!}$ ways

Next arrange 3 identical Black balls in 8 gaps $=\frac{{}^8P_3}{3!}$

Required No. of ways $=\frac{7!}{7!}\times\frac{{}^8P_3}{3!}=56$

21. Each Girls has one Ring = 1 way

Remaining 5 – rings distribute to 3 Girls

Here, $n=5, r=3$

$\therefore\ {}^{(n+r-1)}C_{r-1}={}^7C_2=21$

22. Use formula ${}^nP_r=\frac{n!}{(n-r)!}$ and simplify

23. Black Balls = 6
Green = 4
Required no. of ways
$={}^6C_1\times{}^4C_3+{}^6C_2\times{}^4C_2+{}^6C_3\times{}^4C_1+{}^6C_4\times{}^4C_0$
$=24\times 90+80+15=209$

24. Let (Best + worst) papers = 1 unit
Total papers $=7+1=8$
No. of ways arranging 8 papers = 8!
Arrange Best & worst papers =2! Ways
Arrange Best & worst papers together = 8!2!
Required no. of ways = Total – 8!2! = 9!-8!2!

25. Use formula ${}^nP_r=\frac{n!}{(n-r)!}$

26. 1st arrange 2 Girls =2!
In 3 gaps filled with 3 Boys $={}^3P_3$
Required no. of ways $=2!\times{}^3P_3=12$

27. Required no. of ways = no. of functions
From $A\to B=n(3)^{n(A)}=4^5$

28. ${}^nP_m=2520=7\times6\times5\times4\times3={}^7P_5\ \therefore m=5$

29. 1st arrange 6 Men in circle $=(6-1)!=5!$
In 6 gaps fill with 5 Women $={}^6P_5=6!$
Required no. of ways $=5!\times6!$

30. M A X I M A
Vowels (A, I, A) = 3
Consonants (M, X, M) = 3
Let vowels =1 unit, consonants = 1 unit
Total $=1+1=2\,unit$
2 units arranging = 2! Ways
Vowels arranging $=\frac{3!}{2!}=3$
Consonants arranging $=\frac{3!}{2!}=3$
Required No. of ways $=2\times3\times3=18$

31. Use formula ${}^nP_r=\frac{n!}{(n-r)!}$

32. Total subjects = 8
Student passed = 1 way
Required no. of ways $=2^n-1=2^8-1$

33. Use formula ${}^nP_r=\frac{n!}{(n-r)!}$
But No such r exist.

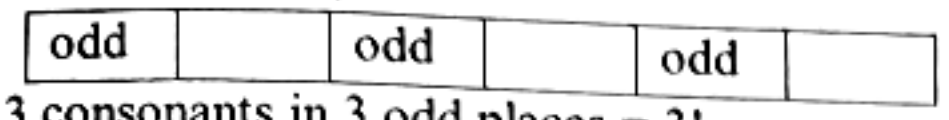
34. $\overbrace{4L\quad 3M}^{7(H)}\qquad\overbrace{3L\quad 4M}^{7(W)}$

$={}^4C_3\times{}^4C_1+{}^4C_2\times{}^3C_1\times{}^3C_1\times{}^4C_2+{}^4C_1\times{}^3C_2\times{}^3C_2\times{}^4C_1+{}^3C_3{}^3C_3$
$=16+18\times18+12\times12+1=485$

35. M O B I L E

Consonants (M, B, L) = 3

Vowels (U, I, E) = 3

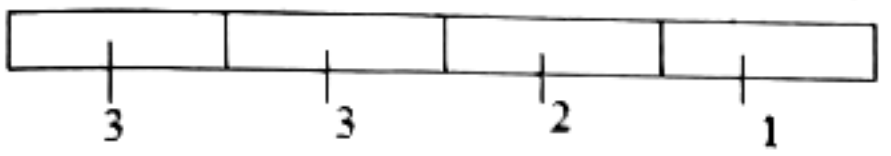


3 consonants in 3 odd places = 3!

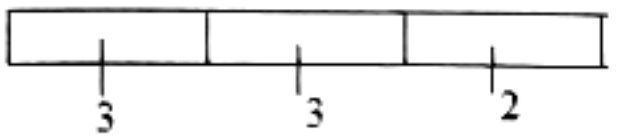
Remaining 3 places fill with 3 vowels = 3!

Required no. of ways $= 3! \times 3! = 36$

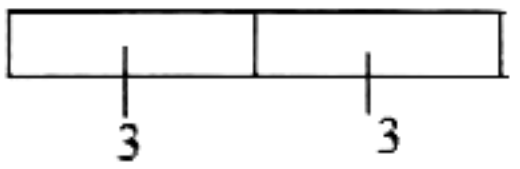
36. All 4 – digited numbers $= 3 \times 3 \times 2 \times 1 = 18$



All 3 – digited numbers $= 3 \times 3 \times 2 = 18$



All 2- digited numbers $= 3 \times 3 = 9$



One digit positive numbers = 3

Total numbers $= 18 + 18 + 9 + 3 = 48$

37. $5!\left(1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!}\right)$

$= 120\left(\frac{1}{2} - \frac{1}{6} + \frac{1}{24} - \frac{1}{120}\right) = (60 - 20 + 5 - 1) = 44$

38. ${}^{22}P_{r+1} : {}^{20}P_{r+2} = 11 : 52$

$\frac{{}^{22}P_{r+1}}{{}^{20}P_{r+2}} = \frac{11}{52} \Rightarrow \frac{22!}{(21-r)!} \times \frac{(18-r)!}{20!} = \frac{11}{52}$

$\frac{22 \times 21}{(21-r)(20-r)(19-r)} = \frac{11}{52}$

$\Rightarrow (21-r)(20-r)(19-r) = 2184 \Rightarrow r = 7$

39. *Given* ${}^{n}p_r = {}^{n}p_s \Rightarrow \frac{n!}{(n-r)!} = \frac{n!}{(n-s)!}$

Given that $r < s \Rightarrow -r > -s$

$\therefore (n-r) > (n-s)$

We know that, two different factorials are zero and one.

i.e., $n - r = 1 \rightarrow (1)$ *and* $n - s = 0 \rightarrow (2)$

$(1) + (2) \Rightarrow 2n - (r+s) = 1 \Rightarrow r + s = 2n - 1$

40 Given digits are 0,1,3,5,9

_ _ _ _ _

First place can be filled with 5 or 9

This can be done in two ways. remaining

Four places can be filled with remaining four digits in 4! Ways.

Hence the numbers of five digit numbers grater then 50000 is $= 2 \times 4! = 2 \times 24 = 48$

41. $\frac{7!}{3!} = \frac{5040}{6} = 840$

42. Conceptual

43. $T_{m+1} - T_m = 15$

${}^{(m+1)}C_3 - {}^{m}C_3 = 15$

$\frac{(m+1).m(m-1)}{1.2.3} - \frac{m.(m-1)(m-2)}{1.2.3} = 15$

$m(m-1)[m+1-m+2] = 90$

$\therefore m = 6$

44. $n + n^2 + n^3 + \ldots\ldots + n^r$

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

45. $n(A) = m, n(B) = n$

The number of injections from A to B is

${}^{n(B)}P_{n(A)} = {}^{n}P_m$ if $n \geq m$

46. C V C C V C C V

The required number of number of

arrangements $= \frac{3! \times 5!}{2!} = 360$

47. The required number of numbers

$= 9_{C_2}\left(\frac{4;}{2!2!} + \frac{4!}{3!} + \frac{4!}{3!}\right) = 504$

48. The required number of words =

$3_{C_2} \times 5_{C_3} \times 5! = 3600$

49. The required number of ways

$= \frac{500!}{(10!)^{50}} \times \frac{50!}{50!} = \frac{500!}{(10!)^{50}}$

50. Treat all the 3S's as one unit required number of arrangements $= \frac{10!}{3!2!2!}$

51. $(0,2,3,4)(0,1,2,3)$

$3\times3! + 2\times3! = 30$

52. 2 digit numbers $= 5\times4 = 20$

3 digit numbers $= 5\times4\times3 = 60$

4 digit number $= 5\times4\times3\times2 = 120$

$120+60+20$

200

53. $5c_2 \times 21c_2 \times 4!$

$= 2100\times4!$

54. ${}^{n-1}P_r + r\ {}^{n-1}P_{r-1} = {}^{n}P_r$

55. The sum of all possible numbers ,using all the digits

$= 3!(\text{sum of digits})(1111)$

$= 6\times17\times1111$

$= 33\times34\times101$

56.

3	4	6	2	1	5
M	O	T	H	E	R
5!	4!	3!	2!	1!	0!

$\text{Rank} = 2(5!)+2(4!)+3(3!)+1(2!)+1 = 309$

57. **1,2,3,4,5,6**

(1,2,3) = 4

(1,2,6) = 2

(1,3,5) = 6

(1,5,6) = 4

(2,3,4) = 2

(2,4,6) = 0

(3,4,5) = 4

(4,5,6) = 2

Total **24**

58. $10!-8!3!$

$= 8!\times9\times10-8!3!$

$= 8!(90-6)$

$= 8!\times84$

59.

L	I	N	E	A	R

$5!2!-4!2!2!$

$= 240-96$

$= 144$

60. $a+b+c=5$

$M = 5^3\ 3\ \ 2$

$L = 2^3\ 3\ \ 5$

$M-L = 5^3.3.2-2^3.3.5$

$= 2\times3^2\times5\times7$

61. Case 1

$\boxed{5}+\boxed{\ }\boxed{5}+\boxed{\ }\boxed{\ }\boxed{5}+\boxed{\ }\boxed{\ }\boxed{\ }\boxed{\ }$

$1+8\times1+8\times8\times1+8\times8\times7\times1 = 521$

Case 2

$\boxed{\ }\boxed{0}+\boxed{\ }\boxed{\ }\boxed{0}+\boxed{\ }\boxed{\ }\boxed{\ }\boxed{0}$

$9\times1+9\times8+9\times8\times7 = 585$

Total=521+585

=1106

62. No. of Six digit natural numbers that can be formed with the digits 2,3,4,0,5,6,7,8, is

$\overline{\downarrow}\overline{\downarrow}\overline{\downarrow}\overline{\downarrow}\overline{\downarrow}\overline{\downarrow}$ $= 7\times8^5$

$7\ 8\ 8\ 8\ 8\ 8$ $= 7\times2^{15}$

ways

63. Exponent of 2 in 16 ! is

$$\left[\frac{16}{2}\right]+\left[\frac{16}{4}\right]+\left[\frac{16}{8}\right]+\left[\frac{16}{16}\right]$$

= 15

64. $(4+6+9+5+3)+(x+y) = 3k$

$27+(x+y) = 3k$

x, y may be $\epsilon\{0, 1, 2, 7, 8\}$

$x = 0 \Rightarrow$ y not possible

$x = 1 \Rightarrow y = \{2, 8\}$

$x = 2 \Rightarrow y = \{1, 7\}$

$x = 7 \Rightarrow y = \{2, 8\}$

$x = 8 \Rightarrow y = \{1, 7\}$

$\therefore$ 8 ordered pairs possible

65. A R R A N G E M E N T

A –2 , R –2, N –2, E –2, G, T, M

Without E's : $\dfrac{9!}{2!\,2!\,2!}$

We have 10 gap's, E's can be arranged in $10_{c_2}\times1$

Total ways =

$$\frac{9!}{(2!)^3}\times 10_{c_2} = \frac{9!\times 10\times 9}{2^4}$$

$$= \frac{9}{16}(10!)$$

66. Conceptual

67. Conceptual

68. *No.of ways arrowing 6letters* $(K,N,G,R,O,O) = \frac{6!}{2!}$

No.of ways arrowing two A's in 6 gaps $= \frac{7p_2}{2!}$

Required permutation $= \frac{6!}{2!}\times\frac{7p_2}{2!}$

$= 7560$

69. Conceptual

70.

Section A (8)	Section B (6)	No.of ways	Total
4	6	$8_{c_4}\times 6_{c_6}$	$= 70$
5	5	$8_{c_5}\times 6_{c_5}$	$= 336$
6	4	$8_{c_6}\times 6_{c_4}$	$= 420$
7	3	$8_{c_7}\times 6_{c_3}$	$= 160$
			986

71. Conceptual

72.
2 | 6300
3 | 3150
3 | 1050
5 | 350
5 | 70
2 | 14
7

22× 32× 52× 71

No.of positive even divisors is

= 2 (2 + 1) (2 + 1) (1 + 1)

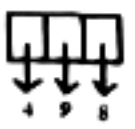
= 2 (3) (3) (2)

= 36

73. Single digit

$\square \rightarrow 9$

Two digit no's  $= 9\times 9 = 81$

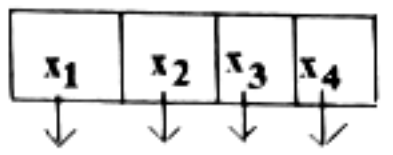
Three digit no's  $= 288$

378

74. Conceptual

75. The no of 4 digits numbers formed by

0,1,2,3,4,5



$5\times 5_{p_3} = 5\times 5\times 4\times 3$

$= 300$

76. If number should be divisible by 4, last two digits should be divisible by 4. So, the last two digits can be 12, 16, 24, 32, 36, 52, 56, 64, 72, 76

$\therefore$ Req *no. of ways* $= 5p_2\times 10 = 200$

77. Let xyz be the 3- digit numbers

$x+y+z=10 \quad x\geq 1, \quad y\geq 0 \quad z\geq 0$

$x-1=t \Rightarrow x=1+t$

$t+y+z=9$ where $t=0, \quad y\geq 0 \quad z\geq 0$

Total No.0f non negivetive integral solutions

${}^{9+3-1}C_{3-1} = {}^{11}C_2 = 55$

but t = 9 , x = 10 not possible

Total numbers =55-1=54

78. Rank of the word THROEM=647

79. Conceptual

80. Conceptual

81. $12600 = 126\times 100$

$= 6\times 21\times 25\times 4$

$= 2^3\times 3^2\times 5^2\times 7$

$n_1 = \text{multiple of } 3 = 4.2.3.2 = 48$

$n_2 = \text{multiple of } 14 = 3.3.3 = 27$

$n_1 + n_2 = 48 + 27$

$= 75$

82. NI D D E E

Rank is $5\times\frac{5!}{2!2!} + 4\times\frac{4!}{2!2!} + 1$

$= 150 + 24 + 1$

$= 175$

83. Given digits 1, 2, 3, 5, 6, 8. the no. Of 5- digit number which are divisible by 3 but not by 6 i.e The unit digit must be contain odd number and sum of all digits divisible by 3

$\Rightarrow \underline{2}\ \underline{5}\ \underline{6}\ \underline{8}\ \underline{3}$

$\Rightarrow 2\times 4! = 2\times 24 = 48$