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MATHEMATICS

TARGET : JEE- Advanced 2023

CAPS-14

Permutation & Combination

SCQ (Single Correct Type) :

1. The number of selections of four letters from the letters of the word ASSASSINATION is-

(A) 72 (B) 71 (C) 66 (D) 52

2. The maximum value of p such that 3^p divides $99 \times 97 \times 95 \times \ldots \times 51$ is -

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

3. There are 8 events that can be scheduled in a week, then The total number of ways in which the events can be scheduled is

(A) 7^8 (B) 8^7 (C) 7! (D) 8

4. Total number of integers 'n ' such that $2 \le n \le 2000$ and H.C.F of 'n ' and 36 is one, is equal to

(A) 666 (B) 667 (C) 665 (D) 668

5. Statement 1: A = { x : x is a prime number, x < 30 } then number of distinct rational numbers whose numerator and denominator belong to ' A' is 93

Statement 2: $\frac{p}{q} \in Q \forall\ q \neq 0$ and $p, q \in I$

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct Explanation for Statement-1

(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

6. Six cards are drawn one by one from a set of unlimited number of cards, each card is marked with numbers -1, 0 or 1. Number of different ways in which they can be drawn if the sum of the numbers shown by them vanishes, is:

(A) 111 (B) 121 (C) 141 (D) none

7. A five letter word is to be formed such that the letters appearing in the odd numbered positions are taken from the letters which appear without repetition in the word "MATHEMATICS". Further the letters appearing in the even numbered positions are taken from the letters which appear with repetition in the same word "MATHEMATICS". The number of ways in which the five letter word can be formed is:

(A) 720 (B) 540 (C) 360 (D) none

8. In a shooting competition a man can score 5, 4, 3, 2, or 0 points for each shot. Then the number of different ways in which he can score 30 in seven shots is-

(A) 420 (B) 421 (C) 422 (D) None of these

9. The maximum number of points of intersection of 7 straight lines and 5 circles when 3 straight lines are parallel and 2 circles are concentric, is/are-

(A) 106 (B) 96 (C) 90 (D) None of these

MCQ (One or more than one correct) :

10. If x be the number of 5 digit numbers, sum of whose digit is even and y be the number of 5 digit numbers, sum of whose digits is odd, then

(A) $x = y$ (B) $x + y = 90000$ (C) $x < y$ (D) $x = 45000$

11. The number of words which can be made from letters of the word INTERMEDIATE is-

(A) 907200 if word starts with I and end with E

(B) 21600 if vowels and consonants occupy their original places

(C) 43200 if vowels and consonants occur alternatively

(D) 302400if all the vowels occur together

12. Identify the correct statement(s).

(A) Number of zeroes standing at the end of 125 ! is 30.

(B) A telegraph has 10 arms and each arm is capable of 9 distinct positions excluding the position of rest. The number of signals that can be transmitted is $10^{10} - 1$.

(C) Number of numbers greater than 4 lacs which can be formed by using only the digits 0, 2, 2, 4, 4 and 5 is 90.

(D) In a table tennis tournament, every player plays with every other player. If the number of games played is 5050 then the number of players in the tournament is 100.

Numerical based Questions :

13. If n is 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 get equal blankets and another three particular beggars get equal blankets, then the value of n/2 is

14. The sides AB, BC & CA of a triangle ABC have 3, 4 & 5 interior points respectively on them. If the number of triangles that can be constructed using these interior points as vertices is k, then sum of digits in the number k equals.

15. Seven different coins are to be divided amongst three persons. If no two of the persons receive the same number of coins but each receives atleast one coin & none is left over, then the number of ways in which the division may be made is k, then sum of the digits in number of k equals.

16. The number of integers which lie between 1 and 10^6 and which have the sum of the digits equal to 12 is N where 'N' is a four digit number of the form abcd then (a – c) equals.

17. The number of ways in which 8 non-identical apples can be distributed among 3 boys such that every boy should get atleast 1 apple & atmost 4 apples is a four digit number of the form pqrs then p.q.r equals.

18. In a shooting competition a man can score 0, 2 or 4 points for each shot. Then the number of different ways in which he can score 14 points in 5 shots, is N then number of digits in 'N' equals

19. The number of permutations which can be formed out of the letters of the word "SERIES" taking three letters together, is:

Comprehension Type Question:

Comprehension # 1

Consider the letters of the word MATHEMATICS there are eleven letters some of them are identical. Letters are classified as repeating and non-repeating letters. Set of repeating letters = {M, A, T}. Set of non-repeating letters = {H, E, I, C, S}

20. Possible number of words taking all letters at a time such that atleast one repeating letter is at odd position in each word

(A) $\frac{9!}{2!\,2!\,2!}$ (B) $\frac{11!}{2!\,2!\,2!}$ (C) $\frac{11!}{2!\,2!\,2!}-\frac{9!}{2!\,2!}$ (D) $\frac{9!}{2!\,2!}$

21. Possible number of words taking all letters at a time such that in each word both M's are together and both T's are together but both A are not together-

(A) $7!.\ {}^8C_2$ (B) $\frac{11!}{2!\,2!\,2!}-\frac{10!}{2!\,2!}$ (C) $\frac{6!\,4!}{2!\,2!}$ (D) $\frac{9!}{2!\,2!\,2!}$

22. Find the number of words in which no vowel is together

(A) $\frac{7!}{2!\,2!}.\ {}^8C_4.\ \frac{4!}{2!}$ (B) $\frac{7!}{2!}.\ {}^8C_4.\ \frac{4!}{2!}$ (C) $7!.\ {}^8C_4.\ \frac{4!}{2!}$ (D) $\frac{7!}{2!\,2!\,2!}.\ {}^8C_4.\ \frac{4!}{2!}$

Matrix Match Type :

23. Match the following

Column-I	**Column-I**
(A) Number of ways in which all the letters of word "RESONANCE" can be arranged such that vowels and consonants occurs alternately is	(p) 720
(B) If probability that product of four whole numbers ends in '5' is q then 10^4q is les than	(q) 210
(C) The variance of a binomial random variable is 180. The minimum numbers of trials possible for the experiment are	(r) 370
(D) If sum of roots of equation $12x^4-56x^3+89x^2-56x+12=0$ A, then value of $\left(\frac{9}{7}A\right)!$ is	(s) 360

(A) A-p; B-p,r; C-p; D-p (B) A-r; B-s; C-r; D-q

(C) A-s; B-p; C-r; D-q (D) A-r; B-q; C-r; D-q

Subjective Based Questions :

24. Find the number of positive integral solutions of x + y + z + w = 20 under the following conditions:

(i) x, y, z, w are whole number

(ii) x, y, z, w are natural number

(iii) x, y, z, w $\in$ {1, 2, 3, ..., 10}

(iv) x, y, z, w are odd natural number

25. Find the number of words of 5 letters that can be made with the letters of the word **"PROPOSITION"**.