Choose the correct alternatives (More than one are correct):

1. The combinatorial coefficient C(n, r) is equal to
(A) number of possible subsets of r members from a set of n distinct members.
(B) number of possible binary messages of length n with exactly r 1's.
(C) number of non decreasing 2-D paths from the lattice point (0, 0) to (r, n).
(D) number of ways of selecting r things out of n different things when a particular thing is always included plus the number of ways of selecting 'r' things out of n, when a particular thing is always excluded.

2. The Number of ways in which five different books to be distributed among 3 persons so that each person gets at least one book, is equal to the number of ways in which
(A) 5 persons are allotted 3 different residential flats so that and each person is alloted at most one flat and no two persons are alloted the same flat.
(B) number of parallelograms (some of which may be overlapping) formed by one set of 6 parallel lines and other set of 5 parallel lines that goes in other direction.
(C) 5 different toys are to be distributed among 3 children, so that each child gets at least one toy.
(D) 3 mathematics professors are assigned five different lectures to be delivered , so that each professor gets at least one lecture.

3. The maximum number of permutations of 2n letters in which there are only a's & b's, taken all at a time is given by
(A) ${}^{2n}C_n$ (B) $\frac{2}{1}\cdot\frac{6}{2}\cdot\frac{10}{3}\ldots\ldots\frac{4n-6}{n-1}\cdot\frac{4n-2}{n}$
(C) $\frac{n+1}{1}\cdot\frac{n+2}{2}\cdot\frac{n+3}{3}\cdot\frac{n+4}{4}\ldots\ldots\frac{2n-1}{n-1}\cdot\frac{2n}{n}$ (D) $\frac{2^n\cdot[1\cdot3\cdot5\ldots\ldots(2n-3)(2n-1)]}{n!}$

4. Number of ways in which 3 numbers in A.P. can be selected from 1, 2, 3, ... n is :
(A) $\left(\frac{n-1}{2}\right)^2$ if n is even (B) $\frac{n(n-2)}{4}$ if n is odd
(C) $\frac{(n-1)^2}{4}$ if n is odd (D) $\frac{n(n-2)}{4}$ if n is even

5. The combinatorial coefficient ${}^{n-1}C_p$ denotes
(A) the number of ways in which *n* things of which p are alike and rest different can be arranged in a circle.
(B) the number of ways in which *p* different things can be selected out of *n* different thing if a particular thing is always excluded.
(C) number of ways in which *n* alike balls can be distributed in *p* different boxes so that no box remains empty and each box can hold any number of balls.
(D) the number of ways in which (n – 2) white balls and p black balls can be arranged in a line if black balls are separated, balls are all alike except for the colour.

6. Number of ways in which the letters of the word 'B U L B U L' can be arranged in a line in a definite order is also equal to the
(A) number of ways in which 2 alike Apples and 4 alike Mangoes can be distributed in 3 children so that each child receives any number of fruits.
(B) Number of ways in which 6 different books can be tied up into 3 bundles, if each bundle is to have equal number of books.
(C) coefficient of $x^2y^2z^2$ in the expansion of $(x + y + z)^6$.
(D) number of ways in which 6 different prizes can be distributed equally in three children.

Paragraph for Question Nos. 7 to 9

16 players P_1, P_2, P_3,.....P_{16} take part in a tennis tournament. Lower suffix player is better than any higher suffix player. These players are to be divided into 4 groups each comprising of 4 players and the best from each group is selected for semifinals.

7. Number of ways in which 16 players can be divided into four equal groups, is

(A) $\frac{35}{27}\prod_{r=1}^{8}(2r-1)$ (B) $\frac{35}{24}\prod_{r=1}^{8}(2r-1)$ (C) $\frac{35}{52}\prod_{r=1}^{8}(2r-1)$ (D) $\frac{35}{6}\prod_{r=1}^{8}(2r-1)$

8. Number of ways in which they can be divided into 4 equal groups if the players P_1, P_2, P_3 and P_4 are in different groups, is :

(A) $\frac{(11)!}{36}$ (B) $\frac{(11)!}{72}$ (C) $\frac{(11)!}{108}$ (D) $\frac{(11)!}{216}$

9. Number of ways in which these 16 players can be divided into four equal groups, such that when the best player is selected from each group, P_6 is one among them, is (k) $\frac{12!}{(4!)^3}$. The value of k is :

(A) 36 (B) 24 (C) 18 (D) 20

MATCH THE COLUMN:

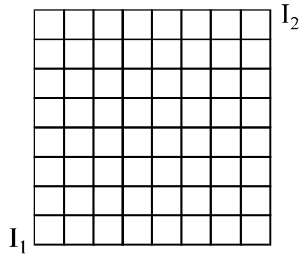
10.

Column-I	**Column-II**
(A) Four different movies are running in a town. Ten students go to watch these four movies. The number of ways in which every movie is watchedby atleast one student, is (Assume each way differs only by number of students watching a movie)	(P)11
(B) Consider 8 vertices of a regular octagon and its centre. If T denotes the number of triangles and S denotes the number of straight lines that can be formed with these 9 points then the value of (T – S) equals	(Q) 36
(C) In an examination, 5 children were found to have their mobiles in their pocket. The Invigilator fired them and took their mobiles in his possession. Towards the end of the test, Invigilator randomly returned their mobiles. The number of ways in which at most two children did not get their own mobiles is	(R) 52
	(S) 60
(D) The product of the digits of 3214 is 24. The number of 4 digit natural numbers such that the product of their digits is 12, is	
(E) The number of ways in which a mixed double tennis game can be arranged from amongst 5 married couple if no husband & wife plays in the same game, is	(T) 84

SUBJECTIVE

11. A commitee of 10 members is to be formed with members chosen from the faculties of Arts, Economics, Education, Engineering, Medicine and Science. Number of possible ways in which the faculties representation be distributed on this committee, is _____. (Assume every department contains more than 10 members).

12. On the normal chess board as shown, I_1 & I_2 are two insects which starts moving towards each other. Each insect moving with the same constant speed . Insect I_1 can move only to the right or upward along the lines while the insect I_2 can move only to the left or downward along the lines of the chess board. Find the total number of ways the two insects can meet at same point during their trip.



13. 10 identical ball are distributed in 5 different boxes kept in a row and labled A, B, C, D and E. Find the number of ways in which the ball can be distributed in the boxes if no two adjacent boxes remain empty.

Answers

1. (ABD) **2.** (BCD) **3.** (ABCD) **4.** (CD) **5.** (BD), **6.** (ACD) **7.** (A)
8. (C) **9.** (D) **10.** (A) $\rightarrow$T; (B)$\rightarrow$ R; (C)$\rightarrow$ P; (D) $\rightarrow$Q; (E) $\rightarrow$S **11.** 3003
12. 12870 **13.** 771