

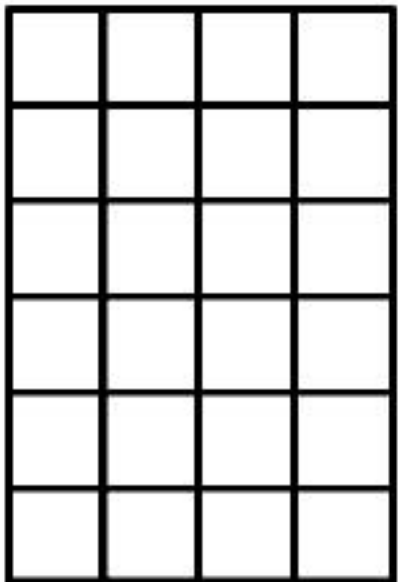
# GUIDED REVISION

(PERMUTATION & COMBINATION + BT)-23

MATHEMATICS

## SECTION-I(i)

**Straight Objective Type** (3 Marks each, -1 for wrong answer)

1. If  $r, s, t$  are prime numbers and  $p, q$  are the positive integers such that their LCM of  $p, q$  is  $r^2t^4s^2$ , then the numbers of ordered pair of  $(p, q)$  is  
(A) 252 (B) 254 (C) 225 (D) 224 [JEE 2006, 3]
2. A rectangle with sides  $2m - 1$  and  $2n - 1$  is divided into squares of unit length by drawing parallel lines as shown in the diagram, then the number of rectangles possible with odd side lengths is  
(A)  $(m + n + 1)^2$  (B)  $4^{m+n-1}$   
(C)  $m^2n^2$  (D)  $mn(m + 1)(n + 1)$
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3. Six cards and six envelopes are numbered 1, 2, 3, 4, 5, 6 and cards are to be placed in envelopes so that each envelope contains exactly one card and no card is placed in the envelope bearing the same number and moreover the card numbered 1 is always placed in envelope numbered 2. Then the number of ways it can be done is -  
(A) 264 (B) 265 (C) 53 (D) 67
4. Coefficient of  $x^{11}$  in the expansion of  $(1 + x^2)^4(1 + x^3)^7(1 + x^4)^{12}$  is -  
(A) 1051 (B) 1106 (C) 1113 (D) 1120
5. For  $r = 0, 1, \dots, 10$ , let  $A_r, B_r$  and  $C_r$  denote, respectively, the coefficient of  $x^r$  in the expansions of  $(1+x)^{10}, (1+x)^{20}$  and  $(1+x)^{30}$ . Then  $\sum_{r=1}^{10} A_r(B_{10}B_r - C_{10}A_r)$  is equal to -  
(A)  $B_{10} - C_{10}$  (B)  $A_{10}(B_{10}^2 - C_{10}A_{10})$  (C) 0 (D)  $C_{10} - B_{10}$
6. The letters of the word **COCHIN** are permuted and all the permutations are arranged in an alphabetical order as in an English dictionary. The number of words that appear before the word **COCHIN** is  
(A) 360 (B) 192 (C) 96 (D) 48 [JEE 2007, 3]
7. The number of seven digit integers, with sum of the digits equal to 10 and formed by using the digits 1, 2 and 3 only, is  
(A) 55 (B) 66 (C) 77 (D) 88 [JEE 2009, 3]



8. The value of  $\binom{30}{0}\binom{30}{10} - \binom{30}{1}\binom{30}{11} + \binom{30}{2}\binom{30}{12} - \dots + \binom{30}{20}\binom{30}{30}$  is, where  $\binom{n}{r} = {}^nC_r$ .

- (A)  $\binom{30}{10}$  (B)  $\binom{30}{15}$  (C)  $\binom{60}{30}$  (D)  $\binom{31}{10}$

[JEE 2005 (Screening)]

**SECTION-I(iii)**

**Linked Comprehension Type (Single Correct Answer Type) (3 Marks each, -1 for wrong answer)**

**Paragraph for Question 9 and 10**

Let  $a_n$  denotes the number of all  $n$ -digit positive integers formed by the digits 0, 1 or both such that no consecutive digits in them are 0. Let  $b_n$  = the number of such  $n$ -digit integers ending with digit 1 and  $c_n$  = the number of such  $n$ -digit integers ending with digit 0.

9. The value of  $b_6$  is [JEE 2012, 3M, -1M]  
(A) 7 (B) 8 (C) 9 (D) 11
10. Which of the following is correct ? [JEE 2012, 3M, -1M]  
(A)  $a_{17} = a_{16} + a_{15}$  (B)  $c_{17} \neq c_{16} + c_{15}$  (C)  $b_{17} \neq b_{16} + c_{16}$  (D)  $a_{17} = c_{17} + b_{16}$

**SECTION-II (i)**

**Numerical Grid Type (Single digit Ranging from 000 to 999) (4 Marks each, -1 for wrong answer)**

1. The number of three elements sets of positive integers  $\{a, b, c\}$  such that  $a \times b \times c = 2310$ , is equal to
2. If coefficient of  $x^5$  in the expression  $(x+3)^9 + (x+3)^8(x+2) + (x+3)^7(x+2)^2 + \dots + (x+2)^9$ , is  $k$  then  $\frac{k}{{}^{10}C_5}$  is equal to
3. How many different ways can 15 Candy bars be distributed between Ram, Shyam, Ghanshyam and Balram, if Ram can not have more than 5 candy bars and Shyam must have at least two. Assume all Candy bars to be alike.
4. Number of 4 digit numbers are there which contains not more than 2 different digits, is
5. Let  $f(x) = 1 - x + x^2 - x^3 + \dots + x^{16} - x^{17} = a_0 + a_1(1+x) + a_2(1+x)^2 + \dots + a_{17}(1+x)^{17}$ , find the value of  $a_2$ .

**SECTION-III(i)****Numerical Grid Type (Single digit Ranging from 0 to 9) (4 Marks each, -1 for wrong answer)**

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1. Let  $n \geq 2$  be an integer. Take  $n$  distinct points on a circle and join each pair of points by a line segment. Colour the line segment joining every pair of adjacent points by blue and the rest by red. If the number of red and blue line segments are equal, then the value of  $n$  is
2. Unit digit of number of 4 digit positive integers if the product of their digits is divisible by 3, is equal to
3. 12 persons are to be seated at a square table, three on each side. 2 persons wish to sit on the north side and two wish to sit on the east side. One other person insists on occupying the middle seat (which may be on any side). If number of ways they can be seated, is  $n$ , then  $\frac{1}{3} \left( \frac{n}{8!} \right)$  is equal to
4. If number of ways in which 3 distinct numbers can be selected from the set  $\{3^1, 3^2, 3^3, \dots, 3^{100}, 3^{101}\}$  so that they form a G.P, is  $n$ , then  $\frac{n}{500}$ , is
5. If  ${}^{100}C_{10} + 5 \cdot {}^{100}C_{11} + 10 \cdot {}^{100}C_{12} + 10 \cdot {}^{100}C_{13} + 5 \cdot {}^{100}C_{14} + {}^{100}C_{15} = {}^{105}C_r$ , then minimum value of  $\frac{r}{3}$  is
6. If  $2^{10} \cdot \binom{100}{0} \binom{100}{10} - 2^9 \binom{100}{1} \binom{99}{9} + 2^8 \binom{100}{2} \binom{98}{8} - \dots + \binom{100}{10} \binom{90}{0} = \binom{100}{K}$ , then maximum value of  $\frac{k}{10}$ , is



**Matrix Match Type (One or More than one option correct)**

1. Consider all possible permutations of the letters of the word ENDEANOEL  
Match the statements / Expression in **Column-I** with the statements / Expressions in **Column-II**.

Column-I	Column-II
(A) The number of permutations containing the word ENDEA is	(P) $5!$
(B) The number of permutations in which the letter E occurs in the first and the last position is	(Q) $2 \times 5!$
(C) The number of permutations in which none of the letters D, L, N occurs in the last five positions is	(R) $7 \times 5!$
(D) The number of permutations in which the letters A, E, O occurs only in odd positions is	(S) $21 \times 5!$

[JEE 2008, 6]

SECTION-I	Q.	1	2	3	4	5	6	7	8	9	10
	A.	C	C	C	C	D	C	C	A	B	A
SECTION-II	Q.	1	2	3	4	5					
	A.	040	211	440	576	816					
SECTION-III	Q.	1	2	3	4	5	6				
	A.	5	4	4	5	5	9				
SECTION-IV	Q.1	A	B	C	D						
		P	S	Q	Q						