Dear student following is an Easy level [● O O] test paper. Score of 24 Marks in 15 Minutes would be a satisfactory performance. Questions 1-10(+3, –1) (All questions have only one option correct)

Q.1 The no. of 10 digit numbers that can be written by using the digits 2 and 3 is
(A) $^{10}C_2 + {}^9C_2$ (B) 2^{10}
(C) $2^{10} - 2$ (D) 10!

Q.2 If $a_n = \sum_{r=0}^{n} \frac{1}{{}^nC_r}$, then value of $\sum_{r=0}^{n} \frac{n-2r}{{}^nC_r}$ is
(A) $\frac{n}{2}a_n$ (B) $\frac{1}{4}a_n$
(C) na_n (D) 0

Q.3 m men and w women are to be seated in a row so that all men sit together. The no. of ways in which they can be seated is
(A) (w + 1)! (B) m! w!
(C) m! (w – 1)! (D) ^nC_w

Q.4 Rakshit is allowed to select (n + 1) or more books out of (2n + 1) distinct books. If the no. of ways in which he may not select all of them is 255, then the value of n is
(A) 3 (B) 4
(C) 5 (D) 11

Q.5 The product of first n odd natural nos. equals
(A) $(^{2n}C_n)$ (^np_n) (B) $\left(\frac{1}{2}\right)^n$ $(^{2n}C_n)$ (^nP_n)
(C) $\left(\frac{1}{4}\right)^n$ $(^{2n}C_n)$ $(^{2n}P_n)$ (D) None

Q.6 A candidate is required to answer 6 out of 10 questions which are divided into two groups, each containing 5 questions. He is not permitted to attempt more than 4 questions from either group. The no. of different ways in which the candidate can choose six questions in
(A) 50 (B) 150
(C) 200 (D) 250

Q.7 If a polygon has 90 diagonals. The no. of its sides is given by
(A) 12 (B) 11
(C) 10 (D) 15

Q.8 At an election there are five candidates and three members are to be elected and a voter may vote for any no. of candidates not greater than the no. to be elected. The no. of ways in which the person can vote is
(A) 25 (B) 30
(C) 35 (D) $2^5 - 2^3$

Q.9 A is a set containing n elements. A subset P of A is chosen. The set A is reconstructed by replacing the elements of P. A subset Q of A is again chosen. The no. of ways of choosing P and Q so that $P \cap Q$ contains exactly two elements is
(A) $9 \times {}^nC_2$ (B) $3^n - {}^nC_2$
(C) $2 \times {}^nC_n$ (D) $^nC_2 . 3^{n-2}$

Q.10 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 then will join. In how many ways can the excursion party be chosen
(A) $^{22}C_7 + {}^{25}C_{10}$ (B) $^{22}C_7 + {}^{22}C_{10}$
(C) $^{25}C_7 + {}^{22}C_{10}$ (D) $^{25}C_7 + {}^{25}C_{10}$

MATHEMATICS IIT JEE (SEPT.3rd WEEK CLASS TEST 2) (PERMUTATION & COMBINATION) ANSWER KEY

Name : ..... **Roll No. :** .....

	A	B	C	D		A	B	C	D		A	B	C	D
1	○	○	○	○	4	○	○	○	○	7	○	○	○	○
2	○	○	○	○	5	○	○	○	○	8	○	○	○	○
3	○	○	○	○	6	○	○	○	○	9	○	○	○	○
										10	○	○	○	○

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	B	D	A	B	B	C	D	A	D	B

SOLUTIONS

Sol.1 (B)

For each place we have two choices i.e. $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^{10}$ ways.

Sol.2 (D)

$$\sum_{r=0}^{n} \frac{n-2r}{{}^nC_r} = \sum_{r=0}^{n} \frac{n-r}{{}^nC_r} - \sum_{r=0}^{n} \frac{r}{{}^nC_r}$$

$$= \sum_{r=0}^{n} \frac{n-r}{{}^nC_{n-r}} - \sum_{r=0}^{n} \frac{r}{{}^nC_r}$$

As ${}^nC_r = {}^nC_{n-r}$ for $0 \le r \le n = 0$

Sol.3 (A)

Let m men as 1 men (object). Now we can permute (w + 1) objects in (w + 1)! ways and m men as m! ways.

Thus total no. of ways in which m men & n women can be a seated in a row is

(w + 1)! m!

Sol.4 (B)

$S = {}^{2n+1}C_{n+1} + {}^{2n+1}C_{n+2} + ... + {}^{2n+1}C_{2n}$

$\Rightarrow S + {}^{2n+1}C_{2n+1} = {}^{2n+1}C_{n+1} + {}^{2n+1}C_{n+2} + ... + {}^{2n+1}C_{2n} + {}^{2n+1}C_{2n+1}$

$\Rightarrow S + {}^{2n+1}C_{2n+1} = 2^{2n}$

$\Rightarrow S = 2^{2n} - 1$

$\Rightarrow 2^{2n} - 1 = 255$

$\Rightarrow 2^{2n} = 256$

$\Rightarrow 2^{2n} = (2)^8$

$\Rightarrow 2n = 8 \quad \Rightarrow n = 4$

Sol.5 (B)

1. 3. 5. .... (2n – 1)

$$= \frac{1.2.3.4.5.....(2n-1)(2n)}{2.4.....2n}$$

$$= \frac{(2n)!}{2^n(n)!} = \frac{1}{2^n} {}^{2n}C_n \, {}^nP_n$$

Sol.6 (C)

No. of ways the candidate can chose questions under the given canditions is enumerated below

group1 4 3 2

group2 2 3 4

$\Rightarrow {}^5C_4 . {}^5C_2 + {}^5C_3 . {}^5C_3 + {}^5C_2 . {}^5C_4$

$= (5)(10) + (10)(10) + (10)5$

$= 200$

Sol.7 (D)

${}^nC_2 - n = 90$

$$\Rightarrow \frac{n!}{2!(n-2)!} - n = 90$$

$$\Rightarrow \frac{n(n-1)}{2} - n = 90$$

$\Rightarrow n^2 - 3n = 180$

$\Rightarrow n^2 - 3n - 180 = 0$

$\Rightarrow n^2 - 15n + 12n - 180 = 0$

$\Rightarrow (n + 12)(n - 15) = 0$

$\Rightarrow n \neq -12, n = 15$

Sol.8 (A)

The no. of ways

$= {}^5C_1 + {}^5C_2 + {}^5C_3$

$= 5 + 10 + 10$

$= 25$

Sol.9 (D)

choose two elements in ${}^nC_2$ ways and rest of (n–2) elements in 3^{n-2} ways

Thus required no. = ${}^nC_2 . 3^{n-2}$

Sol.10 (B)

Required No.

$= {}^3C_3 . {}^{22}C_7 + {}^3C_0 . {}^{22}C_{10}$

$= {}^{22}C_7 + {}^{22}C_{10}$