Branch : CSE/IT Batch :Hinglish

WEEKLY TEST – 7

Subject : Discrete Mathematics

Topic : Combinatorics

Maximum Marks 15

Q.1 to 5 Carry ONE Mark Each

[NAT]

1. A team of 11 is to be selected out of 15 players of whom 6 are bowlers. Find the number of ways in which this can be done so as to include at least 5 bowlers.

[MCQ]

2. The number of ways in which 9 boys can be arranged at a round table if two particular boys should never sit together?

(a) 120 (b) 5040

(c) 40320 (d) 30240

[NAT]

3. How many odd numbers having four digits, without repetition can be formed from the set of whole numbers?

[NAT]

4. How many integers are there in the set {1, 2, 3, …, 1000} with no digit being repeated.

[MCQ]

5. In how many ways can 3 prizes be given to the top 3 players in a game played by 11 players?

(a) ${}^{11}C_3$

(b) 11! * 3!

(c) 990

(d) ${}^{8}C_3$

Q.6 to 10 Carry TWO Mark Each

6. **[NAT]**

How many distinct license plates are possible in the given format: 2 alphabets, followed by four digits. [Example AB6672]

7. **[MCQ]**

In how many ways can we choose 5 different flavors of ice-creme from 9 different flavors?

(a) $\frac{13!}{5!8!}$ (b) $\frac{13!}{5!}$

(c) 13! (d) $\frac{13!}{8!}$

8. **[NAT]**

In how many different ways can the letters in the word "macro" be arranged if it always has to start with a vowel? (without repetition of letters)

9. **[NAT]**

24 people exchange cards at a meeting. Hour many cards are exchanged if everyone greets each other with a card once?

10. [MCQ]

How many lottery tickets must be purchased to complete all possible combinations of 7 numbers each with a possibility of being from 1 to 48?

(a) 76329072
(b) 73629072
(c) 71131278
(d) 73692072

Answer Key

1. **(630)**
2. **(d)**
3. **(1680)**
4. **(585)**
5. **(c)**
6. **(6760000)**
7. **(a)**
8. **(12)**
9. **(276)**
10. **(b)**

Hints and Solutions

1. (630)

The number of ways to find atleast 5 bowlers:-

${}^6C_5 * {}^9C_6 + {}^6C_6 * {}^9C_5$

$$\frac{6\times5!}{5!}*\frac{9\times8\times7\times6!}{3!\times6!}+\frac{6!}{6!}*\frac{9\times8\times7\times6\times5!}{4\times3\times2\times1\times5!}$$

$6 * 3 * 4 * 7 + 9 * 7 * 2$

$6 * 12 * 7 + 9 * 14$

$504 + 126 = 630.$

2. (d)

- Number of ways of arranging 9 boys around a round table is $(9 - 1) = 8!$
- Number of ways such that two particular boys always sit together = $(9 - 2)! * 2! \rightarrow 7! * 2!$
- Number of ways such that two particular boys never sit together $\Rightarrow 8! - 7! * 2!$

  $= 8 * 7! - 7! * 2$

  $= 7! [8 - 2]$

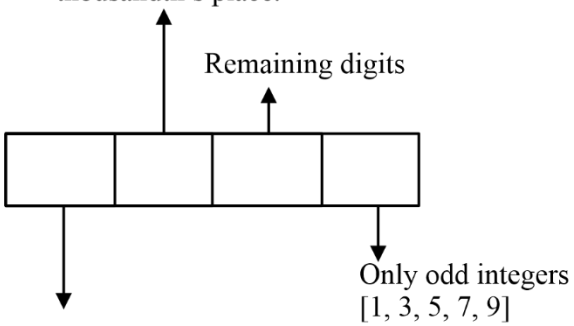
  $\Rightarrow 7! * 6$

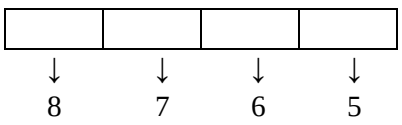
  $\Rightarrow 5040 * 6$

  $\Rightarrow 30240$

3. (1680)

Any integer other than integer at units place and thousandth's place.





Total possible four-digit distinct odd numbers

$= 8 \times 7 \times 6 \times 5 = 1680$

4. (585)

One digit = 9 possiblity

Two digit = 9 * 8 possiblity

Three digit = 9 * 8 * 7 possiblity

$9 + 9 * 8 + 9 * 8 * 7$

$\Rightarrow 9 + 72 + 504$

$\Rightarrow 585$

5. (c)

Winner 1 can be prized in 11 different ways, after first winner 2^{nd} and 3^{rd} winners can also be prized in 10 and 9 different ways.

So total possible ways

$\Rightarrow 11 * 10 * 9 = 990$

6. (6760000)

Sol: For alphabets possibilities for each of the two letters =26

For each of the four digits possibilities =10.

Total number of possibilities =26 * 26 * 10 * 10 * 10 * 10 = 6760000

7. (a)

Sol: Total number of ice-creme flavors $\Rightarrow 9(n)$.

Total number of ice -creme flavors to be selected = 5(r).

$$C(n,r) \Rightarrow \frac{(r+n-1)!}{r!(n-1)!}$$

$$\Rightarrow \frac{(5+9-1)!}{5!(9-1)!}$$

$$\Rightarrow \frac{13!}{5!8!} = 1188$$

8. (12)

Sol: The words will begin with ' a ' ar ' o ' followed by. remaining 3 letters.

$2! * 3! \Rightarrow 2 * 3 * 2 * 1 = 12$

9. (276)

Sol: The cards can be exchanged in ${}^{24}C_2$ ways

$$24_{C_2} \Rightarrow \frac{24 \times 23 \times 22!}{22! \times 2} = 276$$

10. (b)

Sol: $48_{C_7} = \frac{48!}{7! \times 41!}$

$\Rightarrow 73629072$