RD Sharma Solutions Class 11 Maths Chapter 17 Ex 17.3

Combinations Ex 17.3 Q1

Total vowels are 5

Total consonants are 17

Vowels formed from 5 vowels and 17 consonants by selecting 2 vowels and 3 consonants are.

$$= {}^{5}C_2 \times {}^{17}C_3 \times 5!$$

$$= \frac{5!}{2!\,3!} \times \frac{17!}{3!\,4!} \times 120$$

$$= \frac{5 \times 4}{2} \times \frac{17 \times 16 \times 15}{3 \times 2} \times 120$$

$$= 10 \times 17 \times 8 \times 5 \times 120$$

$$= 400 \times 17 \times 120$$
$$= 6800 \times 120$$

$$= 816000$$

Combinations Ex 17.3 Q2

Total persons=10

Number of persons to be selected=5

Condition = p_1 must and p_4, p_5 must not be there

Remaining number of persons required is 4 out of 10-3=7

$^7C_4 \times 5!$

Combinations Ex 17.3 Q3

(i) Total number of 4 letter words formed from the letters of the word 'MONDAY' is = $^6C_4 \times 4! = 360$

(ii) Total number of words formed by using all letters of the word 'MONDAY' is = $6! = 720$

(iii)
There are two vowels A and O. So, first place can be filled in 2 ways and the remaining 5 places can be filled in 5! ways.
So, total number of words beginning with a vowel = $2 \times 5! = 240$

Combinations Ex 17.3 Q4

First separate the 3 and then arrange the remaining things

$^{n-3}C_{r-3}\,(r-2)! \times 3!$

Combinations Ex 17.3 Q5

I N V O L U T E

Number of letters = 8

Wovels = I,O,U,E

Consonents = N,V,L,T,

Number of ways to select 3 wovels = $^4C_3$

Number of ways to select 2 consonents = $^4C_2$

Number of ways to arrange these five letters

$= {^4C_3} \times {^4C_2} \times 5!$

$= 4 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$= 2880$

Required number of ways = 2880

Combinations Ex 17.3 Q6

There are x things

Two specific things are to occur together, so remaining things are $(r-2)$.

Now, number of ways to arrange $(r-2)$ things out of $(n-2) = {^{(n-2)}P_{(r-2)}}$

Two things can be arranged is $(r-1)$ ways.

and these two can be placed in 2 ways.

Therefore,

Required number of ways = $2(r-1)\,{^{(n-2)}P_{(r-2)}}$

Combinations Ex 17.3 Q7

The given word is P R O P O R T I O N.

Total letters = 10

Number of P = 2, Number of R = 2

Number of O = 3, Number of T = 1

Number of I = 1, Number of N = 1

(i) Case I: There are 6 different letters is which all the four are distirct to selected.

Number of ways to select therefour = ${}^6C_4$

$= 15$

Case II: Two same and two distirct letters are selected there are three pairs which more than, letters.

Number of ways to select therefour

$= {}^3C_1 \times {}^5C_2$

$= 3 \times 10$

$= 30$

Case III: Two alike of one kind and two alike of other kind.

There are 3 pairs of letters is the more than one letters. Any 2 of these 3 letters.

Number of ways to select these letters

$= {}^3C_2$

$= 3$

Case IV: Three alike and one dofferent.

Number of ways to select these letters

$= 1 \times {}^5C_1$

$= 5$

Therefore,

Number of ways to select four letters

$= 15 + 30 + 3 + 5$

$= 53$

Required number of ways to select = 53

(ii) For case I:

Number of arrangements of four letters all distirct = ${}^6C_4 \times 4!$

$= 15 \times 24$

$= 360$

For case II:

Number of arrangements of four letters two same kind and two of different kind

$$= {}^3C_1 \times {}^5C_2 \times \frac{4!}{2!1!1!}$$

$= 3 \times 10 \times 12$

$= 360$

For case III:

Number of arrangements of four letters two alike of one kind and two of other kind

$$= {}^3C_2 \times \frac{4!}{2!2!}$$

$= 3 \times 6$

$= 18$

Case IV:

Number of arrangements of four letters 3 alike and 1 other kind

$$= 1 \times {}^5C_1 \times \frac{4!}{3!1!}$$

$= 20$

Therefore,

Total number of arrangements of four letters selected = $360 + 360 + 18 + 20$

Required number of arrangement = 758

Combinations Ex 17.3 Q8

M O R A D A B A D

Number of M = 1, Number of O = 1

Number of R = 1, Number of A = 3

Number of D = 2, Number of B = 1

(i) $\dfrac{\text{Four distirct letters}}{\text{There are 6 letters}}$

Number of arrangement of 4 letters

selected from these 6 = $^6C_4 \times 4!$

$= 15 \times 24$

$= 360$

(ii) Two alike and two different letters

There are 2 pairs with more than one

So, one pair from these and 2 from letters from rest 5 letters.

Number of ways to arrange therefour

$= {}^2C_1 \times {}^5C_2 \times \dfrac{4!}{2!}$

$= 2 \times 10 \times 12$

$= 240$

(iii) Two alike and two alike of other kinds.

Number of ways to arrange therefour

$= {}^2C_2 \times {}^5C_2 \times \dfrac{4!}{2!2!}$

$= 6$

(iv) There alike and one different number of ways to arrange therefour

$= 1 \times {}^5C_1$

$= 5 \times \dfrac{4!}{3!1!}$

$= 20$

Therefore,

Required number of ways $= 240 + 360 + 6 + 20$

Required number ways $= 626$

Combinations Ex 17.3 Q9

In one round table the business man can accommodate the guests in $^{21}C_{15}$ ways. In the second round table he can accommodate the guests in $^6C_6$ ways. Keeping one guest as fixed in the first round table, the other 14 guests can be arrange in 14! ways. Keeping one guest as fixed in the second round table, the other 5 guests can be arrange in 5! ways.

Therefore the total number of ways in which the guests can be arrange is

$= {}^{21}C_{15} \times {}^6C_6 \times 14! \times 5!$ ways

Combinations Ex 17.3 Q10

The word EXAMINATION has letters E,X,A,M,I,N,T,O where A,I,N repeat twice.

$\therefore$ The total number of letter = 11

The number of ways of selecting 4 letters.

$$\Rightarrow {}^{11}C_4 = \frac{11!}{4!\,7!} = \frac{11\times 10\times 9\times 8}{4\times 3\times 2}$$

= 330.

The number of arranging 4 letters

a) All different ${}^{8}C_4 \times 4! = {}^{8}P_4 = \frac{8!}{4!}$

$$= 8\times 7\times 6\times 5$$
$$= 56\times 30$$
$$= 1680$$

b) 2 distinct and 2 alike

$$= {}^{3}C_1 \times {}^{7}C_2 = \frac{3\times 7\times 6}{2} = 63\times \frac{4!}{2!}$$
$$= 378$$

c) 2 alike of one kind and 2 alike of other kind

$${}^{3}C_2 \times \frac{4!}{2!\,2!} = 3\times 6 = 18$$

d) 3 alike and 1 distinct letter

$${}^{3}C_1 \times {}^{7}C_2 = \frac{3\times 7\times 6}{2} = 378$$

$\therefore$ Total number of ways in which 4 letter words are formed $= 1680 + 378 + 18 + 378$

$= 2454$ ways

Combinations Ex 17.3 Q11

$No\ of\ persons = 16$

$Condition\ on\ specific\ persons = 4\ and\ 2 = 6$

Remaining people=16-6=10

So lets fill 8 people on both sides first from these 10.

First side, we can select 4 out of 10.

${}^{10}C_4 \times {}^{6}C_6$

Now we can arrange these 8 people on both sides in $8!\times 8!$ ways

Answer$= {}^{10}C_4 \times {}^{6}C_6 \times 8! \times 8!$