

# Permutation & Combinations

27/08/24

Permutation:- means selection with arrangement.  
 Combination:- only selection.

Factorial  $\rightarrow$   $n!$  or  $L$

\*  $0! = 1$   
 \* Two factorial will never be add; or sub or divide.

\*  $n \geq 5$   
 $r \geq 3$  }  $nPr \Rightarrow 5P_3 \Rightarrow \frac{5!}{(5-3)!} \Rightarrow \frac{5!}{2!} \Rightarrow \frac{5 \times 4 \times 3 \times 2!}{2!} \Rightarrow 60 \text{ Ans.}$

$nPr \Rightarrow \frac{n!}{(n-r)!}$

\* Trick to sol. without formula:-

Eg -  $8P_3 \Rightarrow 8 \times 7 \times 6 \Rightarrow 336 \text{ Ans}$   
 (3 times)

Eg -  $5P_2 \Rightarrow 5 \times 4 \Rightarrow 20 \text{ Ans}$

\*  $n$  will always be positive integer.

\*  $n > r$ , or  $n = r$

\* Factor of  $n$  are always Equal to factor of  $r$ .

## EX-5A

Q3) use option method.

Sol  $\rightarrow$   $12P_4 \Rightarrow 12 \times 11P_2$   
 $\Rightarrow 6P_4 \Rightarrow 12 \times 6P_2$   
 $\Rightarrow 6 \times 5 \times 4 \Rightarrow 12 \times 6 \times 5$   
 $\Rightarrow 360 \Rightarrow 360$   
 So - (6) - (5) Ans

# Word problem qns.

Eg - ABHISHEK, - calculate no. of arrangement.

$\frac{8!}{2!} \rightarrow$  Total no. of word.  
 $\frac{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2!}{2!} \Rightarrow 20160$   
 Rep Fat word

Eg - SAHIL

Sol  $\rightarrow 5! \Rightarrow 5 \times 4 \times 3 \times 2 \Rightarrow 120.$

Eg - RKGICAMPUS

Sol  $\rightarrow 9! \Rightarrow 362880 \text{ Ans}$

Eg - SHUBHAM

Sol  $\rightarrow \frac{7!}{2!} \Rightarrow \frac{7 \times 6 \times 5 \times 4 \times 3 \times 2}{2} \Rightarrow 2520.$

Eg - COMPUTER - rearrange

Sol  $\rightarrow 8! - 1 \rightarrow$  Always deduct one when qtn say to rearrange  
 $\Rightarrow 7 \times 6 \times 5 \times 4 \times 3 \times 2 \Rightarrow 5040$   
 $\Rightarrow 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \Rightarrow 40320 \text{ Ans}$

Concept :- Comes together :-

if - KJARN -

$J \& N$  comes together, so we make both combine box  
 & consider it as one

Sol  $\rightarrow \boxed{JN} \text{ KAR}$   
 $\frac{4!}{1} \times 2! \Rightarrow 24 \times 2 \Rightarrow 48 \text{ Ans}$

★ Never comes together:-

firstly we calculate comes together & then we deduct it from total.

So if we refer qn (1)

$$5! - (4! \times 2!) - \text{comes together}$$

$$\Rightarrow 120 - 24 \times 2 \Rightarrow 48 \Rightarrow 72 \text{ Ans}$$

# Total things 10, 2 things comes together.

So we consider 2 things as 1 so we get -

$$\Rightarrow 9! \times 2!$$

$$\Rightarrow 362880 \times 2 \Rightarrow 725760 \text{ Ans}$$

if Never +

$$\Rightarrow 10! - 9! \times 2!$$

$$\Rightarrow 10 \times 9! - 9! \times 2!$$

$$\Rightarrow 9! [10 - 2]$$

$$\Rightarrow 9! \times 8!$$

★ n things, 2 things comes together

$$\Rightarrow (n-1)! \times 2!$$

$$\Rightarrow n! - (n-1)! \times 2!$$

$$\Rightarrow n(n-1)! - (n-1)! \times 2!$$

$$\Rightarrow (n-1)! [n-2] \text{ Ans}$$

Q15) FAILURE

Sol) VOWEL - A I U E & ~~FLR~~ FLR

1                      2 3 4

$$\Rightarrow 4! \times 4! \Rightarrow 576 \text{ (a)}$$

Q18)

Sol)  $12 \times 11 \times 10 \Rightarrow 1320 \text{ (b) Ans}$

Q19)

Sol) Trick - जितने digit given hain unhe add krdo, उसके बाद जितने भी digit hain उनसे 1 Km krdo.

$$\Rightarrow (2+4+6+8) \times 3! \times 1111 \rightarrow \text{जितने digit utne 1.}$$

$$\Rightarrow 20 \times 6 \times 1111 \Rightarrow 133320 \text{ Ans}$$

OR

$$(\text{Sum of all digit}) \times (n-1)! \times (1111) \rightarrow \text{Acco. to digit.}$$

$$\Rightarrow (2+4+6+8) \times (4-1)! \times 1111 \Rightarrow 133320 \text{ Ans}$$

Q20)

Sol) जितने digit उतने Boys

$$\square \square \square \square \Rightarrow 72 \text{ Ans (a)}$$

$$3 \times 4 \times 3 \times 2$$

Q21)

Sol)  $\square \square \square \square \Rightarrow 4 \times 4 \times 3 \times 2 \Rightarrow 96 \text{ (c) Ans}$

$$4 \quad 4 \quad 3 \quad 2$$

Q22)

Sol) angle TRI  $\Rightarrow 4! \times 3 \Rightarrow 24 \text{ Ans (c)}$

2 3 4

Not Rearrange  
angle word  
shua  
Change

Q7)

Sol →  $9C_4 \times 4!$

$\Rightarrow \frac{9 \times 8 \times 7 \times 6}{4!} \times 4!$

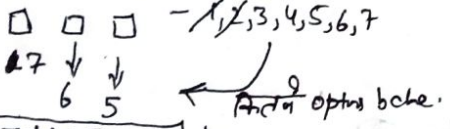
$\Rightarrow \frac{3024}{24} \times 24 \Rightarrow 3024$  - (C) Ans

Q8)

Sol →  $6 \times 5 \Rightarrow 30$  - (A) Ans

Q9)

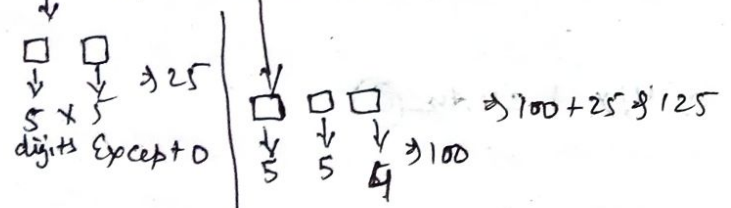
Sol →  $100 - 1000$   
 $101, \dots, 999$



$7 \times 6 \times 5 \Rightarrow 210$  - (A) Ans

Q10)

Sol -  $10 \dots 1000$   
 $11, 12 \dots 99$  - 2 digit  
 $100, 101 \dots 999$  - 3 digit  
}  $2, 3, 4, 0, 8, 9$  use these digits



Q11)  $N P_4 \Rightarrow 12 \times N P_2$

- (A) 10, (B) 8, (C) 6, (D) None

If we use 6 :-

$6 P_4 \Rightarrow 12 \times 6 P_2$

$360 \Rightarrow 360$  - (C) Ans

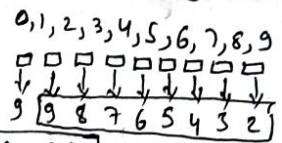
Q12)  $\sum_{r=1}^{10} r \cdot r P_r$

Sol) Trick - Jitni R ki value given ho usme 1 add krangle fir jhane R diye hai deduct it.

${}^{11}P_{11} - 1 \rightarrow$  Ans (B)

Q13)

Sol → 76 digit na diye ho so, we count from 0-9



$9 \times 9!$  - (C) Ans

Q14)

Sol →  $A B C D E F$   
1 2 3 4

$4! \times 3!$ , so  $\Rightarrow 4 P_4 \times 3 P_3$  - (B) Ans

Q15)

Sol →  $A, B, C, D, E$   
 $\downarrow \downarrow \downarrow \downarrow$   
1 2 3 4  
 $\rightarrow A \& B$  cannot interchange!!  
 $4!$  Ans

Q16)

Sol →  $10 \times 9 \Rightarrow 90$  - (B) Ans

Q17)

Sol →  $7 P_7 \Rightarrow$  (B) - 5040 Ans

Q18)

Sol → MONDAY  
 $\downarrow \downarrow \downarrow \downarrow \downarrow \downarrow$   
1 1 3 4 4  
 $\Rightarrow 1 \times 2 \times 3 \times 4 \times 4$   
 $\Rightarrow 96$  Ans

Q19)

Ans  $0+0+0+0+0+0+0$

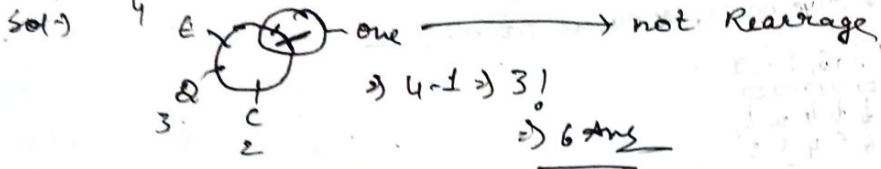
$7 C_4 \Rightarrow \frac{7 \times 6 \times 5 \times 4}{4 \times 3 \times 2 \times 1} \Rightarrow 35$  Ans

Q20) Sol → MOBILE - MBL - consonant - odd place  
- OIE - vowels

① 2 ② 4 ③ 6

$$3P_3 \times 3P_3 \Rightarrow 3! \times 3! \Rightarrow 36 \text{ Ans}$$

Q21)



COMBINATION -  ${}^n C_r$   
 ↓  
 only selection  $\Rightarrow \frac{10 \times 9 \times 8 \times 7}{4!}$   
 ${}^n C_r$

→ formula →

$$\frac{n!}{(n-r)! r!}$$

Eg →  ${}^{12} C_4 \Rightarrow \frac{12 \times 11 \times 10 \times 9}{4!} \Rightarrow \frac{11880}{24} \Rightarrow 495$

Ex - 5C

1)  $\frac{12 \times 11 \times 10 \times 9}{4!} + \frac{12 \times 11 \times 10}{3!} \Rightarrow 715 \text{ Ans (a)}$

2) Sol → By option -

$8P_3 \Rightarrow \frac{8 \times 7 \times 6}{3!} \Rightarrow 336$

$8C_3 \Rightarrow \frac{8 \times 7 \times 6}{3!} \Rightarrow 56 \rightarrow 50 \text{ (b)} - (8, 3) \text{ Ans}$

Q23

Sol →  $nCr \Rightarrow {}^{n+r} C_{r+5}$   
 $\Rightarrow 18C_r \Rightarrow 18C_{r+2}$   
 $\Rightarrow 18 \Rightarrow r+r+2$  }  $16 \Rightarrow 2r$   
 $r \Rightarrow 8$

${}^8 C_5 \Rightarrow \frac{8 \times 7 \times 6 \times 5 \times 4}{5!} \Rightarrow \frac{6720}{120} \Rightarrow 56 \text{ Ans}$

Q25

Sol →  ${}^8 C_1 + {}^8 C_2 + {}^8 C_3 + {}^8 C_4 + {}^8 C_5 + {}^8 C_6 + {}^8 C_7 + {}^8 C_8$   
 Trick:-

$2^8 - 1 \Rightarrow 255$

$256 - 1 \Rightarrow 255 \text{ Ans (b)}$

Q6)

Sol →  $2^4 - 1 \Rightarrow 16 - 1 \Rightarrow 15 \text{ Ans (a)}$

Q7)

Sol →  $nC_{10} \Rightarrow nC_{14}$

$n \Rightarrow 10+14$

$n \Rightarrow 24$

$\Rightarrow 25C_{24} \Rightarrow \frac{25 \times 24}{24!} \Rightarrow 25 \text{ (b)}$

Q8)

Sol →  $C_1 \Rightarrow 7$   
 $L \Rightarrow 4$   
 ${}^4 C_1 \times {}^7 C_4 - \text{Case-1}, {}^4 C_2 \times {}^7 C_3 - \text{Case-2}, {}^4 C_3 \times {}^7 C_2 - \text{Case-3}, {}^4 C_4 \times {}^7 C_1$

Ans - 441 (c)  $\Rightarrow 6 \times 35 + 2 \times 21 + 4 \times 35 + 0 \times 7$   
 $\Rightarrow 210 + 42 + 140 \Rightarrow 392$

Q10)

Sol → Note! - Geometry ke Qtn  $\nabla$  hmes a combination use

${}^N C_2 - N$  → concept for computing diagonal.

$\therefore {}^{10} C_2 - 10 \Rightarrow \frac{90}{2} - 10 \Rightarrow 35 \text{ (b) Ans}$

Q11)  $\rightarrow$  Total triangle kitne bn sktte.  
 Sol)  $12C_3 - 5C_3$  Kitne nai bn sktte.

$\Rightarrow 220 - 10 \Rightarrow 210$  Ans

Q12)  $\rightarrow$  Ek straight line ke liye 2 point chahiye.

Sol  $\rightarrow 16C_2 \Rightarrow \frac{16 \times 15}{2} \Rightarrow 120$  ans

Q13)  $5C_1 + 5C_2 + 5C_3$

$\Rightarrow 5 + 10 + 10 \Rightarrow 25$  Ans

Q14)

Sol  $\rightarrow nC_2 \Rightarrow 66$

By option  $\Rightarrow 12C_2 \Rightarrow \frac{12 \times 11}{2} \Rightarrow 66$  Ans

Q15)

Sol  $\rightarrow 4C_2 \times 3C_2 \Rightarrow 6 \times 3 \Rightarrow 18$  Ans

Q16)

Sol  $\rightarrow 2C_2 \Rightarrow 28$  Ans

Q17)

Sol  $\rightarrow \frac{12!}{3!} \Rightarrow 4$  boys Each group

$\Rightarrow \frac{12!}{4! \times 4! \times 4!} \times \frac{1}{3!} \Rightarrow \frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4}{4! \times 4! \times 4!} \times \frac{1}{3!}$   
 arrange  $\Rightarrow 5775$  Ans

Q17)

Sol  $\rightarrow \frac{15!}{5! \times 5! \times 5!} \Rightarrow \frac{15 \times 14 \times 13 \times 12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5}{5! \times 5! \times 5!}$

L-3

Q19)\*

Sol  $\rightarrow 3L - 8$  ladies  
 $4G - 7$  gents

$8C_3 \times 7C_4 - 7C_2 \times 6C_3$

$\Rightarrow \frac{8 \times 7 \times 6}{3!} \times \frac{7 \times 6 \times 5 \times 4}{4!} \Rightarrow \frac{7 \times 6}{2!} \times \frac{6 \times 5 \times 4}{3!}$

$\Rightarrow 56 \times 35 \Rightarrow 21 \times 20$

$\Rightarrow 1960 - 420 \Rightarrow 1540$  Ans

Q20)\*

Sol  $\rightarrow$  properties  $\rightarrow n+1C_r \Rightarrow nC_r + nC_{r-1}$

$500C_{92} \Rightarrow 499C_{92} + nC_{91}$

$\Rightarrow 499 + 1 = 499C_{92} + 499C_{92-1}$

Ans  $\Rightarrow 499$

Q21)

Sol  $\rightarrow 9C_5 + 9C_6 + 9C_7 + 9C_8 + 9C_9$

$\Rightarrow \frac{9 \times 8 \times 7 \times 6 \times 5}{120} + \frac{9 \times 8 \times 7 \times 6 \times 5 \times 4}{720} + \frac{9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3}{40320} + \dots$

$\Rightarrow 256$  Ans

Q22)

Sol  $\rightarrow 5$

3 सत्री 2 सत्री

$3C_1 \times 2C_1 + 2C_2$

$\Rightarrow 6 + 1 \Rightarrow 7$  Ans

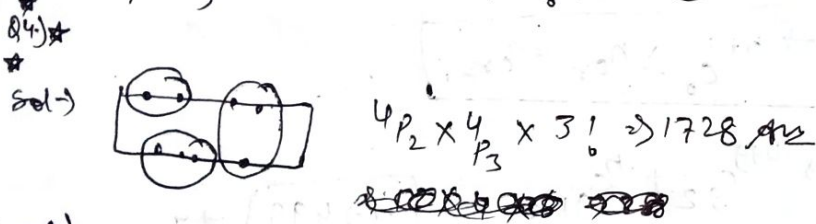
\* \* \*

EX-5B

1) Ans  $\rightarrow \frac{8!}{2! \times 2! \times 2!} \cdot \frac{7!}{2!}$

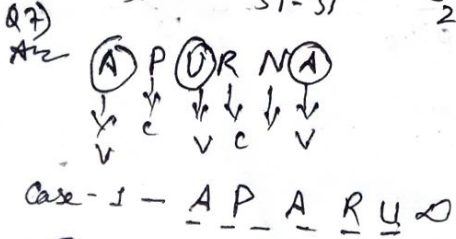
$\frac{8!}{2! \times 2! \times 2!} \Rightarrow \frac{8 \times 7!}{2! \times 2!} \Rightarrow \frac{8}{2 \times 2} \Rightarrow \frac{2}{1} \Rightarrow \boxed{201}$  Ans

Q3) Sol  $\rightarrow 12C_4 \times 5C_3 \times 7! \Rightarrow 4950 \times 7! \Rightarrow \text{Ans } \textcircled{C}$



Q5) Ans  $\rightarrow (3)^n - 1$   
 $\Rightarrow (3)^6 - 1 \Rightarrow 728$  Ans  $\textcircled{D}$

Q6) Sol  $\rightarrow nCr \Rightarrow nC_{n-r} \Rightarrow n \Rightarrow n+n$   
 $51C_{31} \Rightarrow 51C_{51-31} \Rightarrow 51C_{20}$  Ans  $\textcircled{D}$



$\left[ \frac{3!}{2!} \times 3! \right] \times 2 \Rightarrow 36$  Ans

Q8) Sol  $\rightarrow 8! \Rightarrow \frac{8!}{2! \times 2! \times 2!} \Rightarrow \frac{8 \times 7!}{2 \times 2 \times 2} \Rightarrow 7! \Rightarrow \text{Ans } \textcircled{C}$

Q9) Sol  $\rightarrow 12$   
 $A \rightarrow 6 \quad B \rightarrow 6$   
 $* 6C_4 \times 6C_2 \Rightarrow 15 \times 15 = 225$   
 $+ 6C_3 \times 6C_3 \Rightarrow 20 \times 20 = 400$   
 $+ 6C_2 \times 6C_4 \Rightarrow 15 \times 15 = 225$   
 $\Rightarrow 850$  Ans  $\textcircled{B}$

Q10) Sol  $\rightarrow \frac{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 2}{6!} \Rightarrow 112$  Ans  $\textcircled{C}$

Q11) Sol  $\rightarrow \frac{(n-1)!}{2^0} \Rightarrow \frac{(8-1)!}{2} \Rightarrow \frac{7!}{2} \Rightarrow \frac{5040}{2} \Rightarrow 2520$  Ans  $\textcircled{B}$

Q12) Sol  $\rightarrow$ 

2	75600
2	37800
2	18900
2	9450
2	4725

 $\Rightarrow 2 \times 2 \times 2 \times 2 \Rightarrow 4 + 1 \Rightarrow 5$   
 $\Rightarrow 5 \times 5 \rightarrow 2 + 1 \Rightarrow 3 \times 120$  factors  
 $\Rightarrow 3 \times 3 \times 3 \rightarrow 3 + 1 \Rightarrow 4 \times 120$  factors  
 $\Rightarrow 7 \rightarrow 1 + 1 \Rightarrow 2 \times 120$  factors  
 $\Rightarrow 120 - 1 \Rightarrow 119$  Ans

Q13) Sol  $\rightarrow$ 

0	0	0	0
6	5	4	3

 $\Rightarrow \frac{360}{2 \times 2} = 90$  - None of these  $\textcircled{d}$   
 $\downarrow$  Repeat

Q14) Sol  $\rightarrow (2)^n - 1$   
 $\Rightarrow (2)^4 - 1 \Rightarrow 15$

Q15)

$$\text{sol} \rightarrow \frac{9!}{2! \times 3! \times 4!}$$

$$\Rightarrow \frac{362880}{2 \times 6 \times 24} \Rightarrow \frac{362880}{288} \Rightarrow 1260 \text{ (b) Ans}$$

Q19)

$$\text{sol} \rightarrow 5 \times 4 \times 3 \times 2 \times 1 \Rightarrow 120 \text{ (b) Ans}$$

Q16)

sol  $\rightarrow$  put  $N \Rightarrow 3$  (let)  
 $r \Rightarrow 2$

$$(n-1)r + r \cdot (n-1)r_{r-1}$$

$$\Rightarrow (3-1)r_2 + 2 \cdot (3-1)r_{2-1}$$

$$\Rightarrow \text{(6)}$$

$$\boxed{3P_2 \Rightarrow 3 \times 2 \Rightarrow 6}$$

or

$$\star (3-1)r_2 + 2 \cdot (3-1)r_{2-1}$$

$$\Rightarrow 2r_2 + 2 \cdot 2r_1$$

$$\Rightarrow 2 \times 1 + 2 \times 2 \Rightarrow 2 + 4 \Rightarrow \text{(6) Ans}$$

— X ————— X ————— X —————

Ended !!