

22/11/21 Monday

- ① a) In how many ways 6 boys and 4 girls can sit in a row?
 b) In how many ways can they sit in a row if the boys are to sit together and girls are to sit together?
 c) In how many ways can they sit in a row if the girls are to sit together?
- ② How many bit strings of length 10 contain (i) exactly 4 1's (ii) at most 4 1's (iii) at least 4 1's (iv) equal no. of 0's and 1's.
- ③ How many permutations of the letters A, B, C, D, E, F, G contain (i) the string BCF (ii) the string CFA (iii) the strings BA and GF (iv) the strings ABC and DE
- ④ In how many ways can 2 letters be selected from the set {a, b, c, d} when the repetition of the letters allowed if (i) order matters (ii) order does not matter.

Sol:

① a) $10!$

b) $6! \cdot 4! = 720 \cdot 24 = 17280$

c) $7! \cdot 4! = 5040 \cdot 24 = 120960$

② (i) ${}^6P_4 = 1680$

(ii) ${}^6P_0 + {}^6P_1 + {}^6P_2 + {}^6P_3 + {}^6P_4 = 1 + 6 + 15 + 120 + 1680 = 1822$

(iii) ${}^6P_4 + {}^6P_5 + {}^6P_6 = 1680 + 720 + 720 = 3120$

(iv) ${}^6P_4 = 1680$

- ⑤ In how many ways can they sit in a row if just the girls are to sit together?

② a) $\frac{110}{(4)(6)} = \frac{7 \times 8 \times 9 \times 10}{1 \times 2 \times 3 \times 4} = 210$

b)

$0'3$	$1'3$	$\rightarrow \frac{110}{(6)(4)} +$	$\left. \begin{array}{l} 210 + \\ \frac{8 \times 9 \times 10}{1 \times 2 \times 3} 120 \\ + 45 \\ + 10 \\ + \\ 1 \end{array} \right\} =$
7	3	$\rightarrow \frac{110}{(7)(3)} +$	
8	2	$\rightarrow \frac{110}{(8)(2)} +$	
9	1	$\rightarrow \frac{110}{(9)(1)} +$	
10	0	$\rightarrow \frac{110}{(10)(0)}$	

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c)

$0'3$	$1'3$	$\frac{110}{(6)(4)} + \frac{110}{(5)(5)} + \frac{110}{(4)(6)} + \frac{110}{(3)(7)}$
5	5	$+ \frac{110}{(2)(8)} + \frac{110}{(1)(9)} + \frac{110}{(0)(10)}$
4	6	
3	7	
2	8	
1	9	
0	10	

$6 \times 7 \times 3 \times 2$

$= 210 + 252 + 210 + 120 + 45 + 10 + 1$

$= 848$

d) $\frac{0'3}{5} \frac{1'3}{1} = \frac{110}{(5)(5)} = 252$

$\overline{A} \overline{B} C D E \overline{F} G \quad (7)$

- ③ a) contain BCF $\rightarrow 5 = 120$
 b) contain CFGA $\rightarrow 4 = 24$
 c) contain $\rightarrow 5$
 d) $\rightarrow 4$

④ a)  $4 \times 4 = 16$

b) $4C_2 \times$
 $(n + \lambda - 1)C_\lambda = (4 + 2 - 1)C_2$
 $= 5C_2 = 10$

- $\checkmark a \sim abba$
 $\checkmark bb \sim acca$
 $\checkmark cc \sim ad da$
 $\checkmark dd \sim bc cb$
 $\quad \quad \quad ba ab$
 $\quad \quad \quad cd dc$
- $\lambda = 2$
 $n = 4$

Don't buy

