PROBLEM SET-05

SOLUTION

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Q.1 The kindergarten teacher has 25 kids in her class. She takes 5 of them at a time, to zoological garden as often as she can, without taking the same 5 kids more than once. Find the number of visits, the teacher makes to the garden and also the number of of visits every kid makes.

Ans. **(B)**

Sol. (i) No of times teacher Visits the garden = No of Selection /Combination of 5 kids out of "25" $= 25_{C_5}$

(ii) No of visits of a kid = No of Selection of 5 kids out of 25, when a particular kid is always included $= 24_{C_4}$

Q.2 Number of ways in which 8 people can be arranged in a line if A and B must be next to each other and C must be somewhere behind D, is equal to

(A) 10080 (B) 5040 (C) 5050 (D) 10100

Ans. **(B)**

Sol. $\times\times$ $\boxed{AB}$ $\times\times\times\times$

C D

$\boxed{AB}$ and 6 other is 7! but A and B can be arranged in 2! ways

$\therefore$ Total ways $= 7! \cdot 2!$

when C is behind D

$\therefore$ required number of ways $= \frac{7! \cdot 2!}{2!} = 5040$ ways Ans.]

Q.3 In a certain algebraical exercise book there are 4 examples on arithmetical progressions, 5 examples on permutation - combination and 6 examples on binomial theorem. Number of ways a teacher can select for his pupils atleast one but not more than 2 examples from each of these sets, is

Ans. **(3150)**

Sol. $({}^4C_1 + {}^4C_2)({}^5C_1 + {}^5C_2)({}^6C_1 + {}^6C_2)$

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Q.4 In how many different ways a grandfather along with two of his grandsons and four grand daughters can be seated in a line for a photograph so that he is always in the middle and the two grandsons are never adjacent to each other.

Ans. **(528)**

Sol. Total number of ways they can sit $= 6! \times\times\times \boxed{GF} \times\times\times$ no. of ways when the two grandsons are always adjacent $= 4 \cdot 2! \cdot 4! = 192$ where 4 denotes the no. of adjacent positions

(2!) no. of ways in which two sons can be seated and 4! no. of ways in which the daughter can be seated in the remaining places. $\therefore$ required no. of ways $= 720 - 192 = 528$

Q.5 The number of 5 digit numbers such that the sum of their digits is even is

(A) 50000 (B) 45000 (C) 60000 (D) none

Ans. **(B)**

Sol. Total No. of digit $\Rightarrow 9 \times 10^4$

9	10	10	10	10

$\Rightarrow$ 5-digit

$\Rightarrow$ Using 0 to 9

$\Rightarrow$ Rep. allowed

$\Rightarrow$ Sum of digits = even

half of these Numbers will have sum of their digits as even & rest half will have as. Odd

$$= \frac{9 \times 10^4}{2} = 45{,}000$$

Q.6 A forecast is to be made of the results of five cricket matches, each of which can be win, a draw or a loss for Indian team. Find

(i) the number of different possible forecasts

(ii) the number of forecasts containing 0,1,2,3,4 and 5 errors respectively

Ans. **(i), (243); (ii), (1,10,40,80,80,32)**

Sol. **(i)** $= 3 \times 3 \times 3 \times 3 \times 3 = 3^5 = 243$

For every match → Win, Lose, Draw

(ii)

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(i) $N(E_0) = 1$ (ii) $N(E_1) = 2\ {}^5C_4$

(iii) $N(E_2) = 2^2\ {}^5C_3$ (iv) $N(E_3) = 2^3\ {}^5C_2$

(v) $N(E_4) = 2^4\ {}^5C_1$ (vi) $N(E_5) = 2^5$

Q.7 The number of ways in which 8 distinguishable apples can be distributed among 3 boys such that every boy should get atleast 1 apple & atmost 4 apples is $K \cdot {}^7P_3$ where K has the value equal to

(A) 14 (B) 66 (C) 44 (D) 22

Ans. **(D)**

Sol.

$8 \rightarrow (4,3,1) \Rightarrow \frac{8!}{4!3!1!}$

$8 \rightarrow (3,3,2) \Rightarrow \frac{8!}{3!3!2!2!}$

$8 \rightarrow (4,2,2) \Rightarrow \frac{8!}{4!2!2!2!}$

$\therefore$ Total ways $= \left(\frac{81}{4!3!1!} + \frac{8!}{3!3!2!2!} + \frac{8!}{4!2!2!2!}\right) 3! = k \cdot {}^7P_3$

$4620 = k \cdot (210)$

$= \boxed{k = 22}$

Q.8 A women has 11 close friends. Find the number of ways in which she can invite 5 of them to dinner, if two particular of them are not on speaking terms & will not attend together.

Ans. **(378)**

Sol. $\Rightarrow {}^{11}c_5 - {}^9c_3 = 378$

$^{11}c_5$: Total No. of ways to invite "s" friends out of "11"

(But this also include cases when those two particular friends attended the party together)

$^9c_3$: when two particular friends attended the party together

Q.9 A rack has 5 different pairs of shoes. The number of ways in which 4 shoes can be chosen from it so that there will be no complete pair is

(A) 1920 (B) 200 (C) 110 (D) 80

Ans. **(D)**

Sol. ${}^5C_4\ 2 \cdot 2 \cdot 2 \cdot 2 = {}^5C_4 \cdot 2^4 = 80$

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Q.10 Find the number of different ways in which 8 different books can be distributed among 3 students, if each student receives atleast 2 books.

Ans. **(2940)**

Sol. 8 books can be distributed in a group of (2,2,4) or (2,3,3). Number of groups are $\left(\frac{8!}{2!2!4!2!}+\frac{8!}{2!3!3!2!}\right)$ and can be distributed in 3! ways]