Related Questions with Solutions

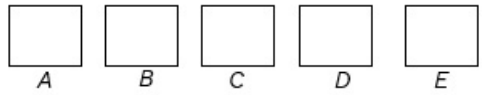
Questions

Quetion: 01

10 identical balls are to be distributed in 5 different boxes kept in a row and labelled A, B, C, D and E. Find the number of ways in which the balls can be distributed in the boxes if no two adjacent boxes remain empty.

Solutions

Solution: 01



Case I: No box empty

Put 1 balls in each box first

$$x_A + x_B + x_c + x_D + x_E = 10 - 5$$

Number of non-negative integral solution $= {}^{5+5-1}C_{5-1}$

$= {}^{9}C_4 = 126$

Case II: Select any 1 box to be empty in ${}^{5}C_1$ ways

Remaining box, put 1 ball in each

$$x_B + x_c + x_D + x_E = 10 - 4 = 6$$

$\therefore$ Number of non-negative integral solution

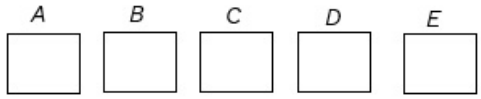
$= {}^{6+4-1}C_{4-1}$

$= {}^{9}C_3$

$\therefore$ Number of ways $= {}^{5}C_1 \times {}^{9}C_3$

$= 5 \times \dfrac{9 \times 8 \times 7}{6} = 420$

Case III: 2 box empties



Select any two boxes out of 5 in ${}^{5}C_2$ways.

Number of ways to select two adjacent boxes = 4

Put 1 ball in each remaining box [to be filled]

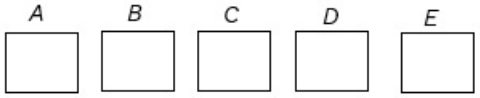
$\therefore x_B + x_D + x_E = 10 - 3 = 7$

Number of non-negative integral solution = ${}^{7+3-1}C_{3-1}$

$\therefore$ number of ways $= \left({}^{5}C_2 - 4\right) {}^{9}C_2$

= 216

Case IV: 3 boxes empty : Only one case



A,C,E→empty
B, D →To fill

Put 1 ball in B and D

$x_B + x_D = 10–2$

number of non- negative integral solutions $= {}^{8+2-1}C_{2-1}$

$= {}^{9}C_1 = 9$

Number of ways = 1 × 9 = 9

Total number of ways = 126 + 420 + 216 + 9

=771

Correct Options

Answer:01
Correct Answer: 771