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Section: 15

Assignment 2 (a)

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a) The No. of ways to select a pair from 8 Singaporeans

$$= {}^8C_2 = \frac{8!}{(8-2)!2!} = \frac{8!}{6!2!} = \frac{8 \times 7 \times 6!}{6! \times 2 \times 1} = 28$$

the No. of ways to select a pair of Indonesians

$$= {}^5C_2 = \frac{5!}{(5-2)!2!} = \frac{5!}{3!2!} = \frac{5 \times 4 \times 3!}{3! \times 2 \times 1} = 10$$

The No. of ways to select a pair from 6 Malaysians

$$= {}^6C_2 = \frac{6!}{(6-2)!2!} = \frac{6!}{4!2!} = \frac{6 \times 5 \times 4!}{4! \times 2 \times 1} = 15$$

the total number of ways to select a pair from the group of tourists

$$= 28 + 10 + 15 = 53 \text{ (Ans)}$$

(ii) The Number of ways to select a team of 3 tourists from different Nationalities.

$$= {}^8C_1 + {}^5C_1 + {}^6C_1$$

↓ ↓ ↘
Singaporean Indonesian Malaysian.

$$= \frac{8!}{(8-1)! 1!} + \frac{5!}{(5-1)! 1!} + \frac{6!}{(6-1)! 1!}$$

$$= \frac{8!}{7! 1!} + \frac{5!}{4! 1!} + \frac{6!}{5! 1!}$$

$$= \frac{8 \times 7!}{7! \times 1} + \frac{5!}{4! \times 1} + \frac{6!}{5! \times 1!}$$

$$= 8 + 5 + 6 = 19$$

the total no. of ways to select 3 tourists from different nationalities are = 19

(ii) The total people in the group = $8 + 5 + 6 = 19$

We have to select 1 representative from this 19 people group.

$$= {}^{19}C_1$$

$$= \frac{19!}{(19-1)! (1)!} = \frac{19!}{18! 1!} = \frac{19 \times 18!}{18! \times 1} = 19$$

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i) total persons = 10

Let a person be selected to sit between brothers = 8C_1
= 8

the total arrangements around the circle = 8!

The brothers can be interchanged in 2! ways

Therefore total ~~arrang~~ arrangement = $2! \times 8!$

ii)



The number of ways to arrange all of them around

$$\text{the circle} = \frac{{}^n P_n}{n}$$

$\therefore$ where $n = 10$

$$= \frac{{}^{10}P_{10}}{10} = \frac{10!}{10} = \frac{10 \times 9!}{10} = 9!$$

(iii) total persons = 10

∴ Let a person selected to sit between brothers = 8C_1
= 8

∴ Let the brothers and selected person to be set

total arrangements around the circle

$$= (n-1)! = (8-1)!$$

$$= 7!$$

∴ the brothers can be interchanged in $2!$ ways.

there fore total arrangements = $2! \times 7!$

(3)

total students = 20

grade A = 5

grade B = 10

grade C = 3

Fail = 2

$$\text{possible grade distribution} = \frac{20!}{5! \cdot 10! \cdot 3! \cdot 2!}$$

$$= \frac{11 \times 12 \times 13 \times 14 \times 15 \times 16 \times 17 \times 18 \times 19 \times 20}{5! \times 3! \times 2!}$$

$$= 465,585,120$$