

Discrete Structure

Quiz # 4

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Q1 # Solution:-

The orders of runners is important, thus we need to use the order of permutation.

We will select 5 runners from the 5 runners as we want an ordering of all runners.

$$n = 5$$

$$r = 5$$

Evaluate the definition of a combination.

$$P(5, 5) = \frac{5!}{(5-5)!} = \frac{5!}{0!} = 5!$$

$$= 120.$$

Q # 2

Solution:-

Total subsets of A with
odd number of elements

$$= C(10, 1) + C(10, 3) + C(10, 5) + C(10, 7) \\ + C(10, 9)$$

$$= \frac{10}{1!} + \frac{10 \times 9 \times 8}{3 \times 2 \times 1} + \frac{10 \times 9 \times 8 \times 7 \times 6}{5!}$$

$$+ C(10, 3) + C(10, 1) \dots \dots (C(n, 1) + C(n, n-1))$$

$$= 10 + 10 \times 12 + \frac{10 \times 9 \times 8 \times 7 \times 6}{5 \times 4 \times 3 \times 2 \times 1} + 10 \times 12 + 10$$

$$= 20 + 2 \times 120 + 2 \times 9 \times 2 \times 7$$

$$= 20 + 240 + 252$$

$$= 512$$

Q. 3

18 x^7 in $(3x - 2y)^{17}$

$$n = 17$$

$$j = 9$$

$$\binom{n}{j} (3x)^{n-j} (-2y)^j = \binom{17}{9} (3x)^{17-9} (-2y)^9$$

$$= \frac{17!}{9!8!} (3x)^8 (-2)^9 y^9$$

$$= \frac{17!}{9!8!} \times 3^8 \times (-2)^9 x^8 y^9$$

$$= -81,662,928 x^8 y^9$$

Coefficient of $x^8 y^9$ is

$$= -81,662,928$$