Assignment-1

CS22BTECH11006

12.13.5.15 Question : The probability that a student is not a swimmer is $\frac{1}{5}$ .Then the probability that out of five students, four are swimmers is

(A) $\binom{5}{4}\left(\frac{4}{5}\right)^4 \frac{1}{5}$ (B)$\left(\frac{4}{5}\right)^4 \frac{1}{5}$

(C) $\binom{5}{1}\frac{1}{5}\left(\frac{4}{5}\right)^4$ (D)None of these

Solution:

Let

X : be number of swimmers

As picking a student is Bernoulli trial

So, X has binomial distribution

$$\mathbf{P(X = x)} = \binom{n}{x}p^x q^{n-x}$$

Here,

n=number of students

=5

Given,

probability that student is not swimmer is $\frac{1}{5}$

So,

$$\mathbf{q} = \frac{1}{5}$$

$$\mathbf{p} = 1\text{- }\mathbf{q} = \frac{4}{5}$$

Probability that out of five students, four are swimmers is **P(X = 4)**

$$\mathbf{P(X = 4)} = \binom{5}{4}\left(\frac{4}{5}\right)^4\left(\frac{1}{5}\right)^{5-4}$$

$$= \binom{5}{4}\left(\frac{4}{5}\right)^4 \frac{1}{5}$$

$$= \binom{5}{1}\frac{1}{5}\left(\frac{4}{5}\right)^4 \qquad \left(\binom{5}{4} = \binom{5}{1}\right)$$

Hence, **option (A) and (C) both are correct**