

Assignment 17.1

Here $n = 20$, $n - k = 5$, $k = 20 - 5 = 15$.

Here the probability of success = probability of giving a right answer = $S = \frac{1}{4}$.

Hence the probability of failure = probability of giving a wrong answer = $1 - S$
 $= 1 - \frac{1}{4} = \frac{3}{4}$.

When we substitute these values in the formula for Binomial Distribution we get,

$$\text{So, } P(\text{exactly 5 out of 20 answers incorrect}) = C(20, 5) \times \left(\frac{1}{4}\right)^5 \times \left(\frac{3}{4}\right)^{15}$$

$$\Rightarrow P(5 \text{ out of } 20) = \frac{20 \times 19 \times 18 \times 17 \times 16}{5 \times 4 \times 3 \times 2 \times 1} \times \left(\frac{1}{4}\right)^5 \times \left(\frac{3}{4}\right)^{15}$$

$$\Rightarrow P(5 \text{ out of } 20) = 0.0000034 \text{ (approximately)}$$

Thus the required probability is 0.0000034 approximately.