# AI1110 Assignment-1

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**Abstract**

This document provides the solution to question 14 in Chapter 13 of the 12th grade NCERT textbook, Exercise 13.5.

**Question :**

In a box containing 100 bulbs, 10 are defective. The probability that out of a sample of 5 bulbs, none is defective is

(A) $10^{-1}$ (B) $\left(\frac{1}{2}\right)^5$ (C) $\left(\frac{9}{10}\right)^5$ (D) $\frac{9}{10}$

**Solution :**

Let **X** be a random variable that represents the number of defective bulbs.

This experiment of picking bulbs follows the binomial distribution.

So, $\mathbf{P(X{=}k)} = \binom{n}{k} p^k (1-p)^{n-k}$

where,

**n** = sample size = 5

**k** = number of defective bulbs in the sample = 0

**p** = probability of selecting a defective bulb, which is $\frac{10}{100} = \frac{1}{10}$ (since there are 10 defective bulbs out of 100)

We need to find the probability that no bulb id defective i.e **P(X=0).**

$$P(X=0) = \binom{5}{0}(\tfrac{1}{10})^0(1-\tfrac{1}{10})^{5-0}$$

$$= 1 \times 1 \times (\tfrac{9}{10})^5$$

$$= (\tfrac{9}{10})^5$$

$\therefore$ **option(C)** is the correct answer.