

AI1103

Assignment 3

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Download Python code and Latex from below link :

[https://github.com/KRISHNASAI1105
/demo/tree/main/Assignment3](https://github.com/KRISHNASAI1105/demo/tree/main/Assignment3)

Hence, The probability of two or more defective resistors in the circuit is 0.26.

Problem number GATE EE 2019 Q.40

The probability of a resistor being defective is 0.02. There are 50 such resistors in a circuit. The probability of two or more defective resistors in the circuit (round off to two decimal places) is —

Solution

Consider, Probability of a defective resistor =
 $P = 0.02$.

Total number of resistors = $n = 50$.

$$\text{From Poisson distribution, Mean} = \lambda = nP \quad (0.01)$$

$$\implies \lambda = 50 * 0.02 = 1. \quad (0.02)$$

Let X be number of defective resistors.

By Poisson distribution,

$$Pr(X) = \frac{e^{-\lambda} \lambda^X}{X!} \quad (0.03)$$

$$Pr(X = 0) = \frac{e^{-\lambda} \lambda^0}{0!} = e^{-1} \quad (0.04)$$

$$Pr(X = 1) = \frac{e^{-\lambda} \lambda^1}{1!} = e^{-1} \quad (0.05)$$

$$\begin{aligned} Pr(X \geq 2) &= 1 - Pr(X < 2) \\ \implies Pr(X \geq 2) &= 1 - [Pr(X = 0) + Pr(X = 1)] \\ \implies Pr(X \geq 2) &= 1 - [\frac{e^{-1} \lambda^0}{0!} + \frac{e^{-1} \lambda^1}{1!}] \\ \implies Pr(X \geq 2) &= 1 - [e^{-1} + e^{-1}] \\ \implies Pr(X \geq 2) &= 1 - \frac{2}{e} \\ \implies Pr(X \geq 2) &= 0.2642 \end{aligned}$$