Solution of 2023 AG-30

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The probability that a storm event with a return period of 20 years will occur once in 5-year period is (rounded off to two decimals)

Solution:

As the occurrence of each storm is independent of the other, and it has a constant mean rate, we can solve this question using the poisson distribution.

Let λ be the expected number of events in a 5-year period with a return period of 20 years.

$$P(X = k) = \frac{e^{-\lambda}\lambda^{k}}{k!}$$

$$\lambda = \frac{5}{20} = 0.25$$

Now that we found λ, we can find our answer.

$$P(X = 1) = \frac{e^{-0.25}0.25}{1} \approx 0.1947001958$$

So, the probability that a storm event with a return period of 20 years will occur once in a 5-year period (rounded off to two decimals) is 0.19.