Structural Reliability
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Lecture –31
Common Probability Distributions (Part - 02)

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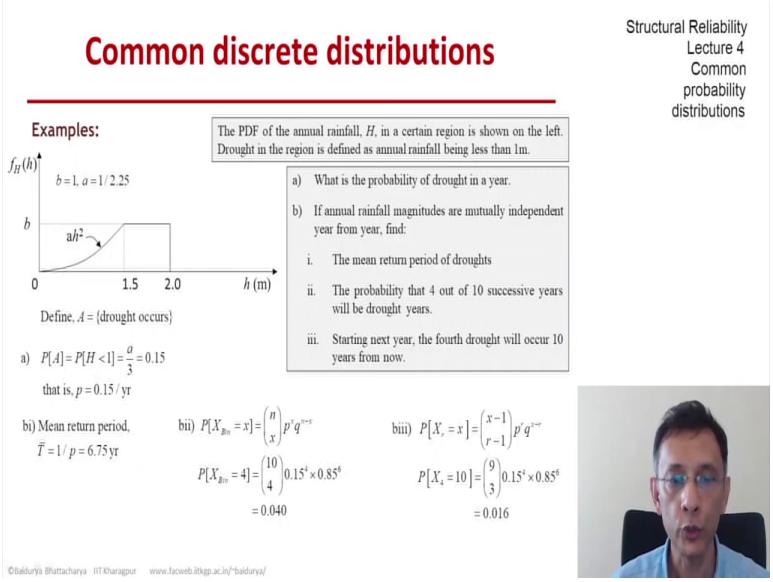

Let us look at a few examples involving the geometric the binomial and the negative binomial distributions. We go back to this rainfall example we have looked at before and the first question we ask is what the probability of drought is in any given year. So, we assume that these years and the outcomes year to year they constitute an IID Bernoulli trial sequence. So, with that we first find the probability of trout in a year by integrating the density function from minus infinity to 1 and that comes to 0.15.

So, p is 0.15 per year. The first question asks what the mean return period is. So, that as a simple application of the geometric distribution and the mean return period is 1 over p. So, that is about 7 years. The next question asks; what is the probability that out of 10 trials 4 will be success, success being the occurrence of a drought. And this is clearly a binomial pmf that has been asked for and using n equals 10 and x equals 4 we come up with the answer of about 4%.

The third question is asking for a negative binomial probability because we are interested not in

just there will be 4 droughts in 10 years but the fourth one will occur on year number 10. So, if you do the math the answer comes to about 1.6% which obviously as expected should be less than the answer to question number 2.