Structural Reliability
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Lecture –125
Component Reliability - Time Defined (Part - 04)

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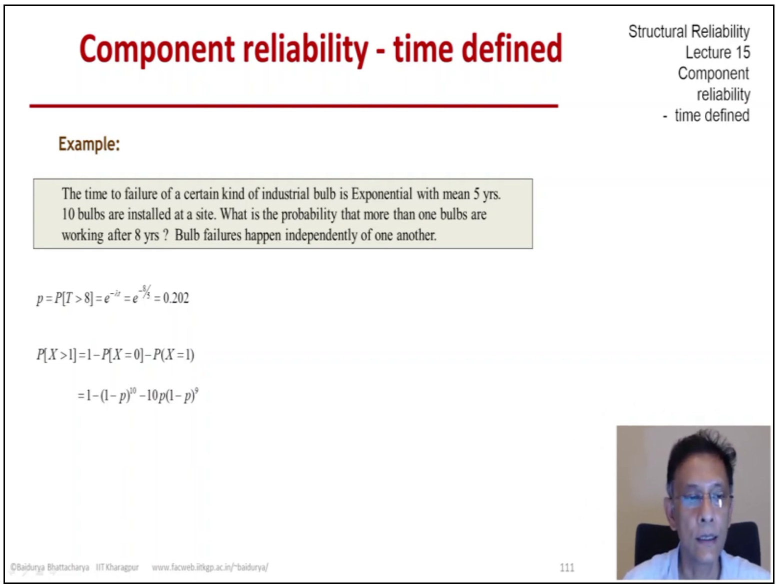

Our next example involves exponentially distributed times to failure let us take a minute to read the problem and then we will solve it. So, what we have here is a sequence of independent Bernoulli trials each trial is the performance of a single bubble. So, there are 10 trials and each with probability p of success. So, how do you define success? Success is that the bulb that particular bulb is working after eight years. So, let us find out the value of small p.

So small p is the random time to failure capital t is greater than 8. So, that gives me a value of exponential minus 8 over 5 which is about 0.2. So, that is the probability that each bulb will remain working at the end of 8 years and we have 10 such bulbs put into service and let us see that at least one is working after eight years. So, the first part of this problem is an exponential random variable related CTF or complement of CDF the second part of the problem involves a binomial probability.

So, x is the number of bulbs that are working at the end of 8 years. So, what we want here is x greater than one because the question asks more than one bulbs are working. So, it's better to look at the complementary event to that. So, P of X greater than one is 1 - P X equals 0 - P X equals 1 and if we plug in the binomial probabilities with n equals 10 we get an answer of 63%.