Structural Reliability
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Lecture –210
Capacity Demand Systems Reliability (Part 01)

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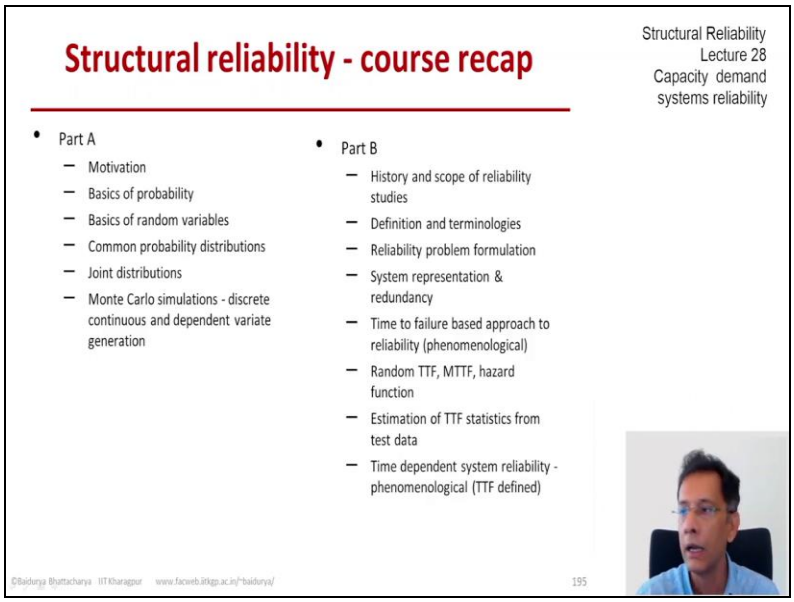

We start the last topic of part C of our course capacity demand system reliability formulation. Let us see how far we have come. So, far in this course and where this fits in, so, in part A we introduced the purpose of the course discuss the basics of probability theory the basics of random variables distributions and spent a good amount of time discussing various continuous and discrete distributions that appear commonly in structural reliability.

Then we discuss joint distributions and ended part a with Monte Carlo simulations particularly how to generate discrete and continuous and dependent variants. In part B we gave an overview of how the subject developed defined the basic terms spent a good amount of time formulating reliability problems. And then discussed how a system can be represented in terms of its elements and what the different types of redundancy are.

Then we took up a time to failure based approach to reliability and we called it

phenomenological because that TTF was the only random variable that defined the failure or success of the unit in question. So, based on that approach we looked at the reliability function the hazard function the mean time to failure and we also estimated these times to failure statistics from test data. And we ended part B with a system reliability formulation based on element times to failure.

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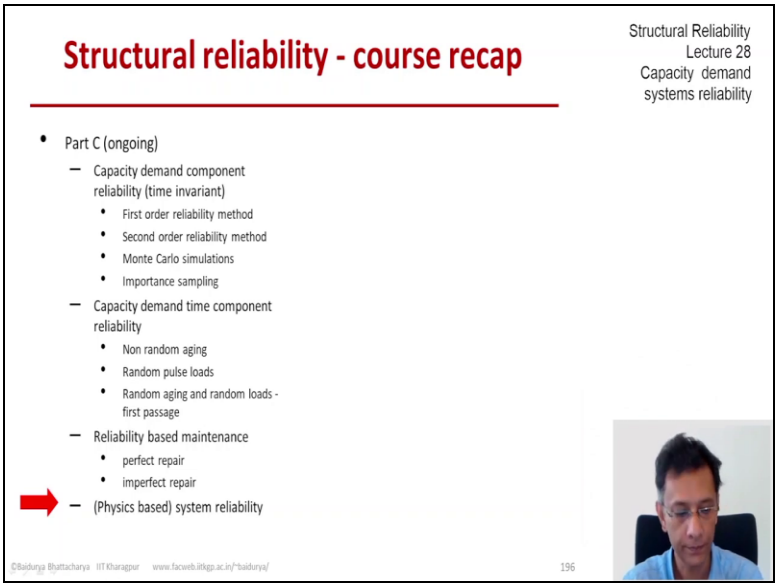

Part C which is what is going on now we started with the time invariant capacity demand component reliability formulation and in that context we studied the first order reliability method the second order reliability method Monte Carlo simulations and importance sampling for estimating component reliability. And then we took up capacity demand time component reliability. So, earlier all the random variables were time invariant but now we started considering if there is time variance.

So, first we looked at non-random time variance and then we looked at random. So, we considered the loads to be random pulses with non-random aging and then in the end we looked at both random aging and random loads and formulated the first passage problem. And in the previous lecture we also looked at reliability based maintenance including the effect of perfect repair and imperfect repair.

Now we are ready to start a physics-based system reliability formulation. So, that is what we

plan to do in the in this and the next two lectures and that would be the end of part C of this course.