Lecture –115
Representation of Systems (Part -19)

(Refer Slide Time: 00:27)
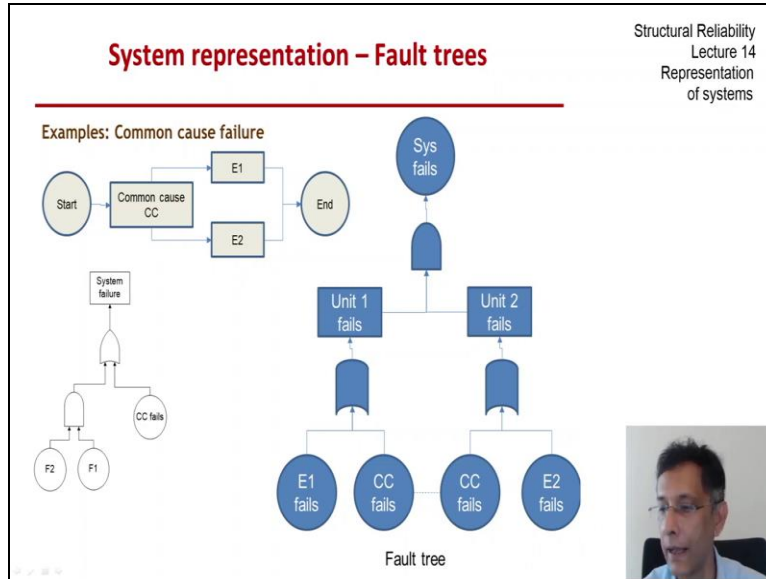
Let us now look at a system whose fault tree has repeated elements. We have looked at this example in the previous lecture there were two units this is the RBD for that system there were two units E1 is part of the first unit which represents a local failure likewise E2 and E1 and E2 are independent of each other but there is a common cause failure which affects both units and it is in series with both E1 and E2 and it is not important here.

But CC E1 and E2 are all mutually dependent but because E1 and cc together make up the first unit and E2 and CC together make up the second unit the two units are dependent. And this can occur in many situations it could be that there are two pumps for a drainage system and the pump itself the the two pumps we can call them E1 and E2 they are independent of each other but the electrical power supply that could be the common cause and if it fails then both pumps fail provided both pumps operate on the same electrical supply.

Another example could be when there are two machines which are in parallel mode and the

system is going to work as long as only one works but there is a maintenance person whose job is to look after them and if that person is not doing his or her job properly then that common cause is going to fail both those machines. So, we have looked at this actually just earlier in this lecture a system in which there are two units' two elements in parallel in series with a third and it would be trivial to draw the fault tree in this manner.

But what we would miss in this sort of representation is how the units come together and how the common cause appears in both. So, a different way of creating the fault tree would be this. So, we have the system failure as the top event and the two units come together through an AND gate because they are in parallel causing system failure. Now each unit has its own structure and that is where the common cause and the dependence can clearly be shown.

So, each unit let us look at unit one that is composed of two elements in a series that local failure which we are calling local failure E1. So, E1 fails or the common cause fails then unit 1 fails and likewise unit 2 is made up of common cause and E2 and either of them failing is the failure of unit 2. So, here this is a different way of representing the fall tree for the same system and we see that CC occurs in both units.

And we have a dashed line connecting the two CC's just to emphasize that it is the same event actually but it appears twice and thereby imparting dependence between the units 1 and 2 and causing system failure in turn.