NPTEL
NPTEL ONLINE COURSE
Discrete Mathematics
Relations
Partition - Part 5
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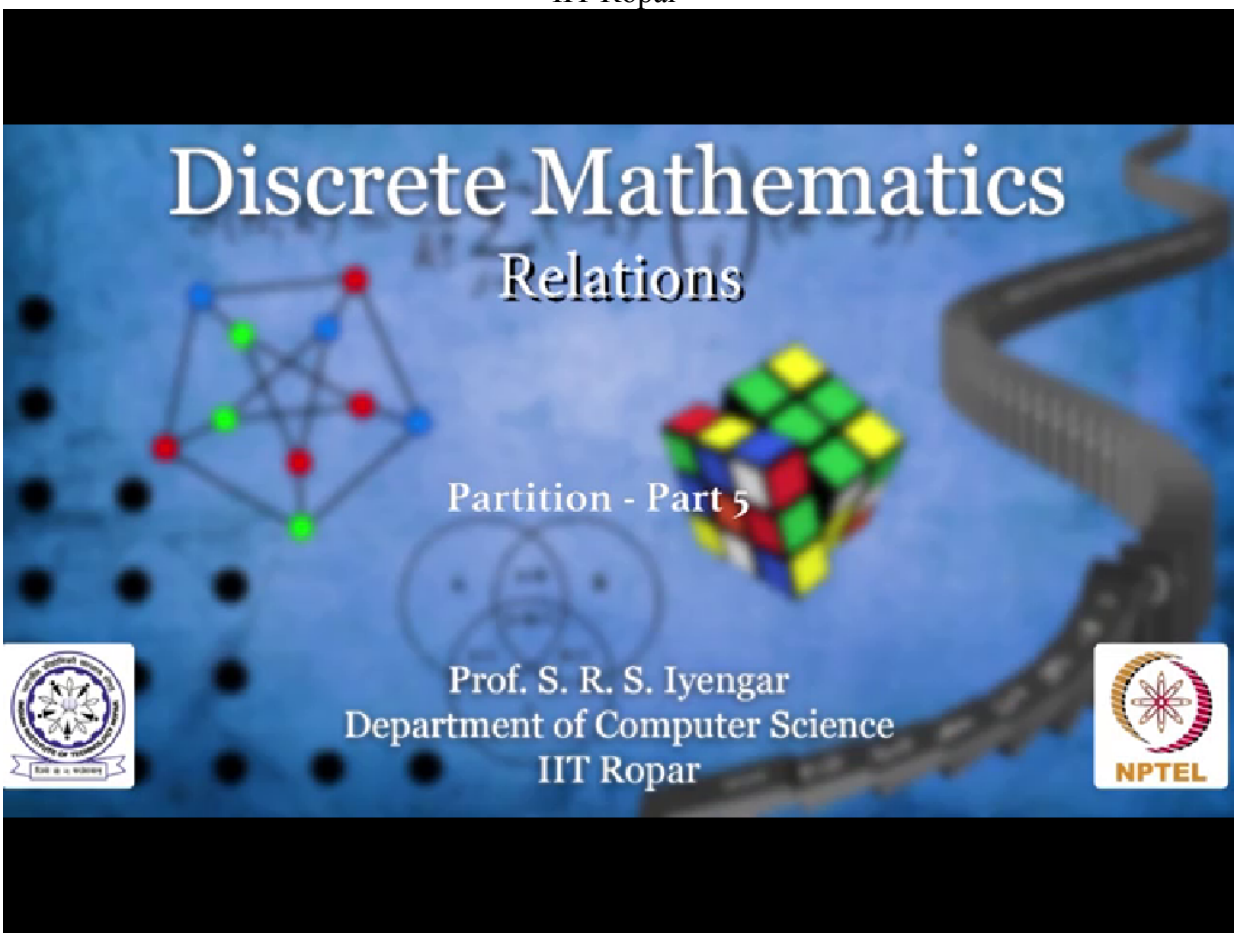
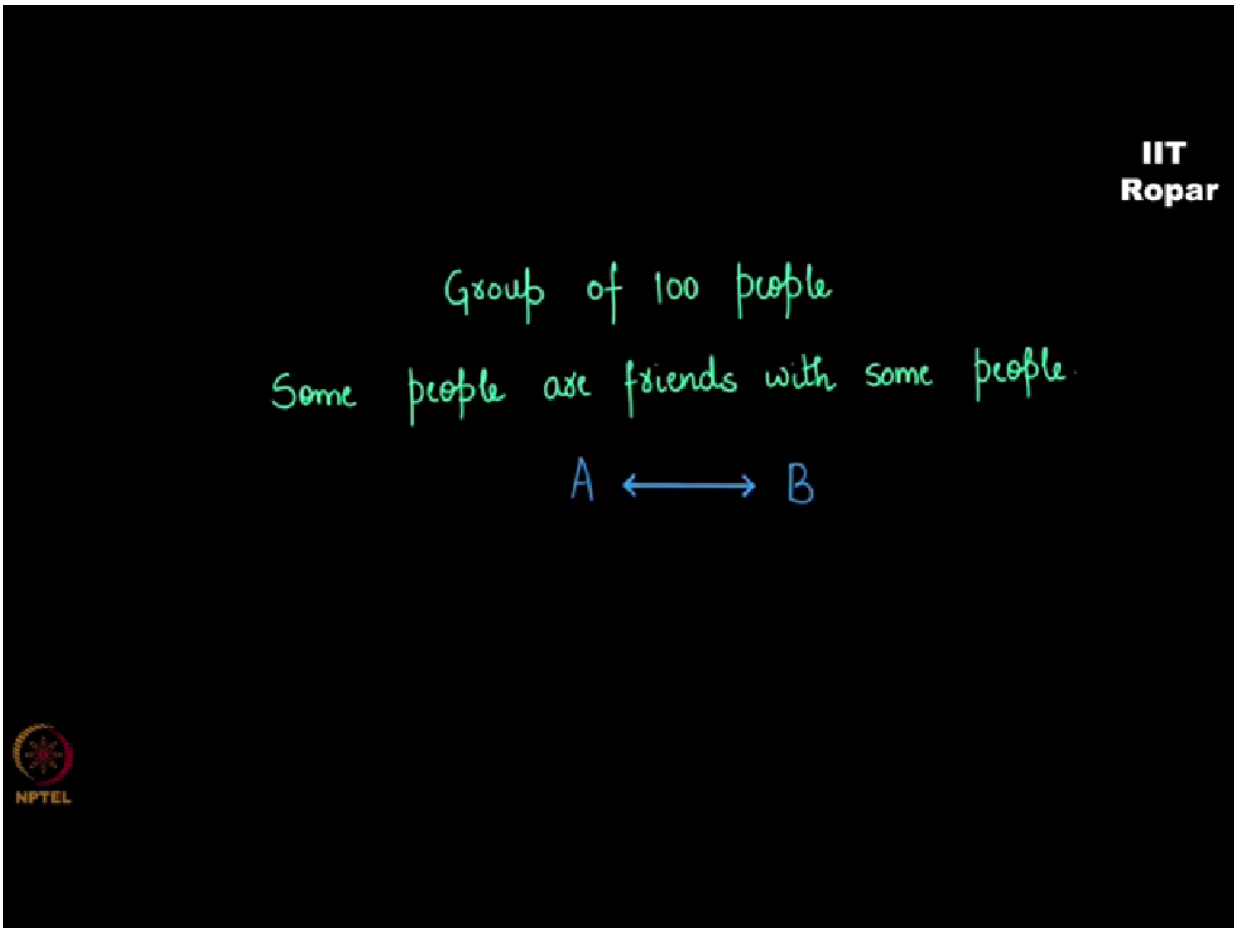
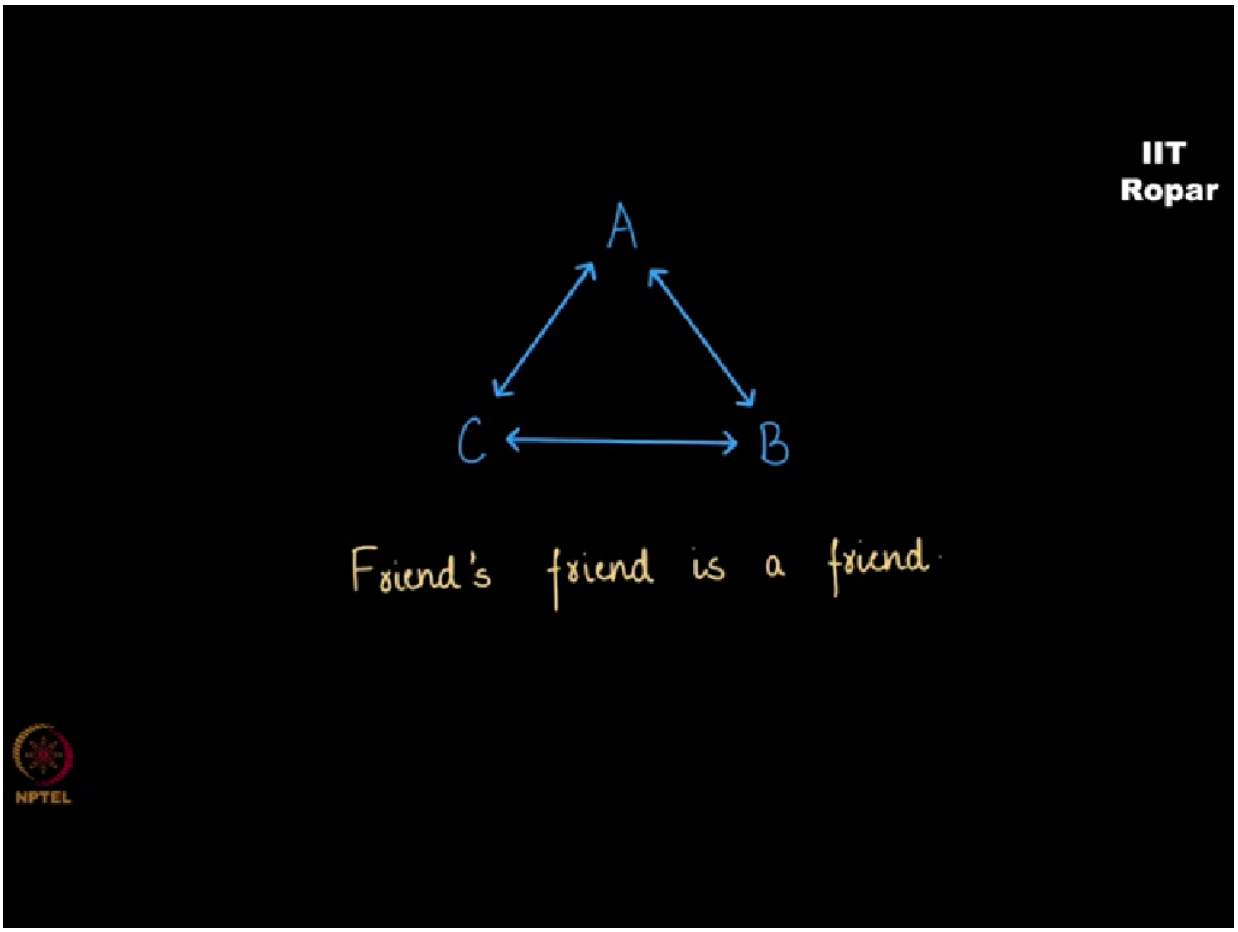


Let us consider a group of people, roughly 100 people. These people are sort of friends with each other. By that I mean not everybody is friends with everyone, but some people are friends with some people. But then friendship is a kind of relation you see. A is friends with B, right? And this friendship as you know is a symmetric relation. A is friends with B. B is also friends with A. Otherwise, you will never say, hey, he is my friend. By that it means he is your friend and you are also his friend. Correct? Okay.



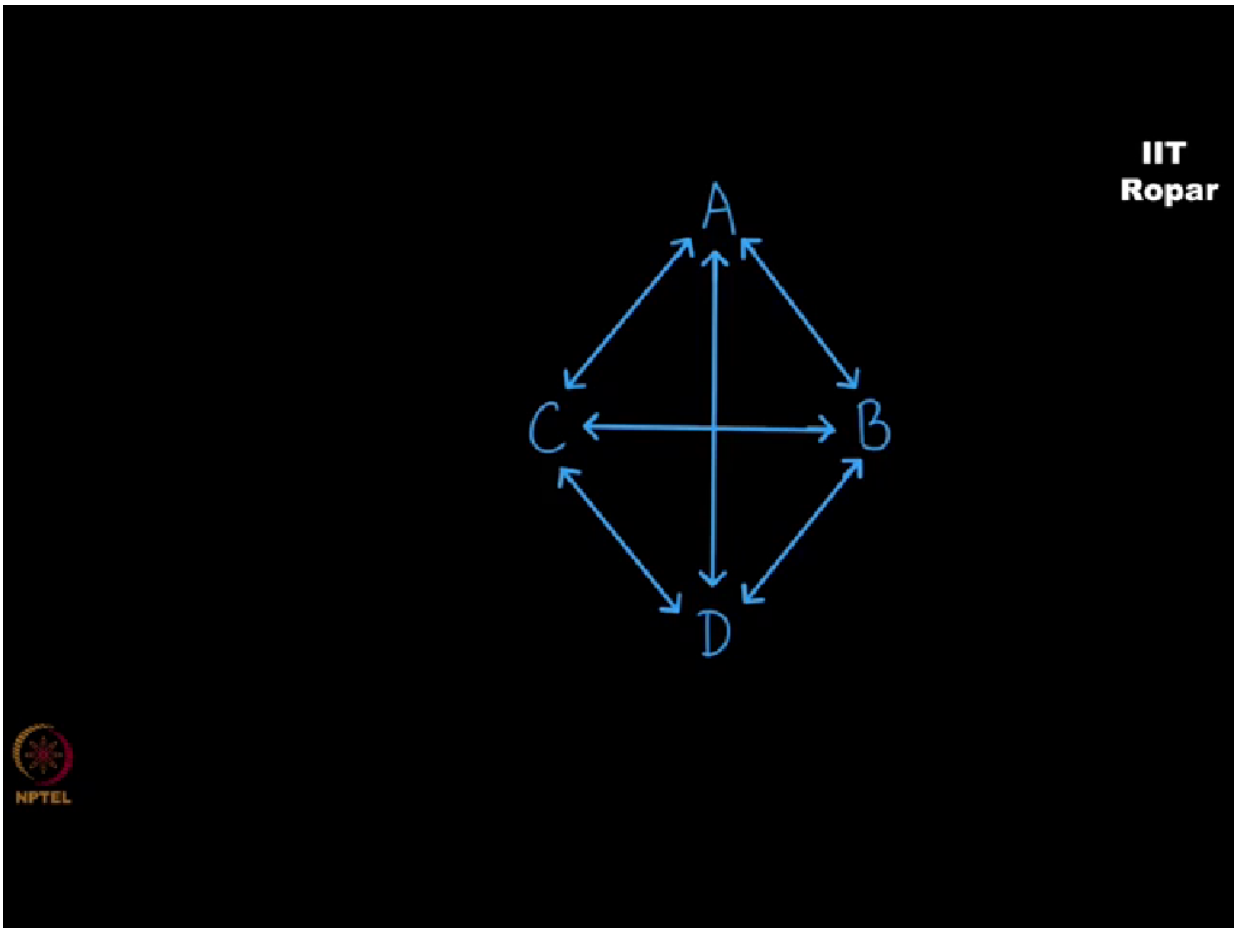
This group of 100 people have a weird kind of friendship. What is the weirdity here? Whenever A likes B and B likes C, A likes C. I repeat when I know someone and that someone knows someone, then I know this new someone as well. So A knows B, B knows C means A should know C. Whenever I say no, it is friendship, and friendship as you can see is a symmetric relation. Okay. A is related to B and B is related to A.

Now this group of 100 people enjoy this new kind of relationship where a friend's friend is always a friend.



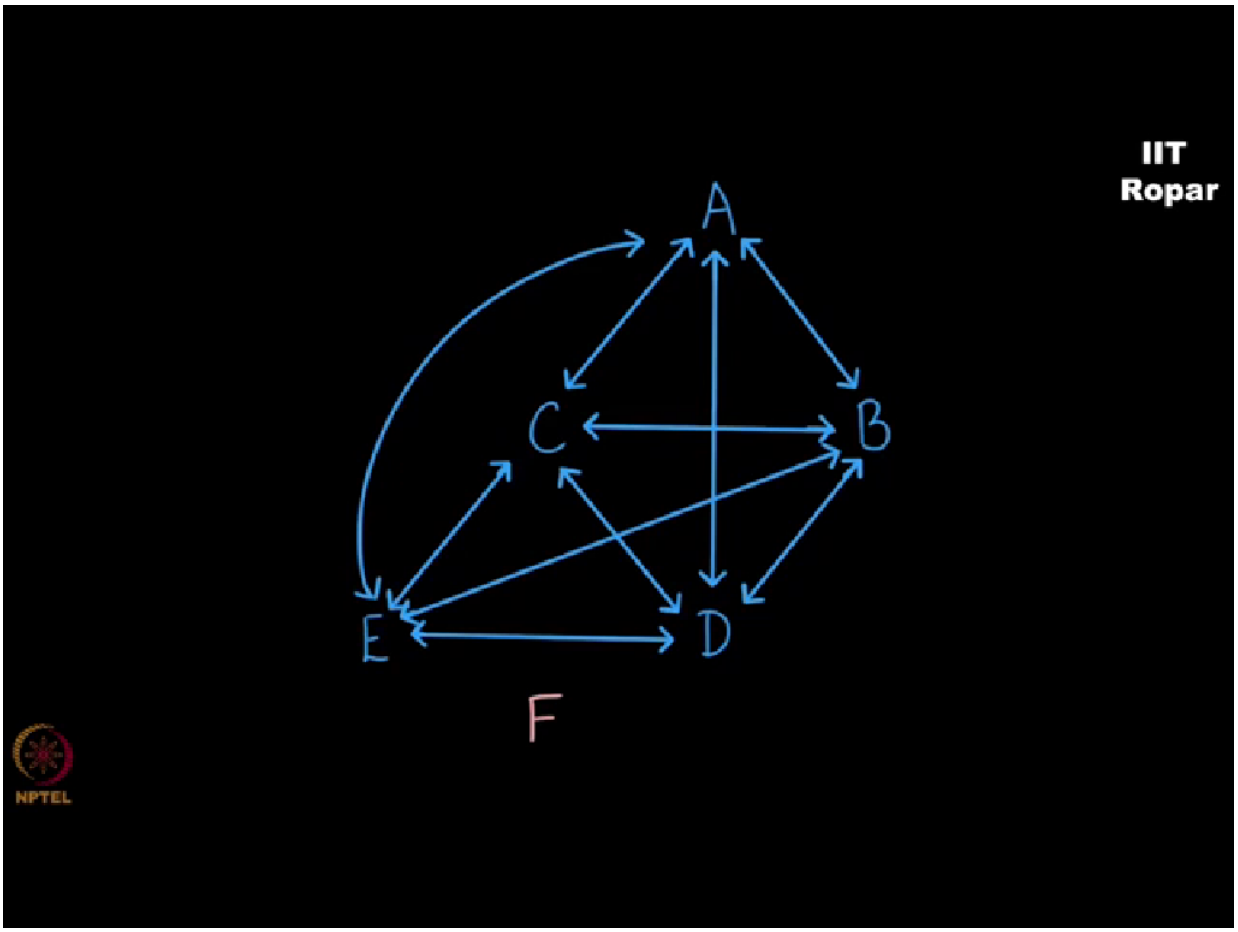
Okay. Let us observe this carefully. How does such group of 100 people look like? Let me analyze. So A is friends with B, B is friends with C, and hence A will be friends with C. Okay. I repeat. This is a property of this group. What is the property? A friend's friend is a friend. That is the main property enjoyed by this group.

Now just in case B is friends with D, okay, A, B, C are friends with each other and D is friends with B. Now look at the property of this 100 friends. B is friends with D, which means A also becomes – is supposed to be friends with D. B is friends with D. C is friends with B. So C will be a friend of D. Correct? You see when D knows someone in this team of three people, D will end up knowing everybody so that the property is satisfied.

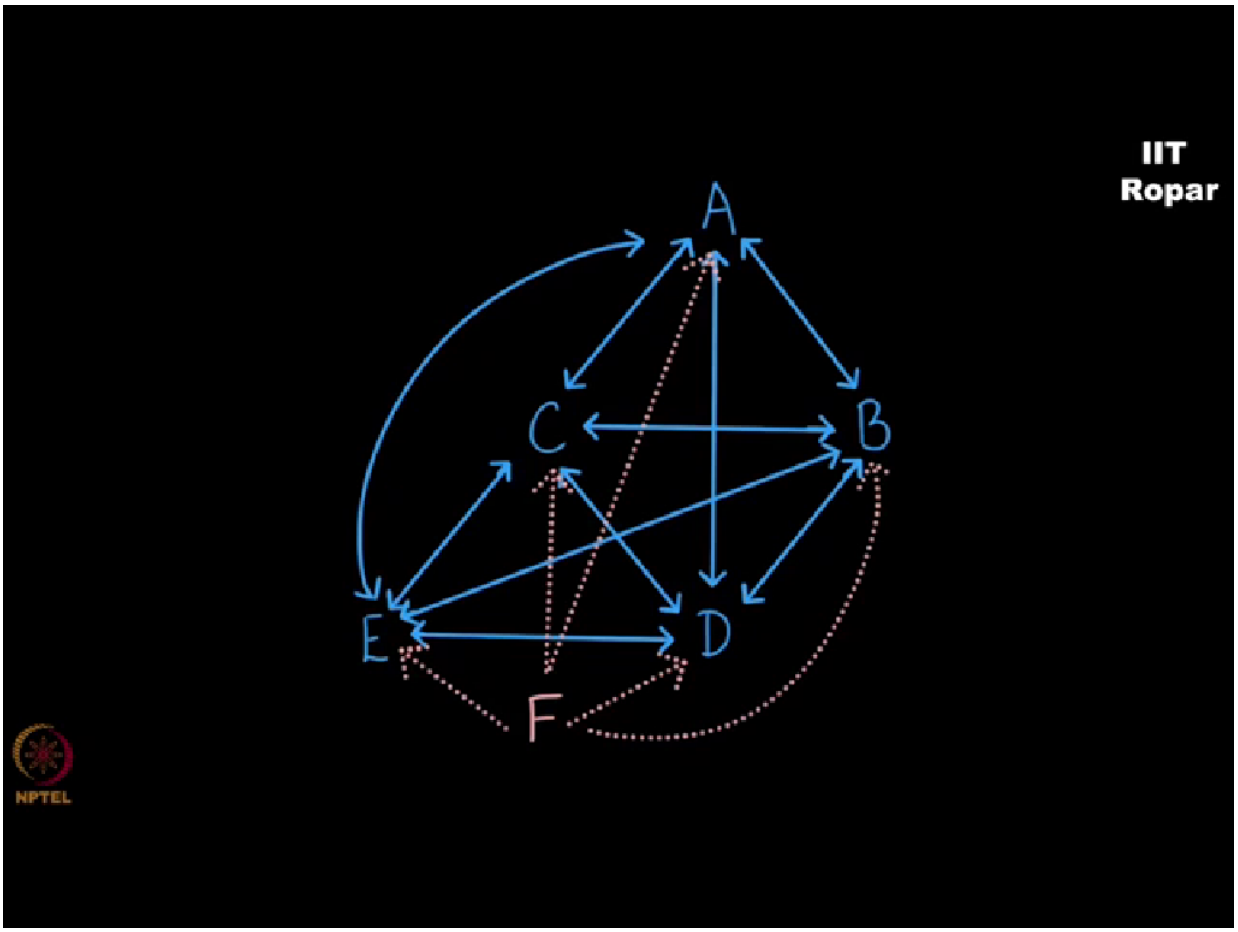


Do you get that? It takes some time to -- for this concept to sync in. Let it take its own time. Don't worry. Okay. The idea is simple. If a group of people enjoy this property that a friend's friend is friend, something like this happens where if some one person knows some person and the – and he ends up knowing the entire team just the way D knew B and that enforces D to know the whole of A, B, C.

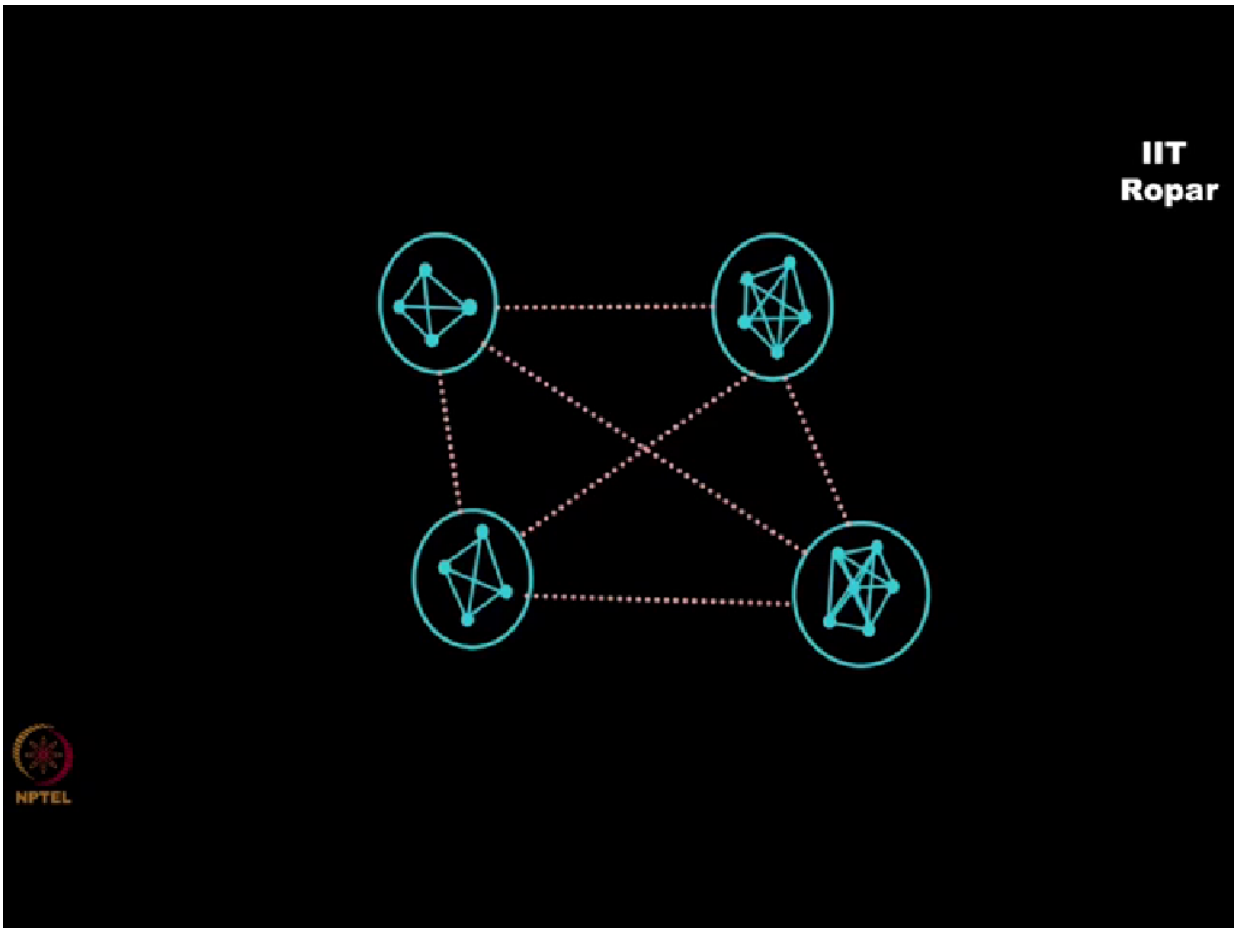
Now A, B, C, D are four friends who know each other. Now let's say, E knows C. C and E know each other. Then this cannot happen, it cannot so happen that C and E are the only ones who know each other meaning E doesn't know anyone else. In that case, the property is not satisfied. So E knows C, C knows D, so E should know D. E knows D, D knows B, so E should know B. Similarly, E should know A.



What just happened? When you realize that a person knows someone, you realize that the person knows everybody in the team. Now patiently observe. Let a new person F come here. He doesn't know let's say D. F doesn't know D. Can F know E? No. If F knows E, then F will be forced to know D, but F doesn't know D. So F cannot know E. In fact, a close observation says F cannot know anybody here. If he doesn't know one person, he will not know anybody in that sort of a team, the closely knit team where everyone knows everyone else. Right?



So these 100 people, if you -- if they enjoy this property that a friend's friend is by default a friend, then such 100 people will appear something like this. They would have formed clusters where people within the cluster will know each other and people across clusters will not know each other.



Isn’t that obvious? You may want to think about it. You see, not everything can be explained with a pen, paper and let’s say animation. There should be some amount of effort from your side as well. Think about it. If you don't understand, you can always ask a question.

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