NPTEL

NPTEL ONLINE CERTIFICATION COURSE

Discrete Mathematics
Set Theory

Symmetric difference

With
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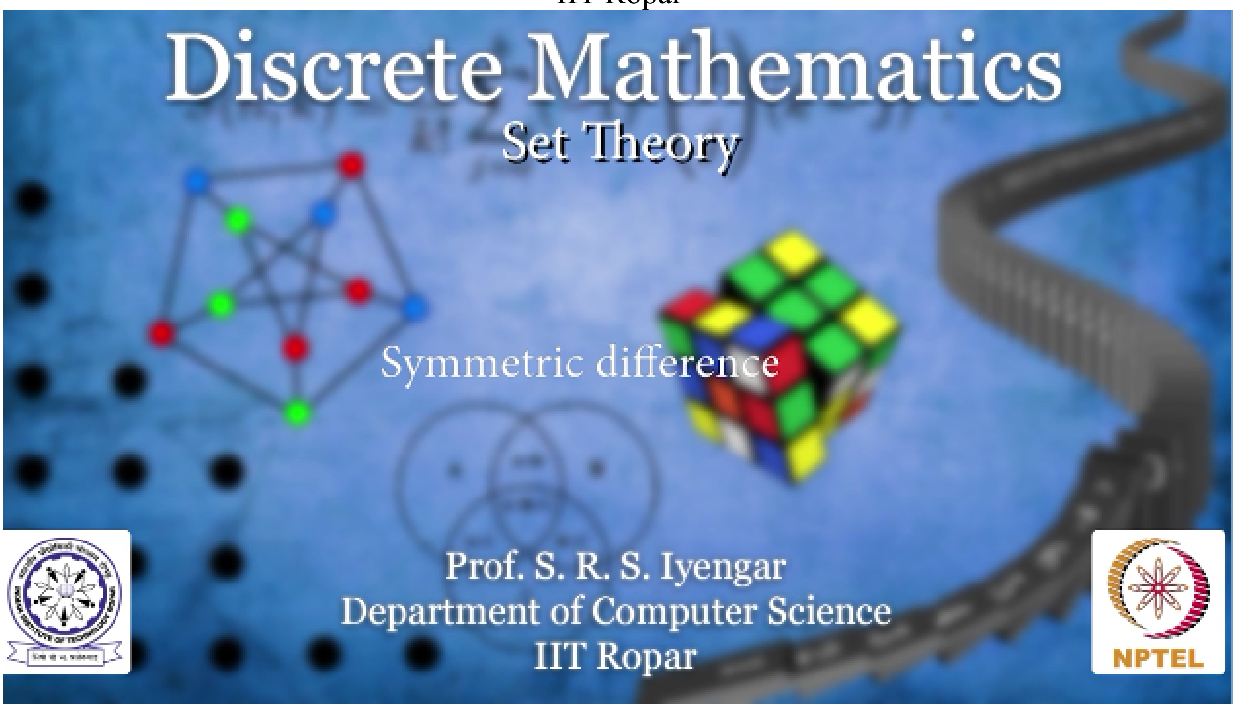
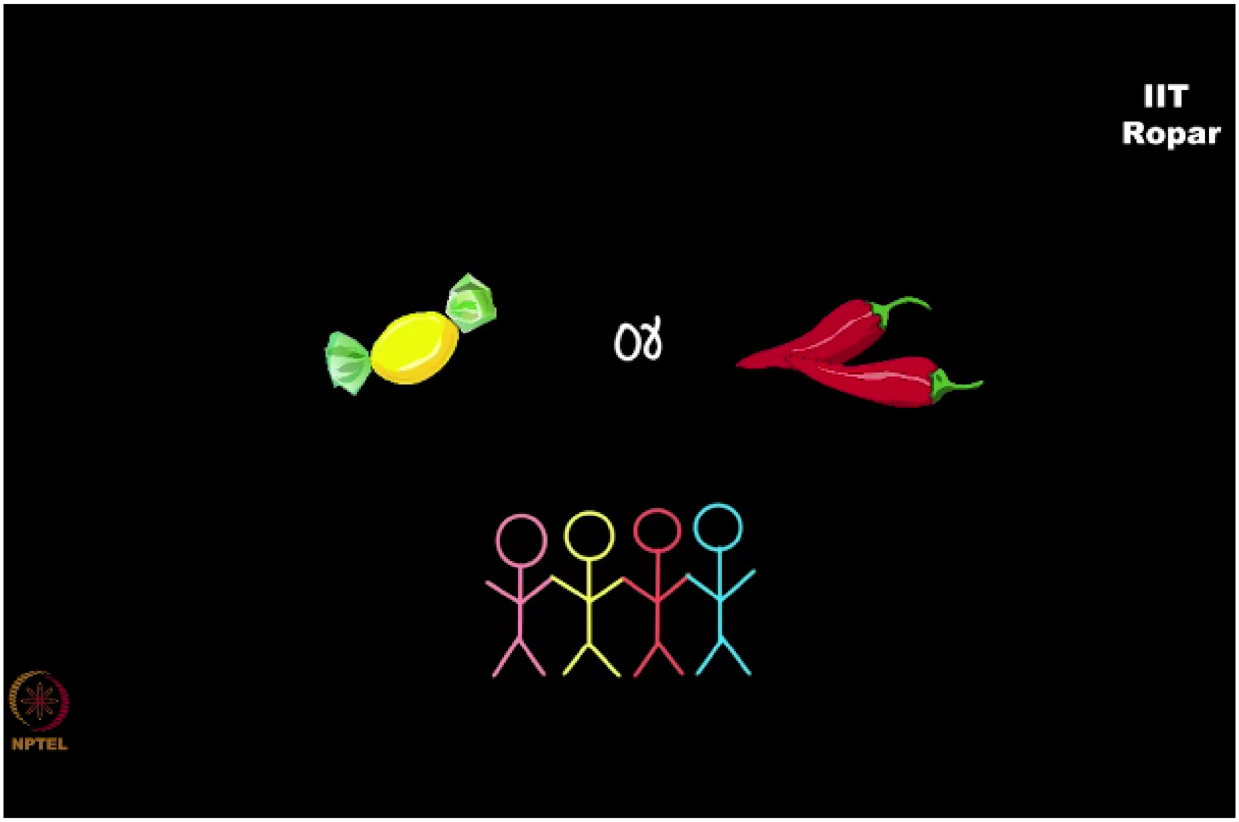
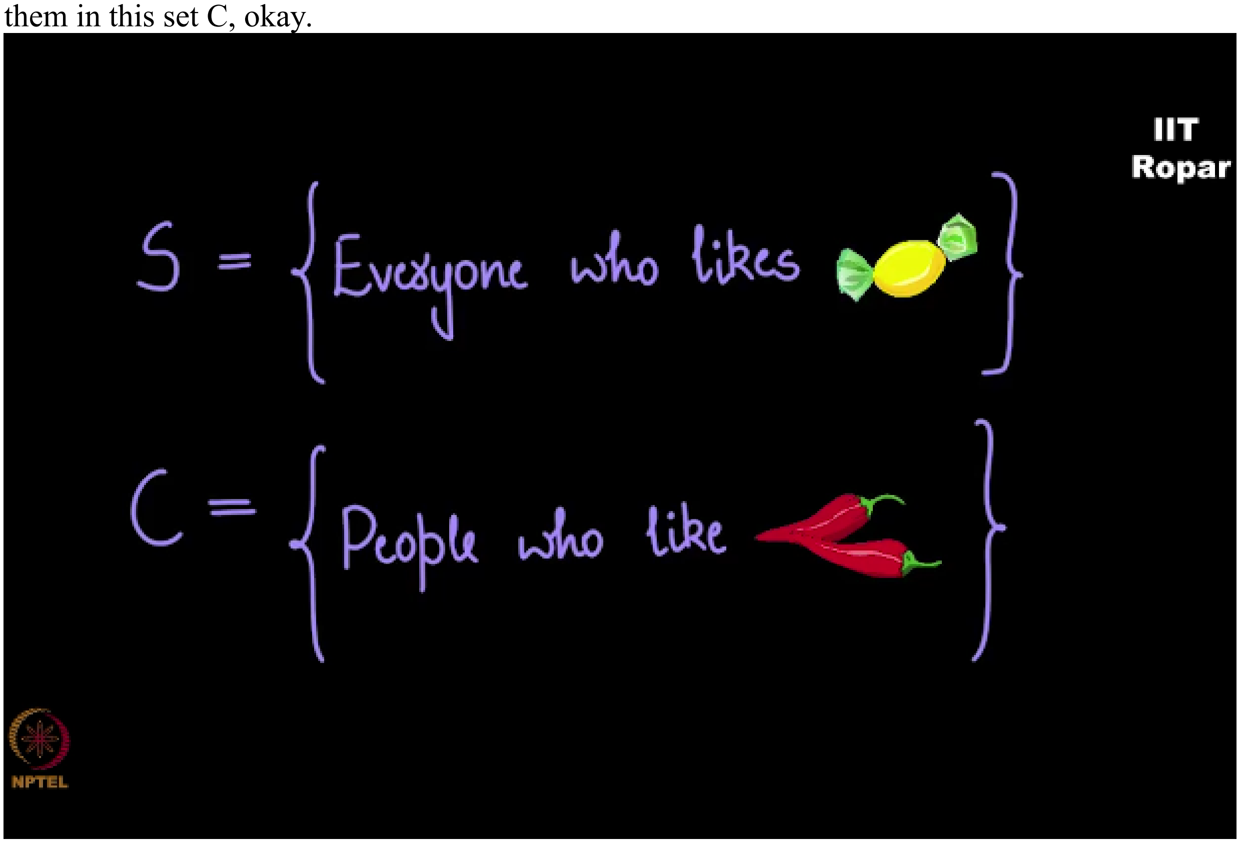


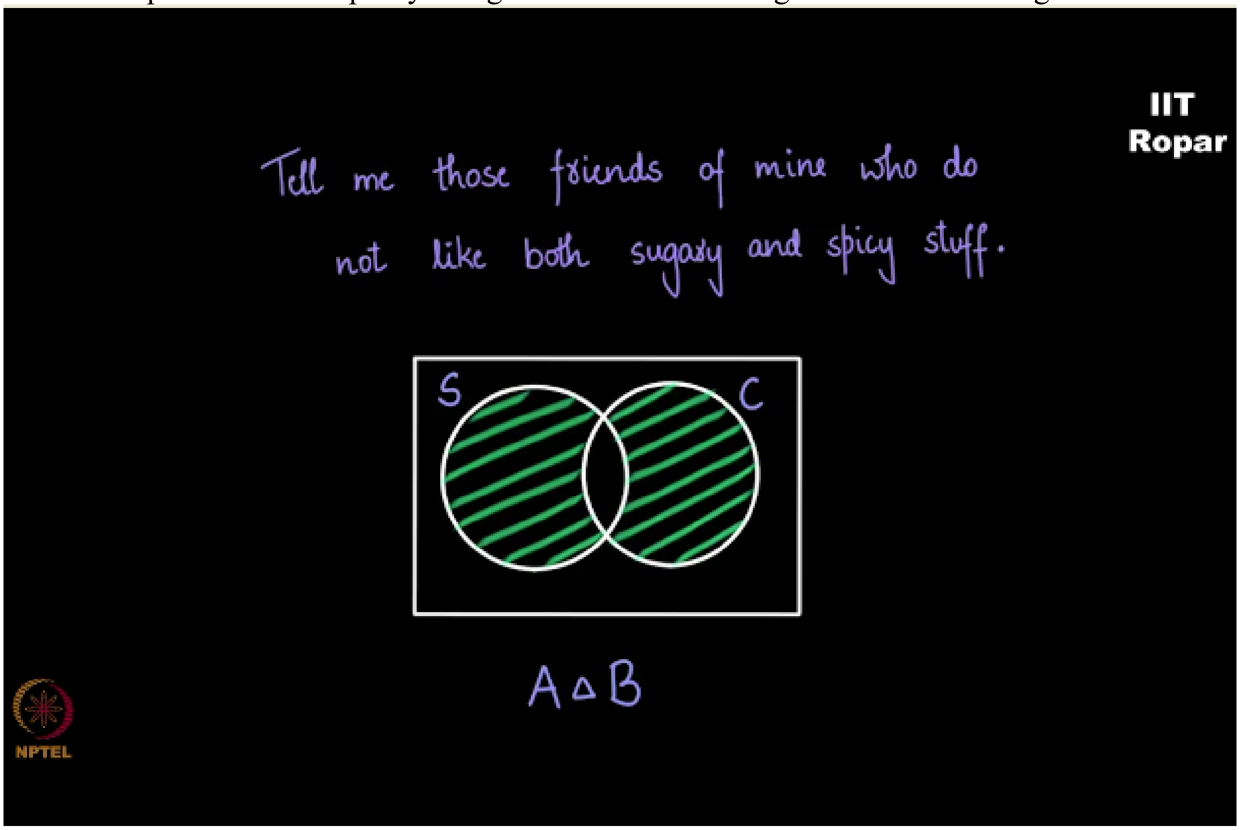
Let us look at all my friends, my friends have this peculiar characteristic that they either like sugary stuff or spicy stuff, some of them in fact like both sugary and spicy stuff, but you cannot find a friend of mine who neither like sugary stuff nor spicy stuff, so I can write them as



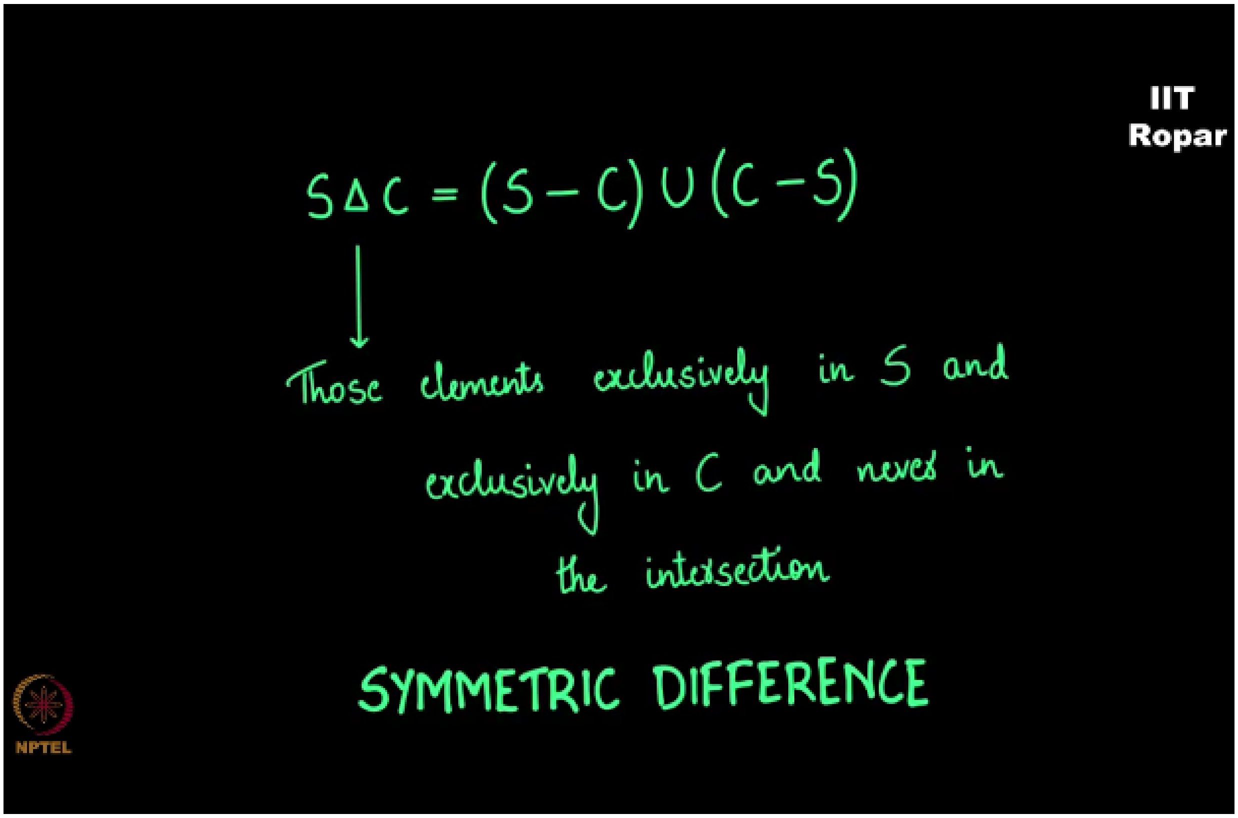
everyone who likes sugary stuff I put them in this set S anyone who likes spicy stuff I will put them in this set C, okay.



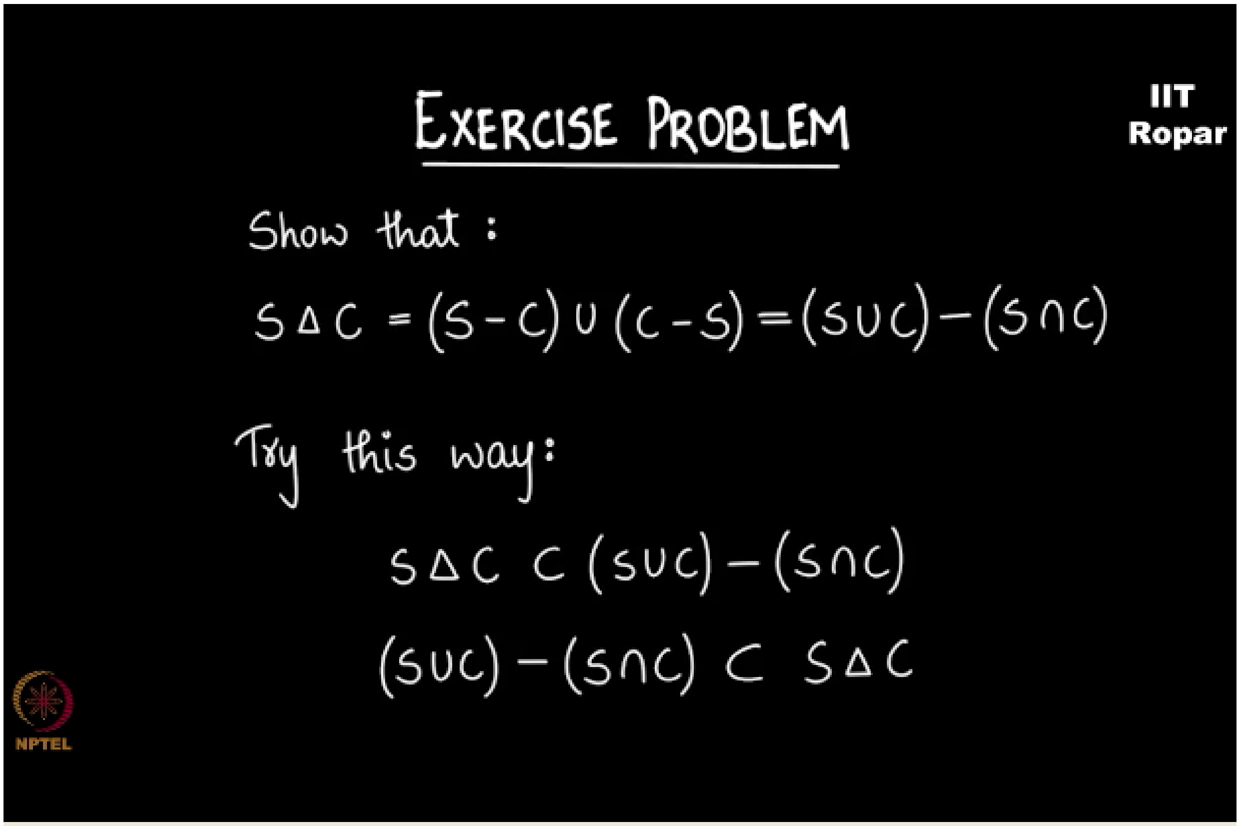
Now if I ask you this question tell me those friends of mine who do not like both sugary and spicy stuff, they like either spicy stuff or sugary stuff not both, so intuitively if you write a Venn diagram like this sugary and spicy all I'm asking for is this shaded region and this shaded region, this is called a symmetric difference A triangle B, that’s how it is denoted, what is it? Looks complicated but it's pretty straightforward it is nothing else but we're using S and C here



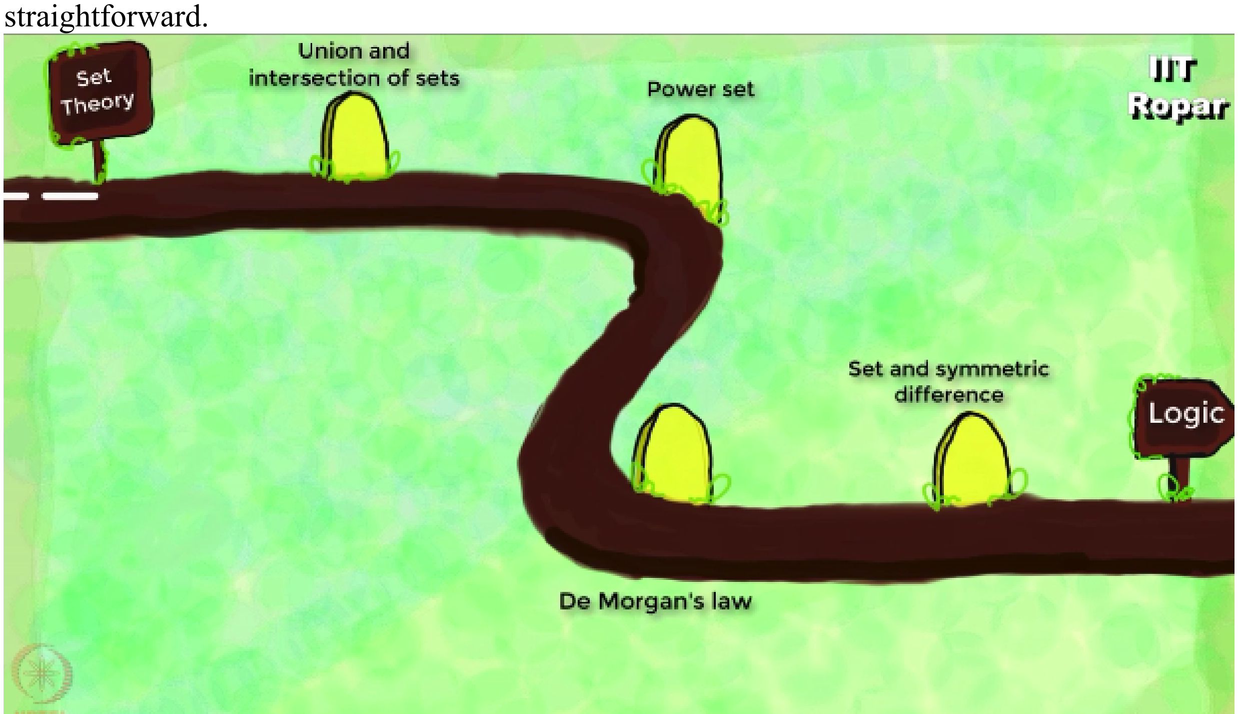
so I'll use S and C, S triangle C = S remove all the elements of C from S, and look at C and remove all elements of S from it, and take the union of these two things this will denote those elements that are exclusively in S and exclusively in C, but never in the intersection this is called the symmetric difference.



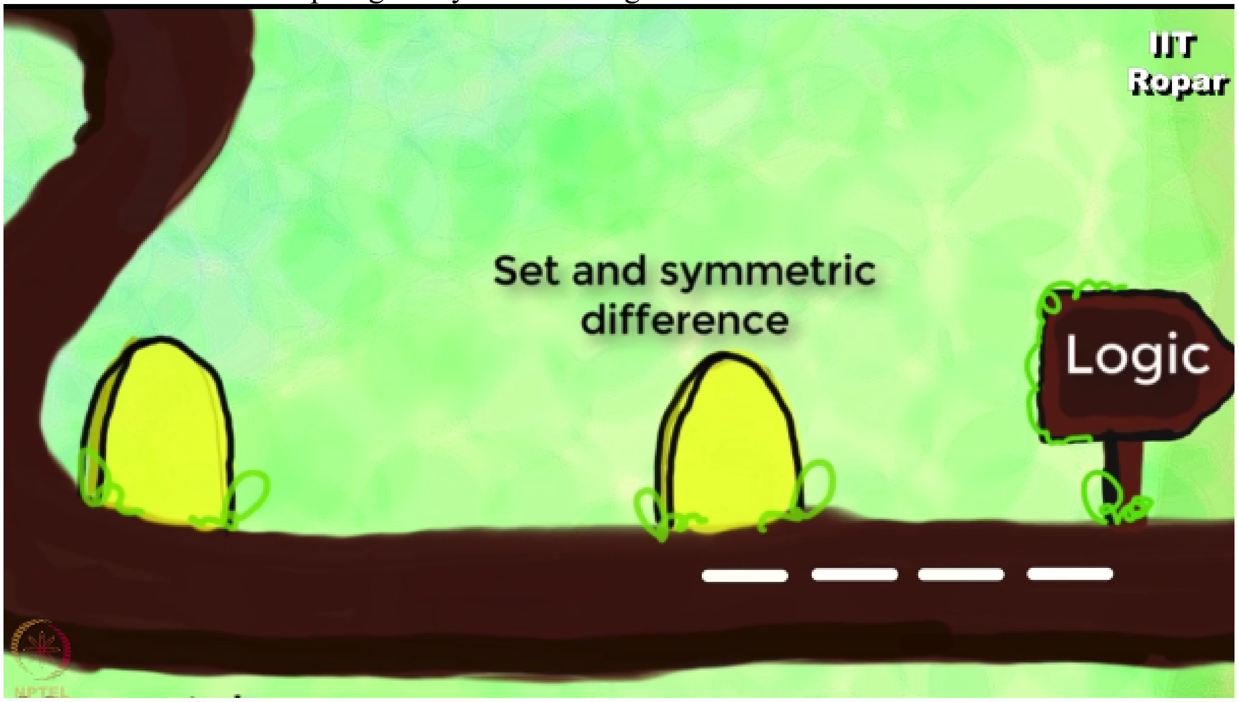
Here is an excise problem for you all, can you show that the symmetric difference S triangle C whatever we wrote which was actually equal to S-C union C-S is indeed equal to S union C - S intersection C, you should jump and tell me that this is very obvious from the Venn diagram, but then can you try showing the two facts that S triangle C is a subset of this right hand side, which is S union C - S intersection C, and the right hand side S union C - S intersection C is indeed a subset of S symmetric difference C or triangle C, if you can show these two things you are through, that the equality in fact codes, try showing this the way I have been showing



containment so far, X belongs to the left hand side and hence X belongs to the right hand side and so left hand side is subset of right hand side, use that logic and try showing this, pretty straightforward.



So we have now come to the end of the chapter set theory, this chapter forms the foundation for several advanced topics in mathematics, you may want to revisit this chapter again if you feel the need for it, the next week we will be training our minds to solve puzzles using logical deduction. The next chapter goes by the name logic.



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