NPTEL

NPTEL ONLINE CERTIFICATION COURSE

Discrete Mathematics
Set Theory

Power Set – Part 2

With
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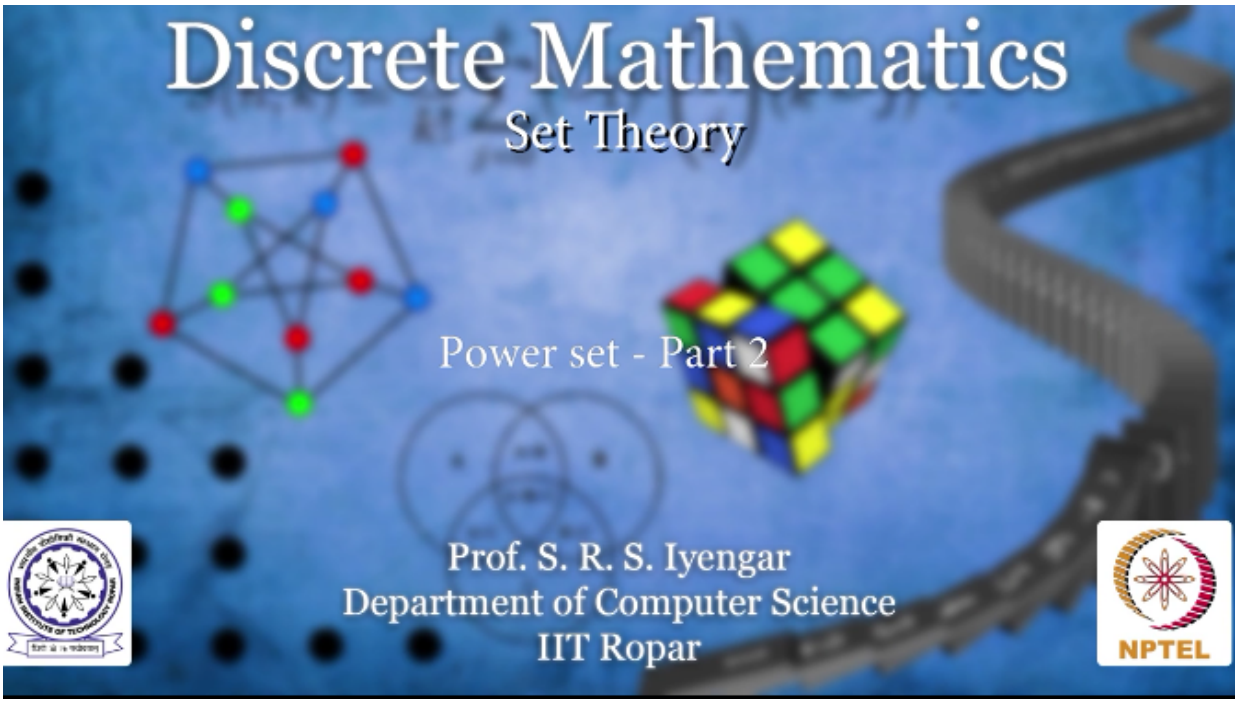
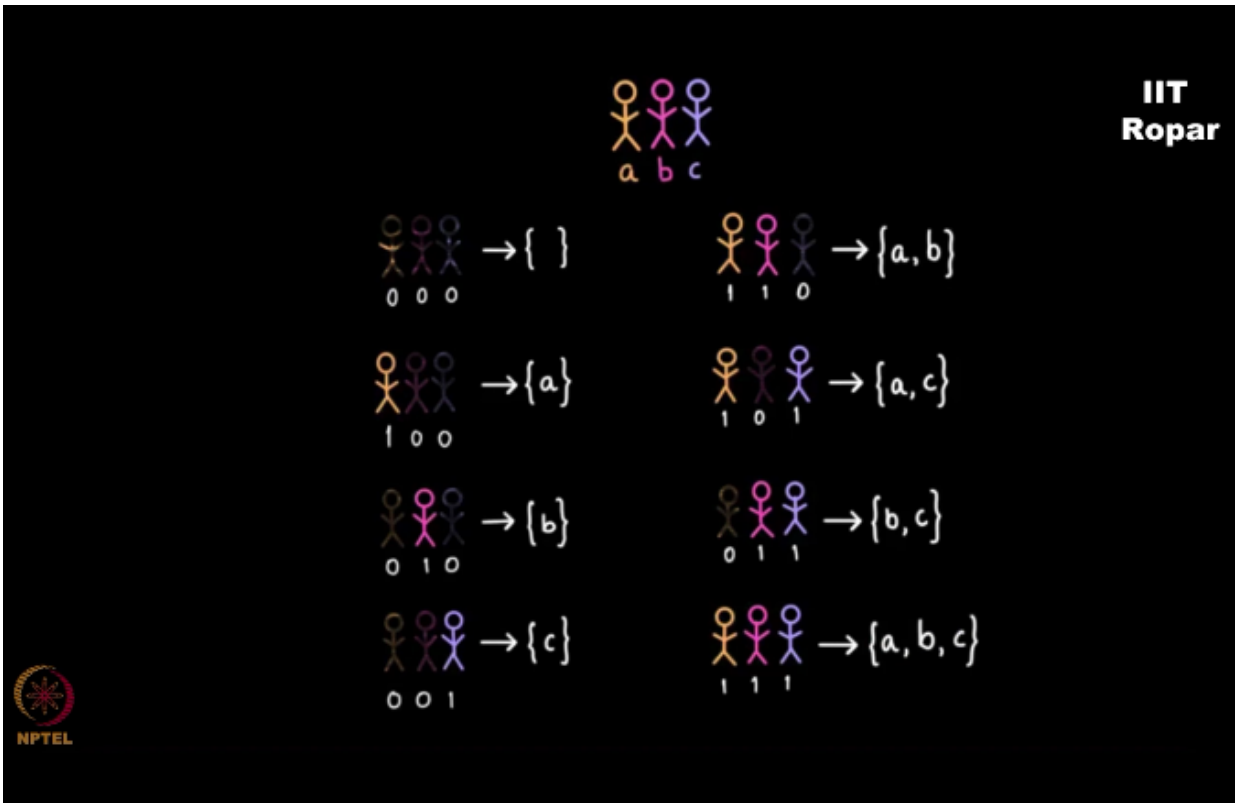
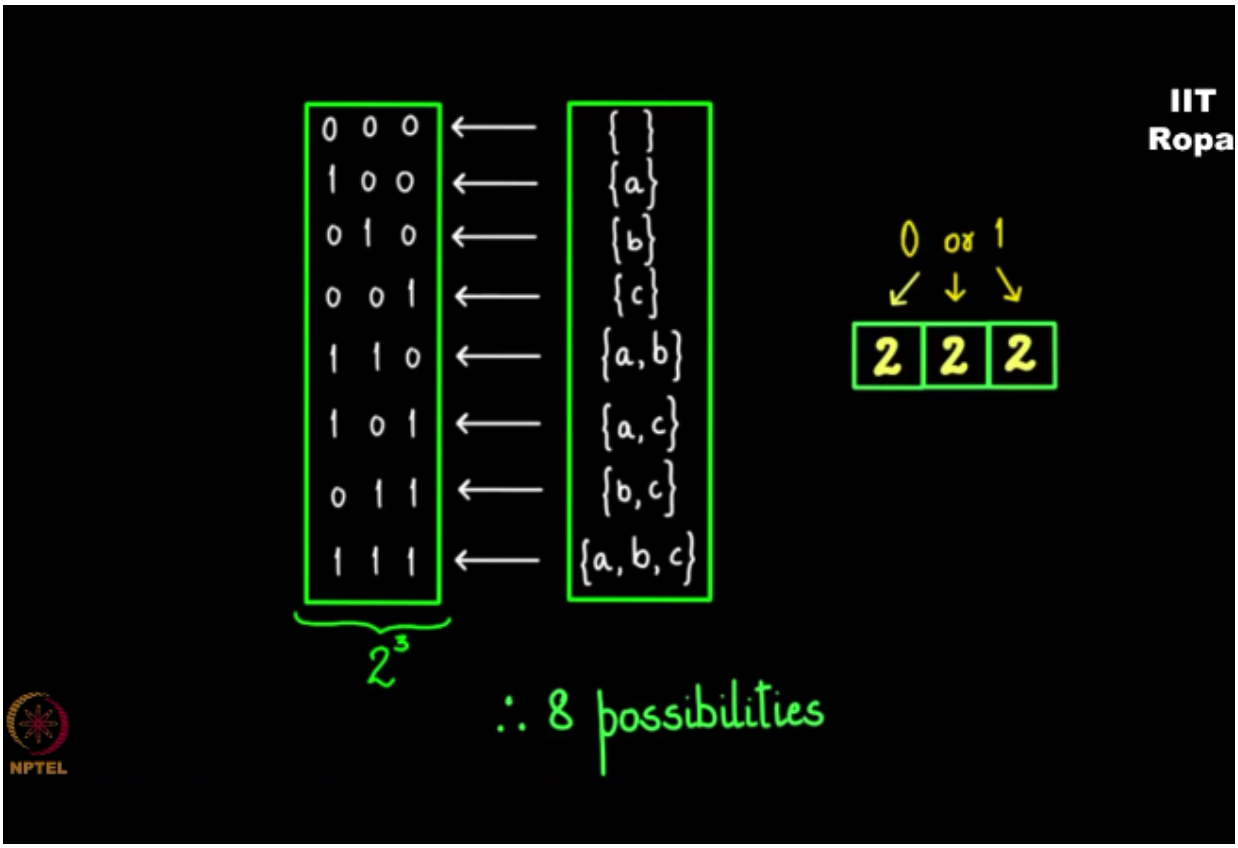


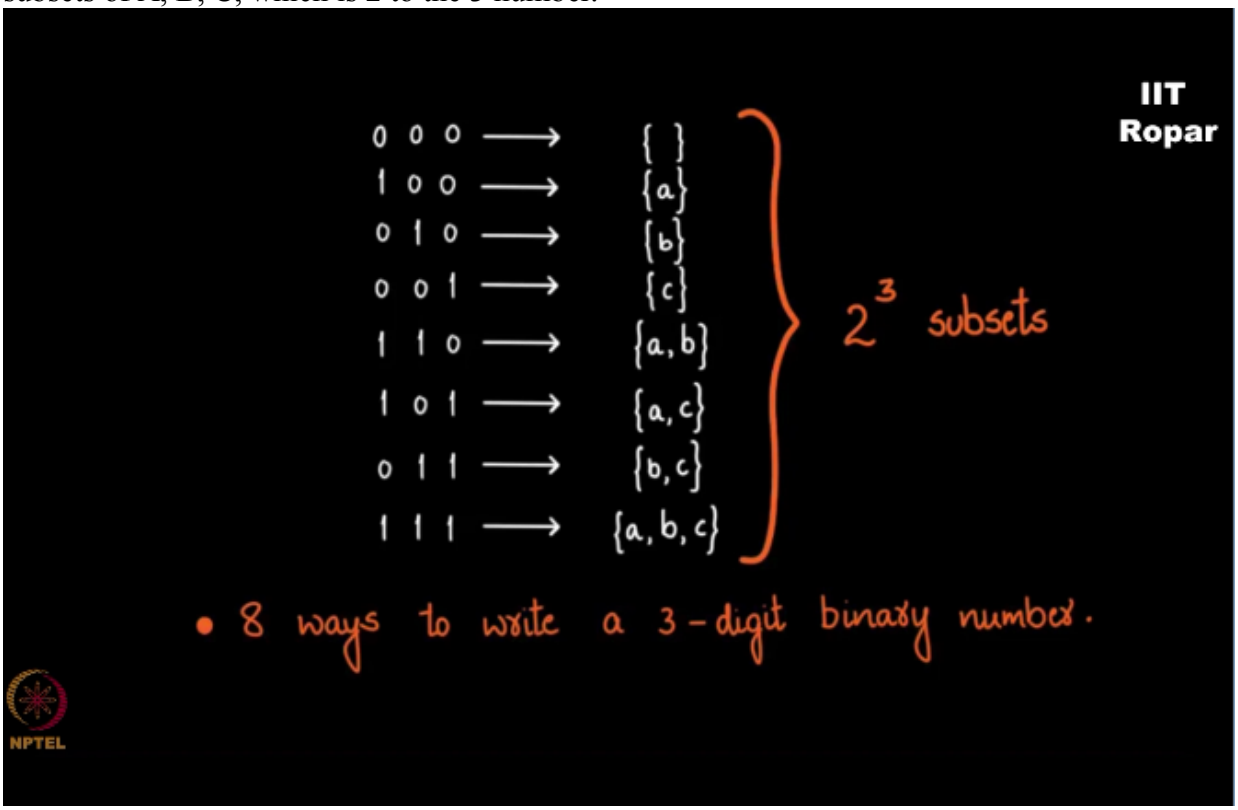
Five is slightly on the higher side, let me take only 3 people, let's say A, B and C. All of them not coming is represented by 0 0 0 A coming and B not coming, C not coming, we represent that by 1 0 0 let me write this down this is nobody comes, this would be A alone comes, 0 1 0 represents B alone comes, 0 0 1 represents C alone comes, 1 1 0 represents A and B come, 1 0 1 means A and C comes, 0 1 1 stands for B and C they come, and 1 1 1 stands for A, B, C all of them come.



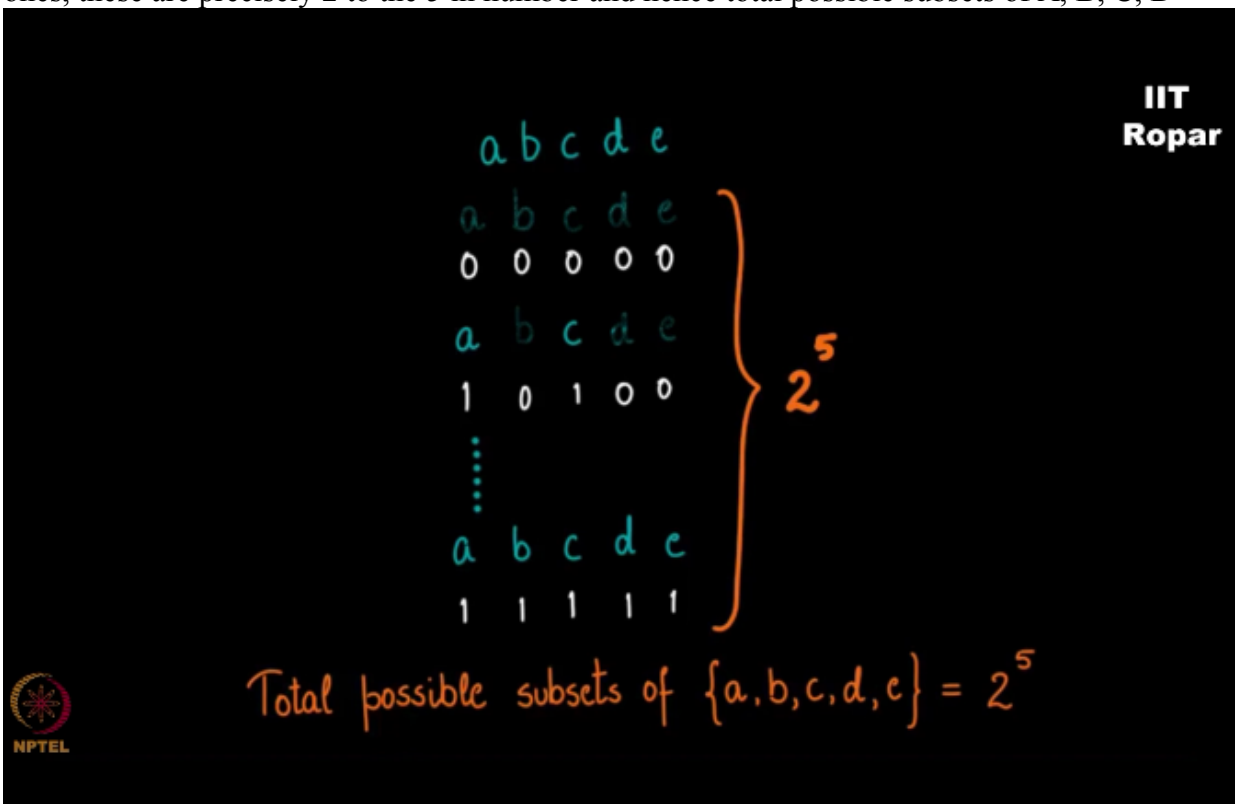
Do you know something, we observe something really fascinating here, you write all possible binary numbers of three digits and you see that for every such binary representation you associate a subset of A, B, C, and for every subset of A, B, C you have a unique binary representation, and you see the number of elements on the right side should be equal to the number of elements on the left side, and the number of elements on the left side as you all know is 2 to the 3, why is that? If you take 3 place holders, where each place holder can have a 0 or a 1, there are two possibilities here, 2 here, 2 here, finally giving you 8 possibilities which means



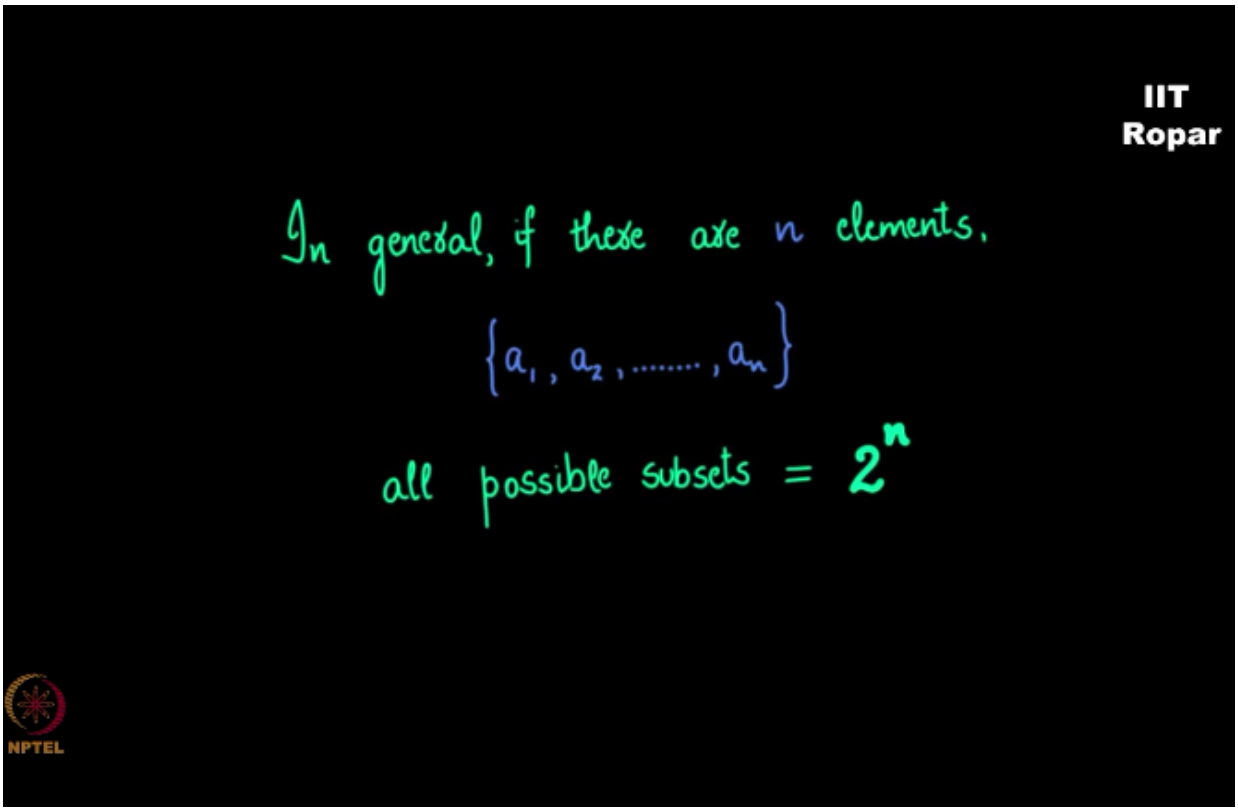
there are 8 ways in which you can write a 3 digit binary number and hence there are so many subsets of A, B, C, which is 2 to the 3 number.



Similarly as we have been discussing, 5 of my students let me know call them A, B, C, D and E because they are 5 in number, none of them coming will be 0 0 0 0 0, let's say A and C come and B D E don't come that represents this and so on, so all of them coming would be all five are ones, these are precisely 2 to the 5 in number and hence total possible subsets of A, B, C, D



and E has to be 2 to the 5, so in general you see if there are N elements A1, A2 up to AN all possible subsets of this set will be 2 to the N, think about it for a moment.



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