NPTEL
NPTEL ONLINE COURSE

Discrete Mathematics
Functions

Number of One-One functions - Part 3

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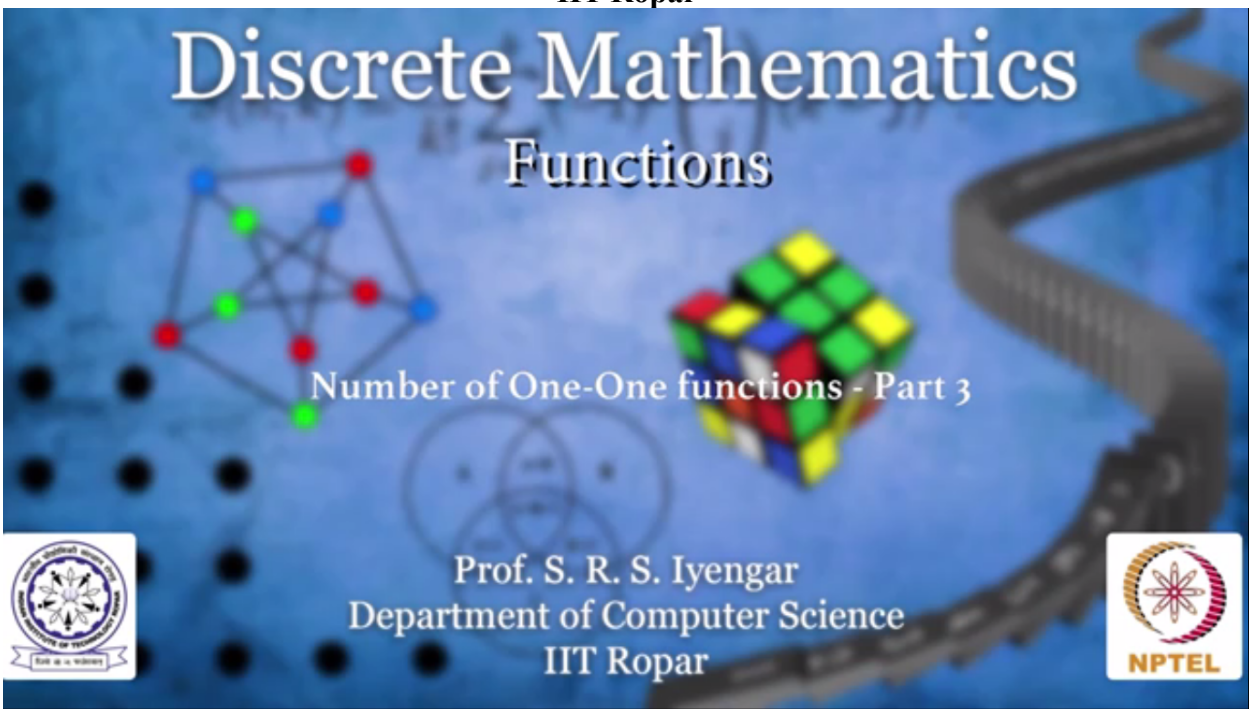
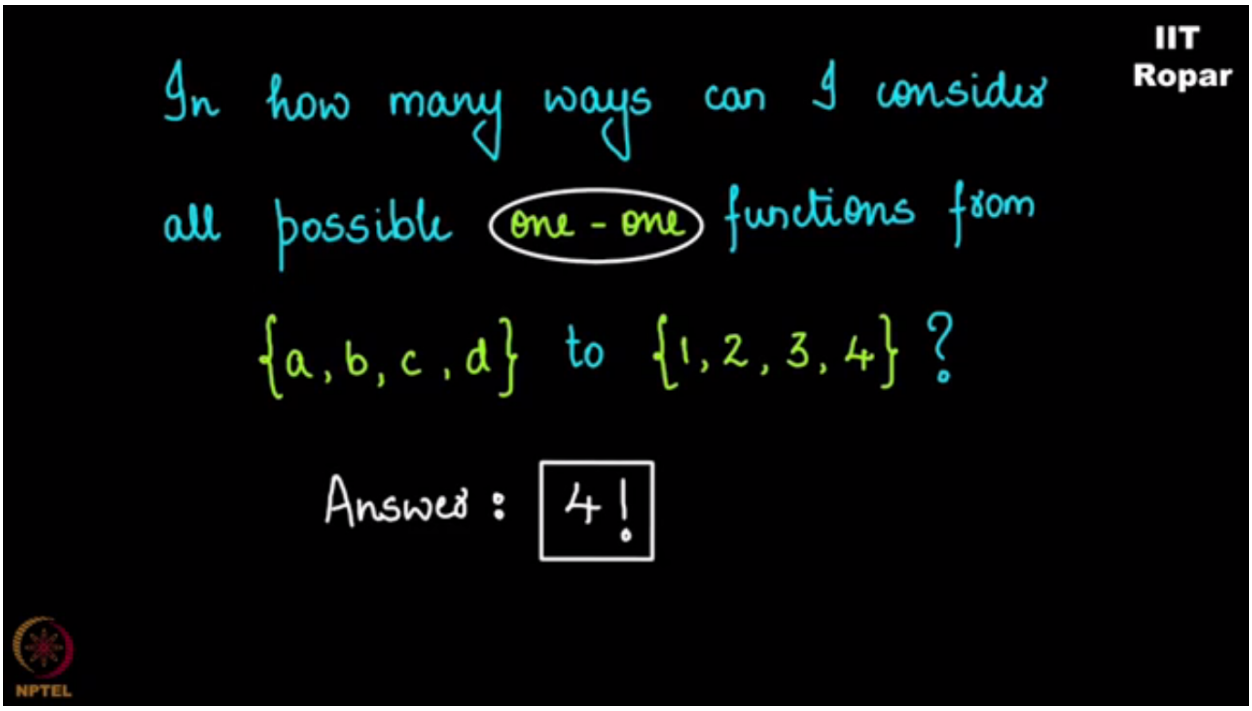


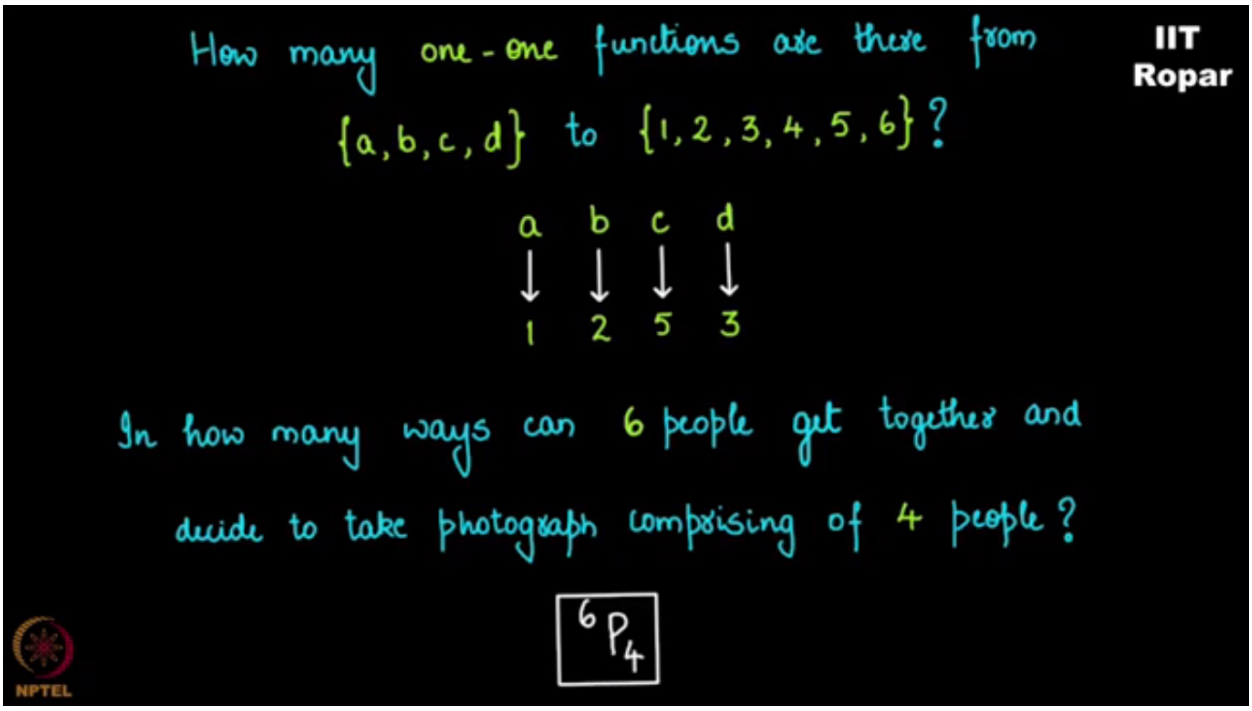
Let us now look at a slightly involved problem. In how many ways can I consider all possible one – one functions from {a, b, c, d} to {1, 2, 3, 4}? The answer is 4! One – one functions that is 4!. We saw how for 3 if it is 3!, for 4 it's going to be 4!.



Now what if I increase this to 6 and ask this question, how many one – one functions are there from {a, b, c, d} to {1, 2, 3, 4, 5, 6}? Now a can go to 1, b can go to 3, c can go to 2, d can go to 5. Again, let's use the same trick. Below a b c d, you will write what? 1 3 2 and 5 which corresponds to this function, correct?

Now if you see the question of how many one – one functions are there from {a, b, c, d} to {1, 2, 3, 4, 5, 6} boils down to simply writing a b c d and simply picking some four different numbers from 1 2 3 4 5 6 and putting them here. 1 3 2 5 was one such way. 1 2 5 3 is another such way. You see. So on and so forth.

This problem again boils down to some problem that we are very, very familiar with. What is that? In how many ways can 6 people get together and decide to take a photograph comprising of 4 people in all possible ways?



The answer is already known. What is that? $6P_4$ and that precisely is the answer for this question as well. So what is the total number of one – one functions from {a, b, c, d} to {1, 2, 3, 4, 5, 6}? The answer is $6p_4$.

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