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Discrete Mathematics
Mathematical Induction and pigeonhole principle

Mathematical Induction - The formal way

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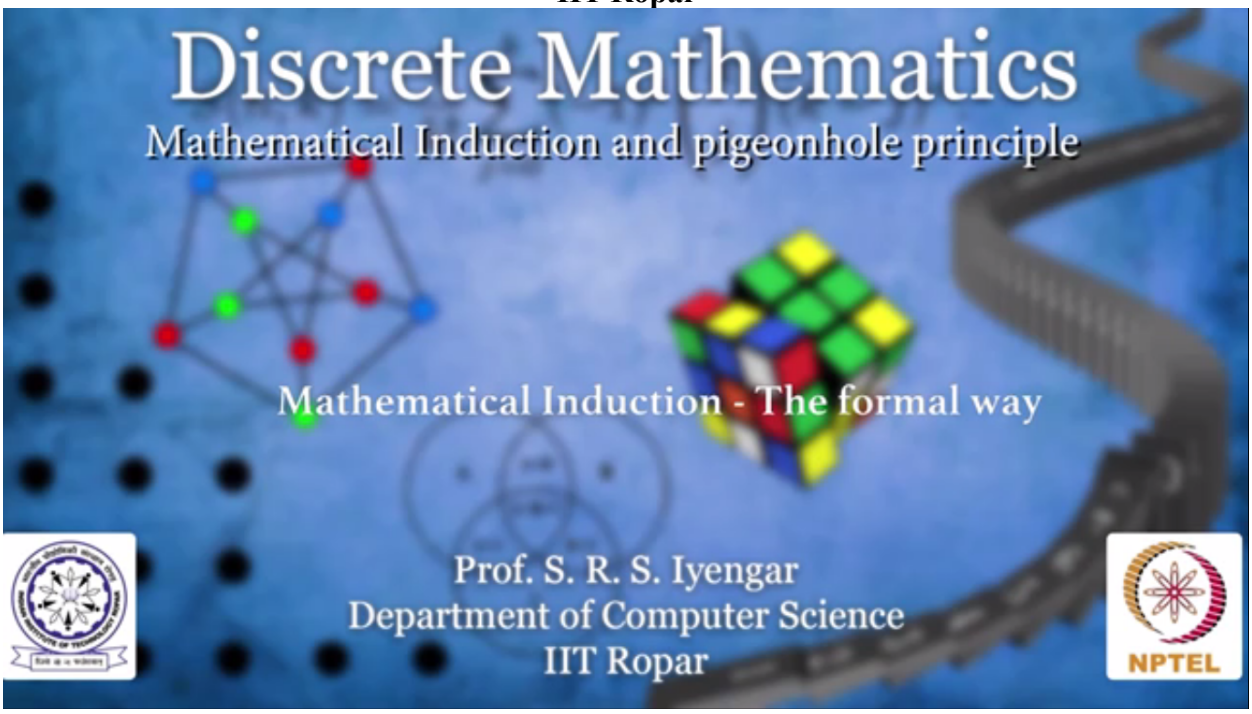
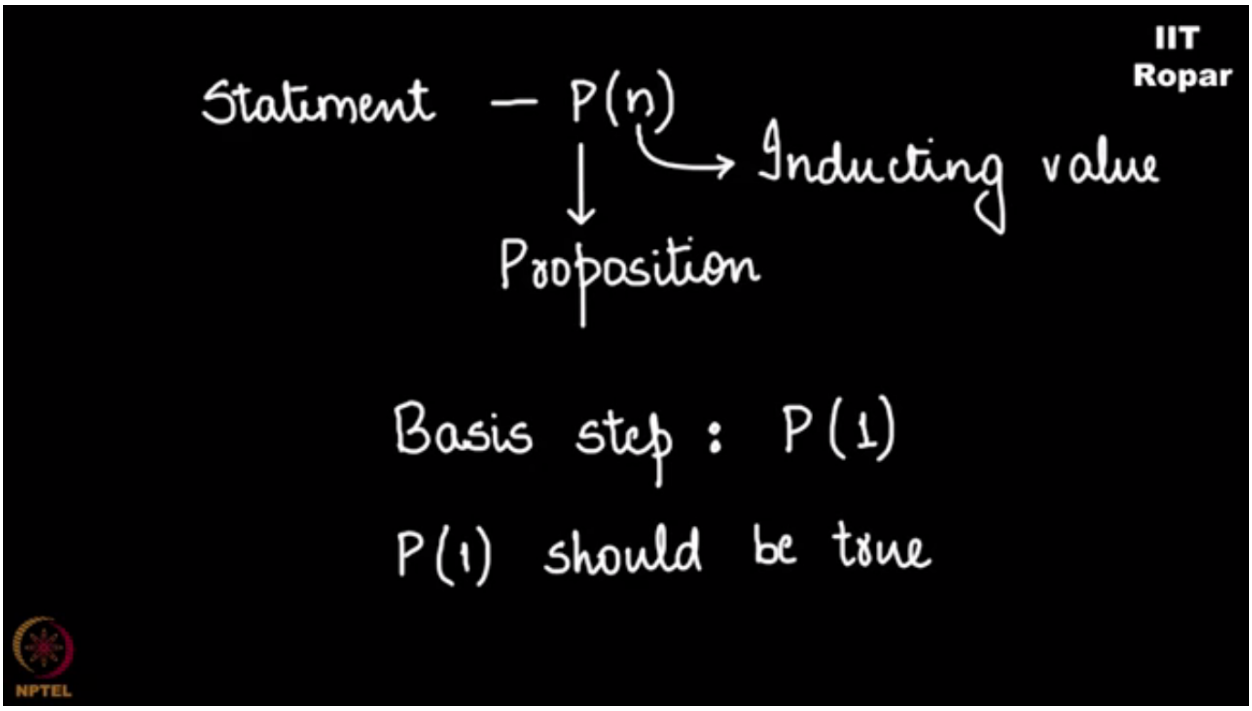


The professor has given a nice introduction on what is induction and how we do it. Let me put the pieces properly and in a formal way. So what do we do? We take the statement and we consider it to be P(n). P represents the proposition or the statement and n is the value which we are inducting on.

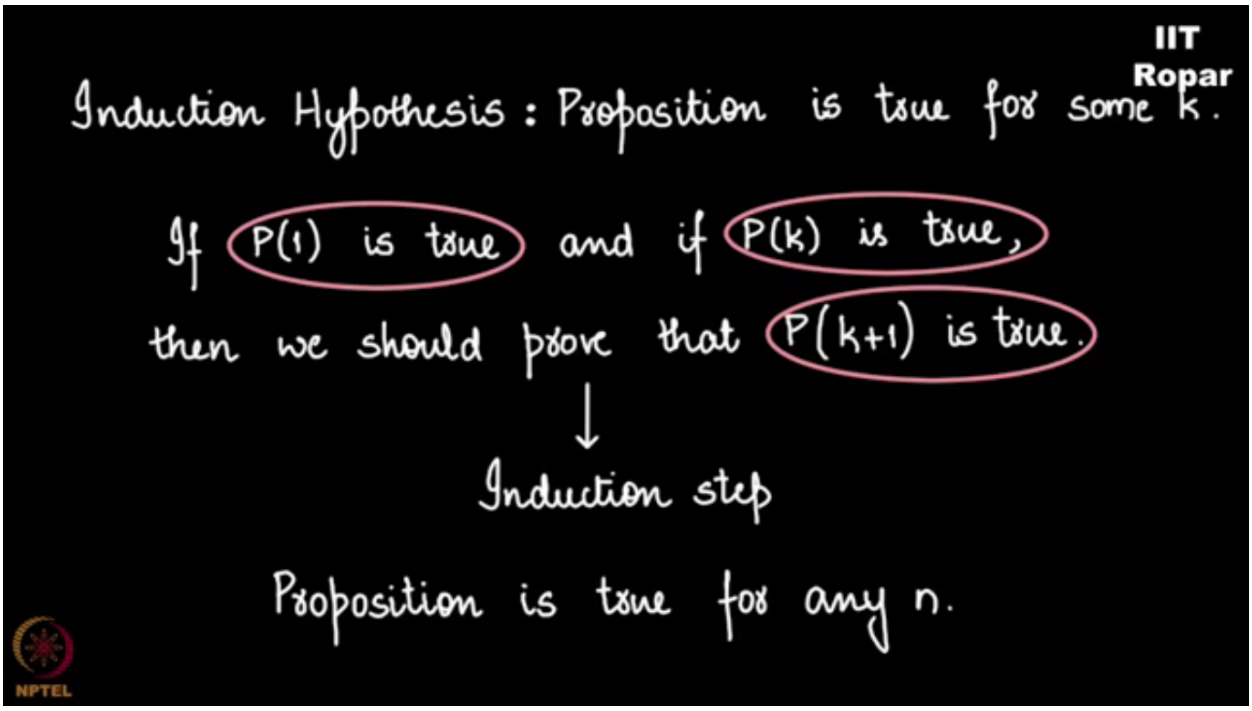
For the basis step we consider P(n) as P(1). That is I start inducting on n by taking values from 1, then give it to the value 2 and so on. And hence I consider my basis step to be P(1) and then P(1) will happen to be true.



And then we move on to what the professor mentioned as gap if you remember that is called an Induction Hypothesis. What do we do then? We assume that the proposition is true for some k numbers, right?

So at this point of time, what has happened? I proved that my proposition is true for n = 1, n = 2, n = 3 and so on up to n = k. If it is true for n = 1, that is if P(1) is true and if my proposition happens to be true for n = k, then we have to prove that the proposition is true for k+1. There lies the induction step. Correct?

And if P(1) happens to be true and if I assume that P(k) is true and I prove that P(k=1) is true, we have completed the inductive proof and then I can say that proposition is true for any n.



So this is the method we follow and henceforth, in all the problems, you will be see – you will be seeing this method in action. It will be more clear with the further problems.

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