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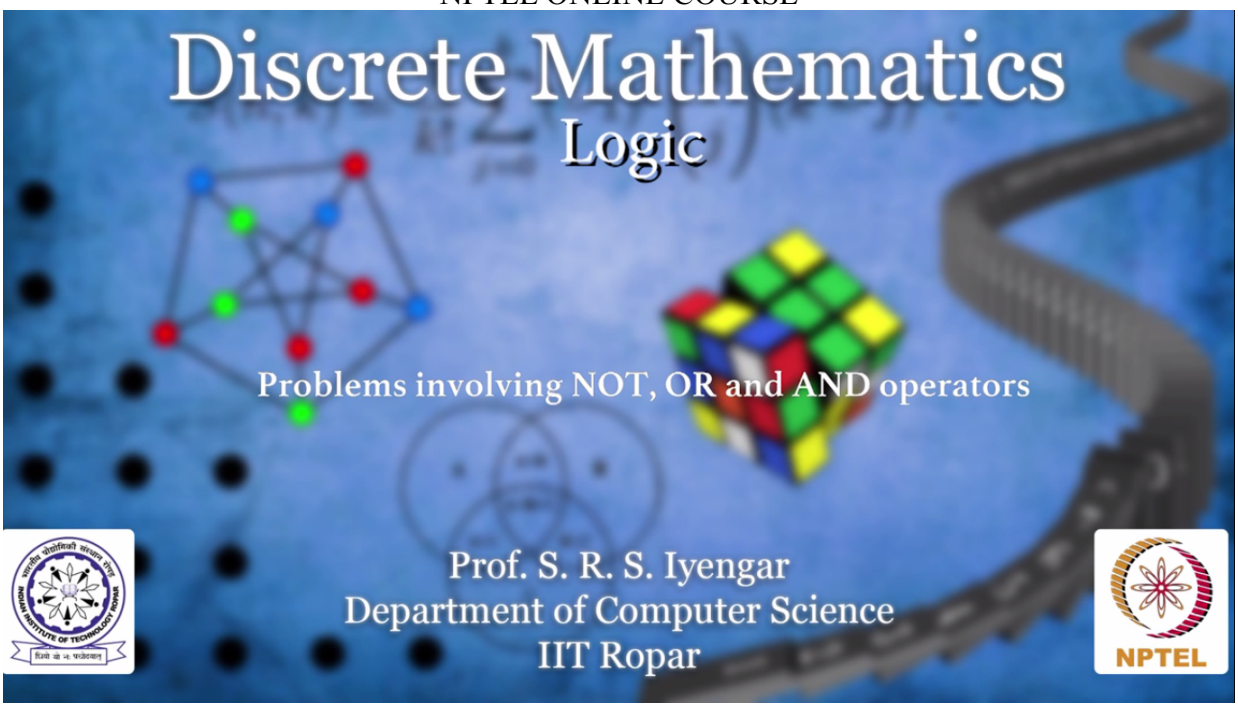

Discrete Mathematics
Logic
Problems involving NOT, OR and AND operators
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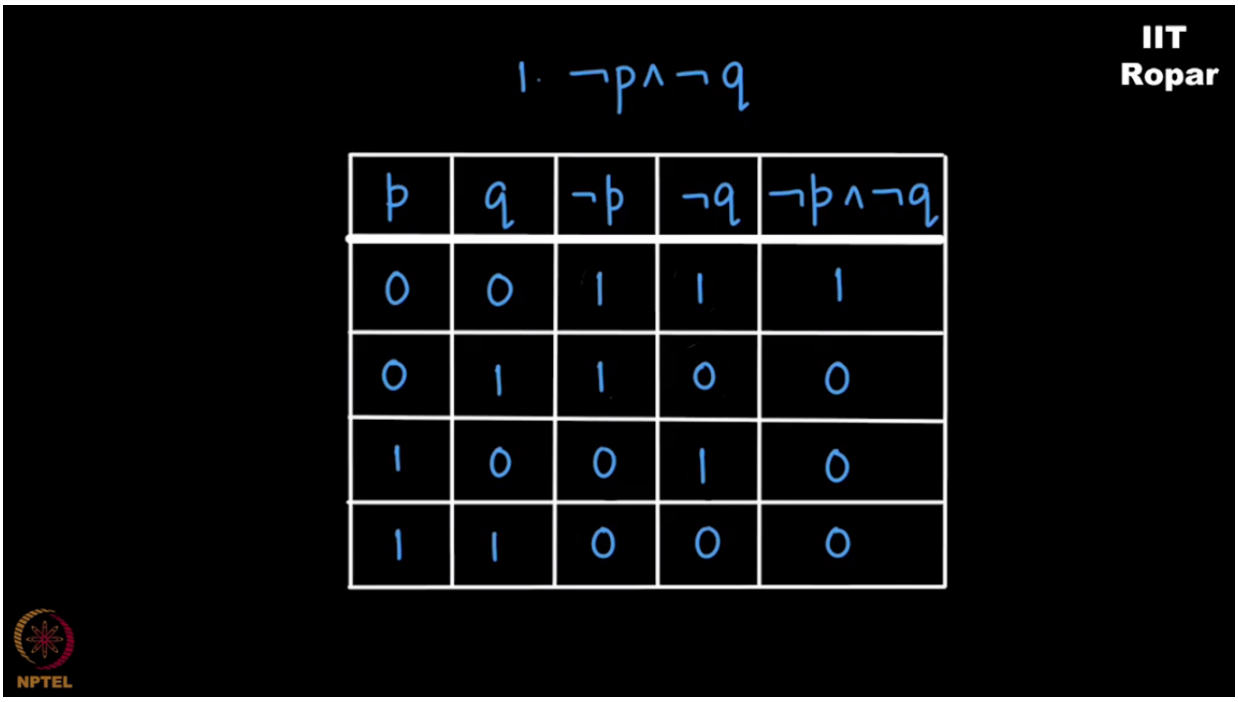
You have seen some simple straightforward truthtables. Let us now look at slightly involved truthtables. So how does a truthtable for not P AND not Q look like? So what do we do P, Q fill up the entries of P and Q and then create not P and then create not Q so that it becomes easy for you to create the entries for not P AND not Q. So what is not P now? P 0 means not P will be 1, 1, 0, 0 and not Q column will be simply the negation of the Q column which will be 1, 0, 1, 0 and now not P AND not Q will be 1 and 1 will be 1. 1 and 0 will be 0. Then again 0, and then 0. So 1, 0, 0, 1 will be the entries of not P AND not P.



Well how does the truthtable for P and Q within brackets OR not P look like? So how do we go about constructing this table. We need entries P, Q, not P, P AND Q and finally we need the answer P AND Q OR not P. So as you can see 0, 0, 1, 1. 0, 1, 0, 1. Not P will be 1, 1, 0, 0. Why? Obvious P AND Q will be 0, 0, 0, 1, just verify and P AND Q OR not P will simply be the OR of the third column here and the fourth column here which would simply be 1, 1, 0, 1. Let us now write the truthtable for P OR R AND Q. How does it look like? Now you have three variables which means you should first write P, Q, R and flood the entries with all possible 0s and 1s. So what do you do? P will have four 0s, four 1s. Q will have two 0s, two 1s, two 0s, two 1s and R will have alternate 0 and 1 like this. Correct? This is the way in which you write all possible three digit binary numbers if you know what I mean. Think about it. Okay. So what is P OR R. So P OR R is this column OR operated on this column which will be 0. 0 or 0 is 0. 0 or 1 is 1. 0 or 0 is 0 and so on and the rest will all be 1s here in this column and then what will be P OR R AND Q, the final column. That will be the AND of the Q column and this P OR R column which will be 0, 0, 0, 1 because it's 1 and 1. 1, 0, 0, 1 and 1.