Introduction to Logic
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Lecture - 14
Syllogistic Poem, Reduction of Syllogisms

Welcome back, in the last class we presented Aristotle in theory of syllogisms, where we discussed in extensively about the validity of syllogisms. And we presented 5 rules for the validity of syllogisms with which one can come to know what kind of syllogisms is valid etcetera and all.

So, his rules are like this that you know how when middle term needs to be distributed, at least once in the premises nothing no term is distributed in the conclusion which is distributed in the premises. And if you are to negative premises nothing can be inferred in the same way if you have 2 particular propositions; that means, i proposition there is no away in which you can infer anything. And the 1 of final rules is that which is little bit controversial that is this that.

In Aristotelian logic if there are 2 universal propositions at you can infer a particular kind of proposition and all. So, this is not permitted in the modern logic because ... So, we will be borrowing existentially import in to the conclusion which is actually not there in the premises and all. So, this leads to existential fallacy. So, we are been discussing Aristotelian logics which have dominated from more than 2000 years then it is served as a paradime for this logics and all.

So, there are certain important features in Aristotelian logic they are this that they are close it to the natural language and then the rules are easy to apply, but it has is own limitations and all.

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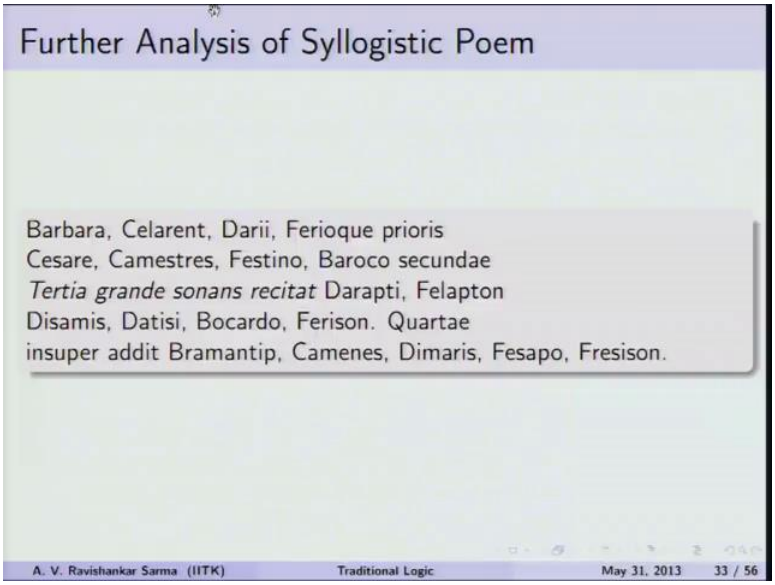

So, in this class what will be doing is will be continuing our discussion with this famous syllogistic poem due to Aristotle. And this poem conveys us lot of information and all. So, what information it conveys is like this. So, this is the syllogistic poem that we have it is like this Barbara, Celarent, Darii, Ferioque. So, this stands for the 4 syllogisms that are valid unconditionally valid in figure number 1 Cesare, Camestres, Festino, baroco etcetera there are all valid in figure number 2.

So, these figures are this figures are formed just based on how the middle term is actually distributed and all. So, based on how the middle term is distributed Aristotle classified into 4 figures and out of each figure there are 64 modes possible per each figure and out in total there are 256 such kind of moods are possible. And out of that only 15 are unconditionally valid and 9 are said to be conditionally valid. So, we will try to analyze this syllogistic poem with which people in the ancient past in the Greek period they remembered everything based on this particular kind of poem.

So, each word let say if I say Barbara we need look for vowels and the consonants and all. For example, in the case of Barbara the vowel are a a a; that means, it is an a a a kind of syllogists; that means, there are 2 universal propositions a propositions and we have a another kind of proposition a which is considered as a conclusion. So, for example, all x

are y all y are z and all x are z. That comes under e e e kind of proposition. And then we Celarent means we have we have to look for the vowel see here that is e a e. And then not only that thing right from the second stanza onwards that cesare camestres etcetera and all. So, this components also conveys us some kind of information. According to Aristotle only the modes which fall under figure number 1 are consider to be perfect moods.

Whereas, the once which fall under third and fourth figure are considered to be imperfect in all you mean the second figure as. So, that means, so will be talking in this class about the reduction of syllogisms and all reduction syllogism in the sense that whatever falls under figure number 3 4 2 etcetera they all can be reduced to the moods in figure number 1. So, there are some rules for reducing these syllogisms into the syllogisms of first figure. So, why Aristotle considers as figure number 1 as considered to be perfect figure because it is in the sense that the middle term is nicely distributed in the first figure rather than the other figures and all. So, this is the way in which the middle is distributed and I will look in to this syllogistic poem in greater detail.

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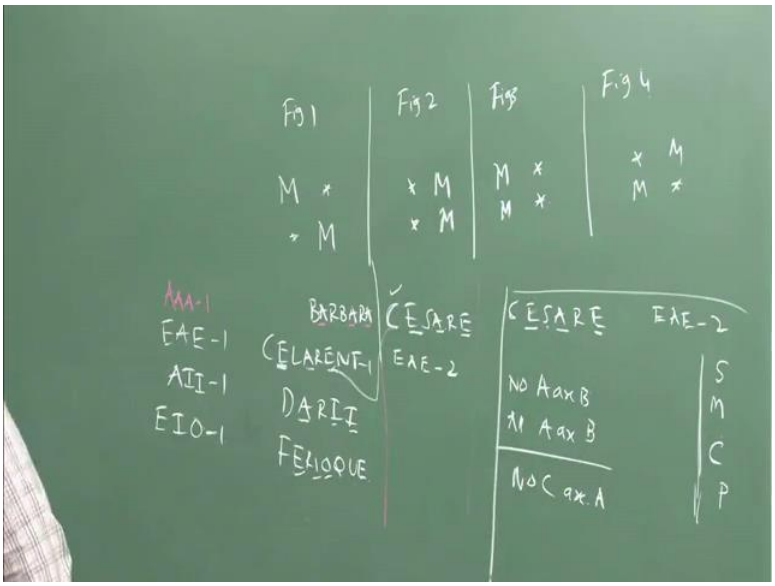

So, the distribution of middle term is like this, in the first case the first figure we have like this and these are some predicate and if calls this is a subject here this is in figure

number 1 and figure number 2. We have thing we have m here which occupies the position of predicate. And then in the in figure number 3 we have middle term here which occupies the position of subject and in figure number 4 we have m m. So, these are the 4 figures which Aristotle could think of in each figure there are 50 64 moods which are possible. There are 256 such kind of syllogisms out of that only 15 are conditionally valid and 9 are 15 are unconditionally valid and 9 are conditionally valid.

So, now, according to aristotle ... So, these are the things which are valid in figure number 1 Barbara, Celarent some D A R I I and then Ferioque. So, that is e i o propositional. Now, what we need to do here is to look for the vowels here: a here, a here, a here so; that means, a a a and this is with respect to figure number 1. So, that is why we have written 1 here. So, this gives us complete information about what kind of mood it is mean and then it falls under what kind of figure and all. So, this is considered to be the perfect figures and all and there are some other things which fall under this 1 all this thing can be reduced to this particular kind of thing and all.

So, now, this is e a e. Now, we need to look for the vowels here and then here in this case A I A I I and then in this case E I O and off course and off course this is figure number 1. So, now, what we will be doing the next 10 minutes is this that will be trying to reduce the syllogisms that fall under a figure number 2, figure number 3, figure number 4. And we will try to convert it into the standard perfect moods which fall under figure number 1. So, now, this syllogistic poem conveys us lot of information and all starting for the 2nd line let us say if we have something called Cesare. For example, if you have this particular kind of thing Cesare. So, this is E A E proposition, E A E proposition and it is in figure number 2.

So, now, according to the syllogistic poem these over, these consonants also conveys some kind of information. First thing it is look for the vowels it is E A E proposition and it falls it under figure number 2; that means, middle term should be occupying the position of predicate and all in this case. Now, what needs to be case is is that if you find any syllogis any word with start with c and all this can only be reduced to syllogism which starts with the letter c in figure number 1. That means, Cesare can only be reduced to Celarent. So, now, we are trying to see how Cesare can be reduced to Celarent and all

by using some kind of rules.

So, this is what happens in case of this thing. So, I will work on this particular kind of thing here. So, what is Cesare this is the Latin term and all we not have to worry much about it we need to worry about the vowels here. So, this E A E and 2 and then these C S etcetera conveys some kind of information and all. So, there let us letter that are of importance to us importance to us are like this. So, s stands for simple conversion and all example if you have no x or y you can convert it into no Y's are x. And then suppose if you have a letter m; that means, you need to inter change the premises little bit and then and the other letters that we have are S M and then ... Right now we do not have any such letters here so ...

Then C is a letter which you will find it little bit later and then we will talk about that particular kind of thing. So, this happens due to and there is 1 letter which is called as p which talks about per accidence and all which we will talk about little bit later. So, all the consonants also conveys some kind of information in this particular kind of Latin word that we are trying to use.

So, what is that we are saying we are saying simply this that Cesare is the term which occurs in the second stanza of you are syllogistic poem; that means, it is it occurs in the second figure. That means, it can be reduced to the 1 which is having the same which is start with the same kind of letter and all. That means, Cesare can only be reduced to celarent and all it cannot be reduced to any other Latin word that which occur in figure number 1 that is D A R I I, Ferioque, Barbara etcetera and all.

So, that is the why they have chosen these letters carefully and all Cesare mean can only be reduced to this 1. Now, will see how this can be reduced to Celarent that is in figure number 1. So, now, what is Cesare is like this on A are B's and all A's are B's and then no C's are no C's are A. So, this the way in which it is the middle term is occupying the position of some kind of predicate and all here.

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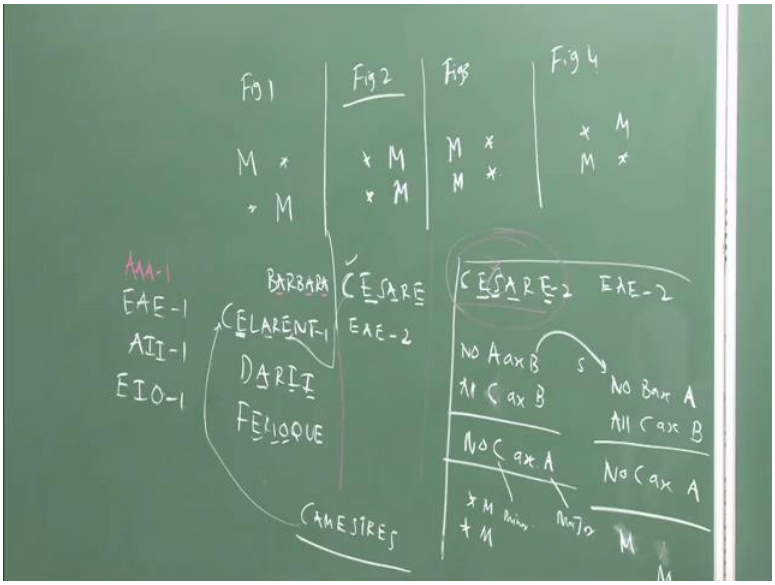

So, the structure of this 1 is like this middle term and again. So, this is the 1. So, that is the reason why this is in this falls under figure number 2. So, now, we are trying to reduce this thing into this 1 and then how do we reduce it. Again we need to observe this Latin word carefully everything is hidden in this particular kind of information. So, immediately following i-th vowel, i-th vowel means it here in this case the first vowel. Immediately after this we have a letter called S, S stands for simple conversion.

So, simple conversion we will be talking about these 3 rules little bit later: conversion, aversion and contraposition. Conversion applies to only e proposition and i proposition we will see little bit later. So, what we will be doing is this thing. So, we have letter S here and then we need to change this premises little bit late I mean. So, now so observe the predicate of you are conclusion.

This is the major term and the C stands for minor term and all. So, wherever you find major term in you are premises and all that is considered to be major premise and wherever this minor term occurs that is considered to be a minor premise. So, here A occurs no once again no A's are B's no C's are B's and all no C's are B's. So, this is the thing. So, this occurs here this is the major premise minor premise and this is the conclusion.

So, how this get converted into celarent and all? So, now, the first thing which you need to note is this thing we are applying some simple conversion rule - no A's are B's can be converted into no B's are A's, Because, this Cesare in this Cesare it says clearly that we need to use S rule. So, S rule is that you have make some kind of simple conversion and then other things you keep it like this only. Now, so this is same no B's are A's all C's are B's and this is no C's are A's.

So, now, what we have done is we applied simple conversion rule here that kind of information coated in this particular kind of word and all. Because, immediately starting after the i-th vowel; i-vowel means second vowel here the first here we have a later called S. S stands for simple conversion we need to convert 1 of these premises into it is converted kind of thing and all that is E kind of rule and all simple conversion rule we need to use. So, now, this becomes like this.

Now, we will observe the middle term here. So, middle term is here and you have a subject s something here and now middle term occupies the position of subject here and it occupies position of a predicate here. So, now, we have converted this Cesare 2 to Celarent 1 by using the simple conversion rule. So, this is how this figure number 1 the moods which fall under figure number 2, which are consider to be imperfect moods can be reduced to the perfect moods and all. Suppose, if it so happen that, you will come across another kind of thing let us say CAMESTRES or something like that CAMESTRES.

So, this is 1 which you have then this again can be reduced to only Celarent and all because; the corresponding letter that you find it in figure number 1 is Celarent. So, CAMESTRES can also be converted into the Celarent kind of thing and all. So, what we get out of these things. So, it tells us how something which is considered to be an imperfect mood can be converted into a perfect mood by using some kind of rules which are simple conversion, per accidence and some other kind of rules which is called as may M rule which is talking about some kind of simple conversions and all.

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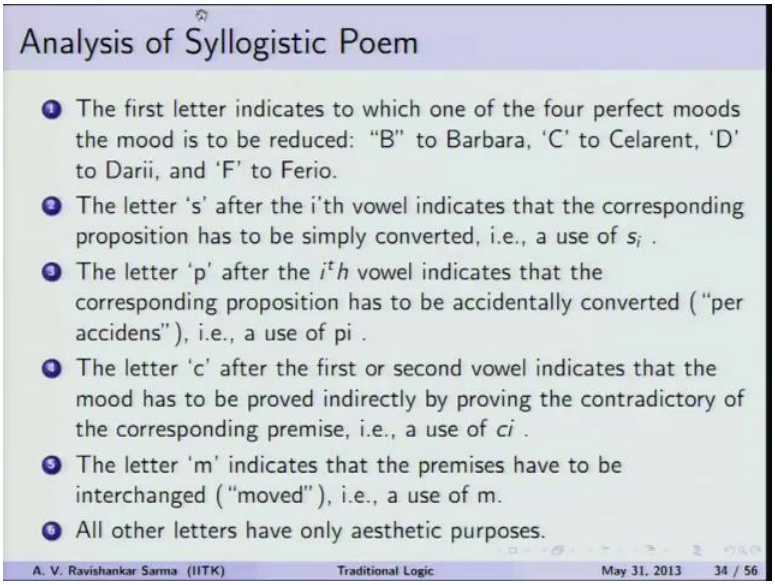

So, here is how we make these conversions and we will going to the example little bit later. So, the first letter of the Latin word that you have seen earlier corresponds to one of the perfect moods that is need that needs to be reduced and all. For example, if we have letter B, then it will reduced to Barbara; if you find later C in the second and third kind of stanza that you have seen there in the poem and it can be reduced to Celarent.

Suppose if you find any latin word which starts with d that can be reduced to DARRI and if you start if you have letter F it can be reduced to this 1. For example, in this syllogistic poem let us say you considered DATISI and all D A T I S I. That can be reduced to only D A R I I that means, the 1 which is in the fourth figure can be reduced to in other first figure that is E A I proposition with respect to the first figure. In the same way if you find C A M E N E S and all that can be reduced only Celarent and all. The first what tells us to which can be reduced and all suppose if you find DIMARIS for example, it can only be reduced to D A R I I.

So, that is the first expression that we get from this syllogistic poem say very interesting poem and all it conveys us lot of information and all. See tells us not only what kind of mood that syllogism has and it also tells us, I mean how this can be converted into the perfect mood and all which are Celarent figure number 1.

So, now the letter s after i-th vowel it can be first vowel or it can be second vowel that occurs in that particular kind of latin word, indicates that corresponding proposition needs to be simply converted and all. So, that means, no x are y can be converted into no y are x some x are y are converted into some y are x and all. However, it has it would not apply for all x are y; all x are y is different from all y are x. In the same way some x are not y is different from some not x are y and all it will not apply to O proposition E O proposition a proposition, it will not apply there.

So, now if you find letter p after i-th vowel and the corresponding proposition has to be accidently converted. So, this rule will talk about little bit later. So, that p rule is this that for example, if you have all x are y you can change it to some x are y and all cats are dogs; that means, some dogs are cats and all. So, this is little bit objectionable to us, but still Aristotle follows this things from all x are y you can say that some y are x and all. That is case it is called as per accidence kind of rule. Suppose, if you come across after i-th vowel may be second or third kind of thing if you find letter C not in the beginning and all, but after some i-th vowel once you come across an vowel and after that you find letter C.

The second vowel indicates that the mood has to be proved indirectly by using contradictory of the corresponding premise. So, what you will do is, you will take the conclusion you will take the negation of the conclusion and you will add it to the major premise and then you will come across contradiction and all. So, if you come across a contradiction then whatever you assumed is wrong and all. So, in that case conclusion has to follow from the premises and all; it is like some kind of reduction add upside down method.

So, what you will do if you are asked to prove something 1st you will take the negation of the conclusion and then you will show that some contradiction arises out of it. If the contradiction arises then you will say that negation of the conclusion is false; that means, the conclusion has to be correct. So, this is a 1 which we use in mathematical that Redecksho add Upsodem method. So, this is what we do when you come across letter C after i-th vowel not in the beginning.

So, now, what will happen if you come across m, m in the case of camestres c a m e n e s where you will come across m after a. So, then what you need to do. So, this syllogistic poem again tells us language and all it tells us the letter m indicates that the premise have to be interchanged now. So; that means, you will see where the major premise occurs and all major premise always it should be stated first and followed by that you have a minor premise and then you will have a conclusion and all.

So, usually it is an interchange of premises and all and I thing much is involved in that particular kind of thing. So, all other letters such as t other letters p x etcetera all this thing which you have seen in the syllogistic poem there only used for some kind of aesthetic purposes and all is only for remembering particular kind of word will be using is particular kind of thing and all. So, although Aristotle has no formal axiomatic system and all, but still you know it is a beginning starting point of formal logics and all.

Aristotle system still has some kind of axiomatic it can be called as axiomatic system in a in a weaker sense. So, it has these 4 axioms, 4 axioms in the sense you know whatever falls under perfect mood; that means, figure number 1 Barbara, Celarent Darii and Ferio. Then corresponding to that, these 4 are considered to be axioms of Aristotelian syllogistic logic.

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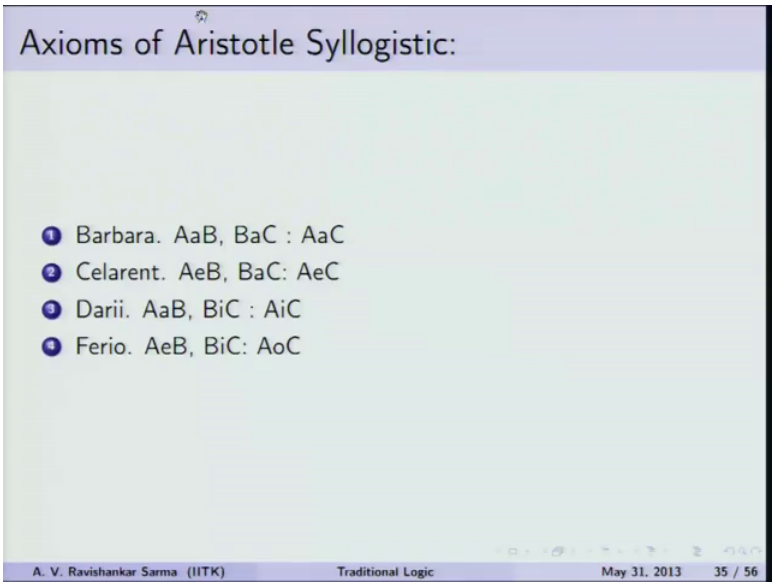

So, what I consider to be axioms, axioms are considered to be self evident rules which need not have to be proved. But, you have seen still now that all the syllogisms that fall under figure number 2, figure number 3, 4 and all there all can be reduced to figure number 1. But whatever occurs in figure number 1 whatever syllogisms that you have observed in figure number 1 I cannot be further reduced and all. So, it is in that sense it retains its axioms status and all. Axioms cannot be reduced further it cannot it need not have to be proved there all self evidence kind of proves and all.

So, these are like these Barbara means a a a proposition all A's are B's all B's are C's, then all A's are C's. And the other kind of axiom is this thing Celarent; that means, no A's are B's and all B's are C's means no A's are C's. Darii: that rule says that all A's are B's some B's are C's and then some A's are C's and all. In the sense Ferio can also read like this no A's are B's some B's are C's and then some A's are not C's and all.

So, this is what considered to be some kind of axiomatic system of Aristotelian logic. But it not so rigorous like the 1 which you will see later in the case of Russell whitehead axiomatic system or Hilbert Carmen axiomatic system which we are going to see while dealing with metal logic little bit later. So, these are considered to be some of the axioms of Aristotle logic, because it cannot be reduced further into any other kind of axioms and all.

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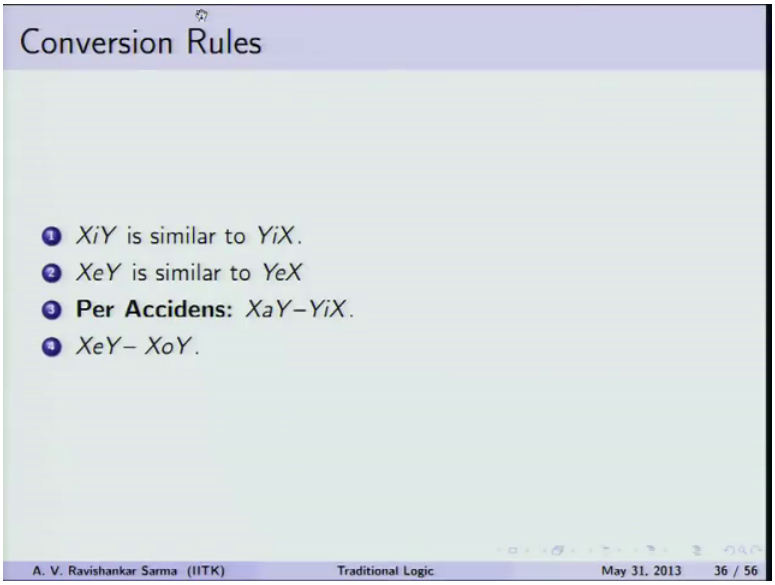

So, these are the conversion rules which we are talking about. So, this is a simple conversion rule XiY that means some X are Y which is similar to some Y's are x. Some cat's are animals; that means, some animals are cats is 1 is the same. So, in the same way no cats are dogs that is XeY is similar to YeX that means no dogs are cats. So, this is the rule which we use that is p rule per accidents kind of rule that is for all X are Y you can converted into some Y's are X. This is little bit difficult to follow, but this is a rule which Aristotle allows in the 4th rule is simple conversion that is no X are Y can be converted into some X are not Y.

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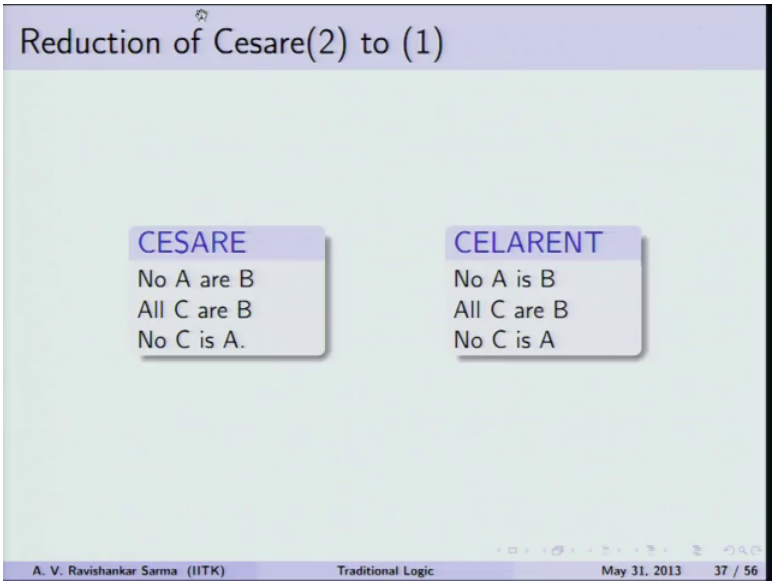

So, these are the conversion rules which we use and these rules which we will be using for converting this thing into this particular kind of thing.

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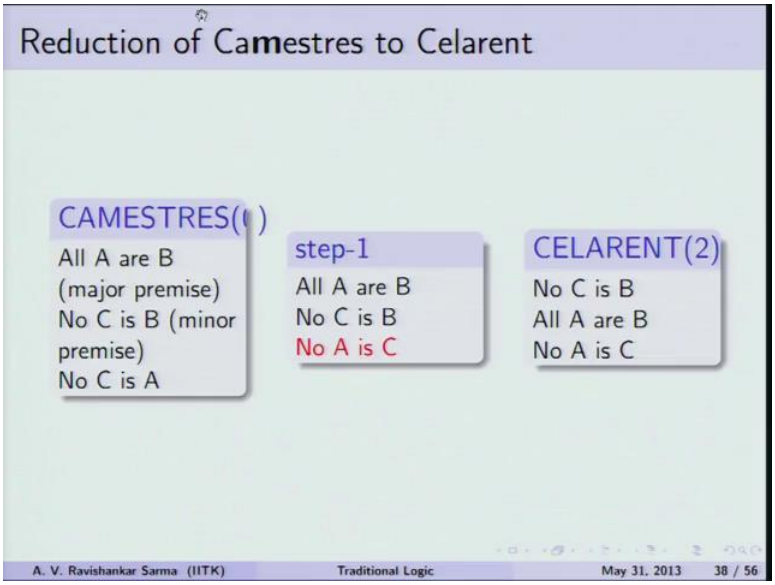

So, let us consider 1 simple example how this particular kind of thing can be reduced to another kind of thing. So, now we will see how CAMESTRES for example, which occur

CAMESTRES can be reduced to which occurs in figure number 2 can be reduced to Celarent of figure number 1.

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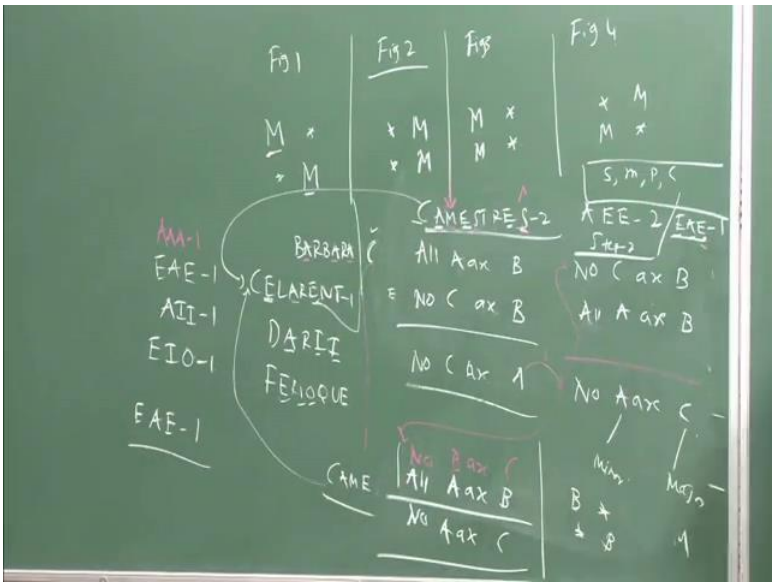

So, this is what is CAMESTRES, CAMESTRES now we to observe the vowels here A E E this A E E proposition. And then based on how the middle term is distributed we need say what kind of figure belongs. So, it appears that this falls under this figure number 2 where the middle term occupies position of predicator.

So, this is like this all A's are B's no C's are B's now you will see middle term here in the occupying the position of a predicate and all. So, now this conclusion is no C's are AA. So, this is what we have. So, now you will clearly here that this is the middle term and whatever occupies the whatever occupies the predicate of a conclusion should be the major term. This is the minor term and wherever you will find c that considered to a minor premise; that means, no C are B is a minor premise. And then wherever this term A occurs here that is why it a major premise and all. So, it is arranged in this particular kind of Forman. So, what is that we are trying to do with this particular kind of, why we have taken this C.?

This occurs in figure number 2. So, now, we should be in a position to reduce this thing

into the corresponding kind of word which occurs in figure number 1. So, the first later is C; that means, this can be reduced only Celarent and all what is Celarent here this is E A E A E E A E with respect to figure number 1. So, now this A E E should reduced to E A E 1, but E A E 1 cannot be reduced to any other thing and all. It in that sense they are considered to be axioms and all where this first 2 are premises and other 1 is called as a conclusion always valid kind of thing and all. So, now what are what are the consonants that occurs after the letter A, this is the 1st vowel that means Ith vowel after that we have letter M.

So, now M rule says that we need to interchange the premises and all. So, what we need to do here is like this. So, this cannot be changed and all. So, so far that what we need to do first is we need to look for a proposition where we can apply some kind of simple conversion and based on that we can change the premises and all. So, now first what you will do is you will apply some kind of simple conversion rule because it is same as this 1 no A's are C no C's are A's same as no A's are C's and all. So, now, what happened here is this thing that this is a major term now this is a minor term.

So, now, M rule is A 1 which we need to apply off course M immediately followed by e proposition we need to apply this S rule. So, immediately followed by this E proposition we need to apply S rule here that is what we have d1 here. That means, we converted no C's are A's to this 1. So, then will look back and then we will apply M rule M rule says that now you need to interchange this premises and all interchanging the premises. In the sense that major premise should always come first followed by that you have a minor premise. So, this 1 wherever C occurs, it is a major premise now right now; that means, this should go 1st and this should can later. So, now no C's are B's now this will become all A's all A's are B's.

So, this is step number 2. So, now what we have d1 we have applied M rule here and S rule here and again we have to apply there is 1 more later here S; that means, you need apply s rule again. So, now we need to apply S rule for this particular kind of thing. So, now, this changes to not this 1 it goes like this now this changes to no B's are C's and then the rest is same and all A's are b. And then you keep it like this only no A's are C's. So, now, you will see here clearly this is an e proposition and a proposition and E

proposition now we need to check whether this falls under figure number 1.

How do you know that it falls under figure number 1 it is based on how the middle term is distributed and all. Now, you will see clearly here middle term is like this off course there is term here that term is C and there is 1 more term here that is A and on which occupies the subject position and all. So, now what is that we have d1 based on the information that is coded? In this 1 is simply this thing first in the first step what we have d1 is we change we applied some kind of simple conversion rule to E A whatever follows after the e proposition and all. So, E proposition occurs here and then after that you need S rule and all here.

So, with that no C's are A's are converted into no A's are C's. So, now, once you converted in to this thing then you need to full these premises and all. Why we need full the premises, because it is a convention that major premise always should come first. So, now based on this information that is means c is the major term right now wherever C occurs that should come first. But in this case it came second and all, but interchanging the premises that is what we mean by M rule. So, we reach premises and all without violating the truth of this categorical proposition and now this becomes like this no C's are B's all A's are B's.

So, now, again there is 1 more operation here 1 more consonant S here we need to look for only this letters and all S m P and C. So, these are the letters that we need to look for especially the consonants that we need to look for. And the other things which we need to look for are vowels and all which tells us what kind of mood the proposition is in. So, then what we did was we can still applied simple conversion rule to this 1. So, now no C's are B's are converted into no B's are C's this like.

No cats are dogs; that means, no dogs are cat and all let us see 1 or the same and all. So, now, we kept it this thing as it is now, we reduced this thing into this format and all. So, now what we have achieved is simply this that Camestres considered to be the 1 which occurs in figure number 2; that means, E A E E 2 can be reduced to A E A E 1. So, like this many things can be converted in to this particular kind of thing and all. There are some other examples which you which we can take into consideration. So, such things

can be reduced to this particular kind of thing and all.

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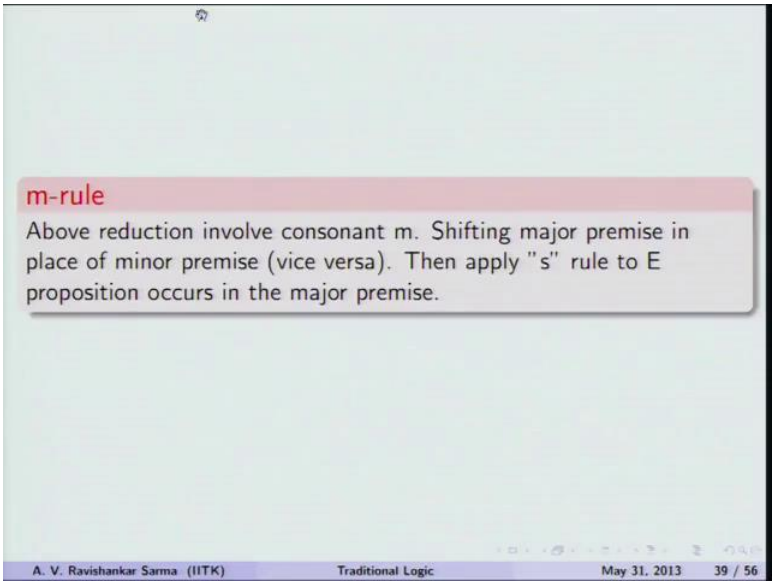

So, this is the M rule. So, M rule tells us that shifting of major premise in the place of minor premise and all. So, then we apply S rule to e proposition which occurs. In the major premise that is what we have d1 in the case of Camestres and all.

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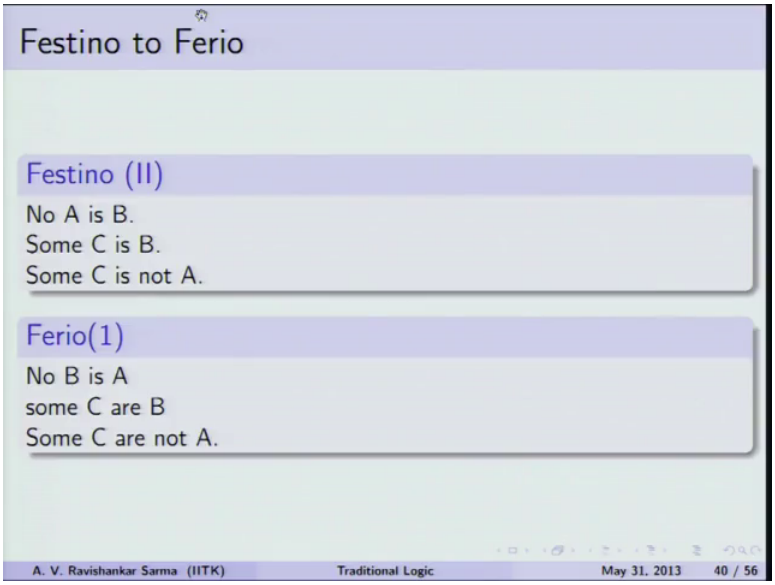

For example, in this case how do you reduce from Festino to Ferio occurs in figure number 1 Festino occurs in figure number 2 again. So, because middle term is occupying the position of a predicate in both the thing and all no A's is B's some C's is B etcetera some C's is not A. Then what you need to do here is this that immediately following E we have letter called S. S stands for simple conversion rule and then after that there are no other consonants that we can will be interested in. That means, t and n does not convey any information and all we need to look for only S m P and C and all. So, now, no A 's is B in the first premise is by simple conversion this converted into no B's are A's and all. And you keep the same thing some C's are B and some C's are not A.

Then it changes into Ferio part which is which falls under figure number 1. So, like this we can convert things into corresponding Latin word in which occurs in figure number 1. So, in some cases things would be little bit difficult and all like suppose what happens when you come across a word let us say c and all rather than this. So, now let us consider 1 more example in which instead of know you come across instead S and M, you come across a word a letter C. And also that means, the move the syllogism needs to be proved by using contradiction rule indirect method we can you in particular.

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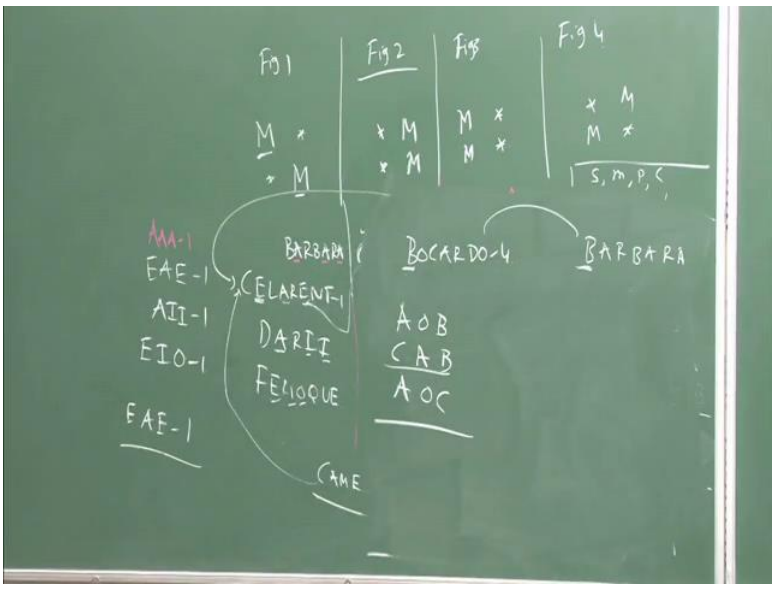

Convert bocardo to something like this can only be reduced to barbara because the 1st .

So, now, we are trying to letter is B and then this will be reduced to this thing just let me retails of this 1.

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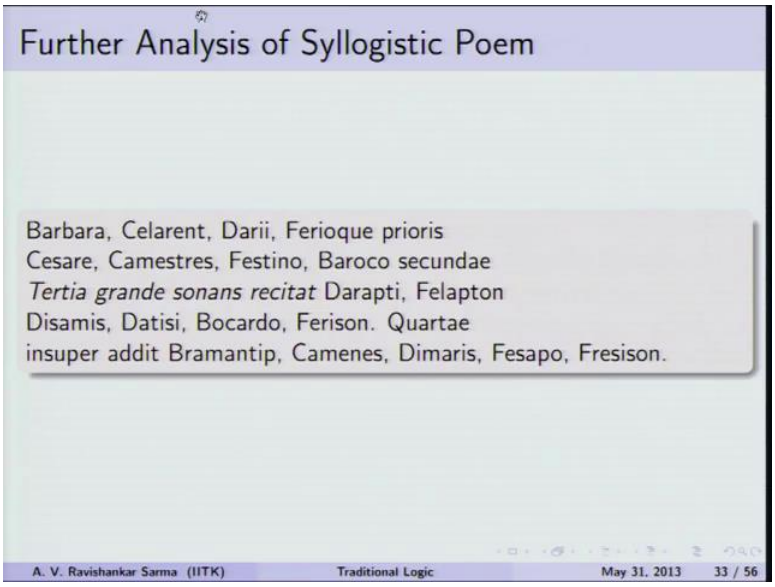

Bocardo occurs in the fourth figure. So, this is fourth 1 and then it should be reduced to it can only be reduced to first letter which occurs in figure number 1. That means, the letter that starts with b is only Barbara kind syllogism. So, now this can be written like this AOB; that means, some A's are B's and then this is CAB.

Then AOC just second ... So, AOB and CAB this is not in this particular kind of format just we look in to some kind of example with which we can come to. So, let us try to convert actually this should be in this particular kind of format. If it is in the fourth figure the middle term should be here, but here it occurs in this 1 it occurs in this 1.

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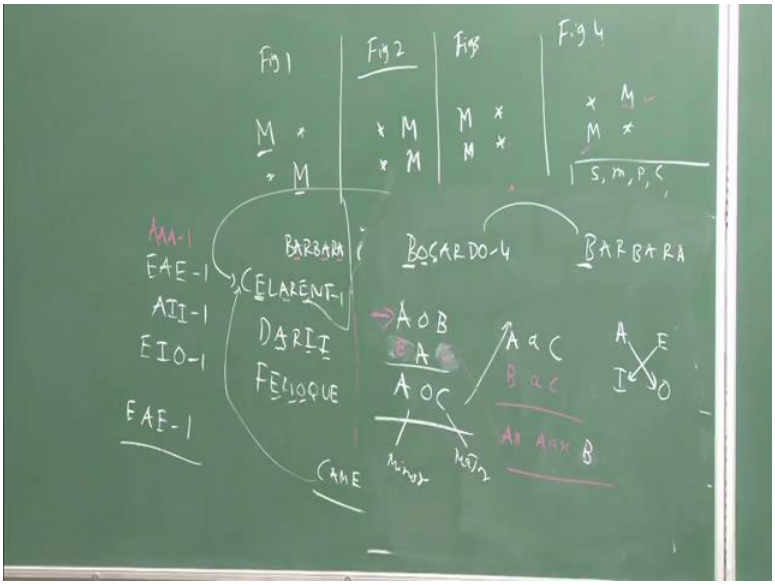

We will change it little bit and see what is a case this is AOB this is a fine and then this should be BAC, so BAC and then this converts into this 1. So, now, what we need to do here is this thing. So, now, what you came across after this vowel is the C whenever you come across a letter C. That means, this syllogism can only be proved by means of indirect methods; that means, we can only prove with the help of contradiction. So, now what you will do here is this particular kind of thing. So, just 1 second now this is a major term and this is a minor term. And wherever major term occurs that is a major premise and minor premise minor tem occurs that is considered to be minor premise and all.

So, now, what you will do is there is a some kind of thing which we follow A E I and O in this 1. So, A and O are opposite to contradictory to each other and E and I are contradictory to each other; that means, diagonal are contradictory to each other. So, now what is contradiction in contradiction to AOC that is a proposition? So, a proposition is the 1 which we take into consideration A stands for all A's are C's and all. So, now, what we are taken is that you are denied the contradiction and all. And that is what we have taken into consideration and then added to that the you have to add it to the major premise here the major premise is the 1 in which the major term occurs. So, now this is what need to see all A's are C's all B's are C's.

So, now ... So, what is the conclusion that we get let us say all A's are C's now for example, no 1 second all A's are because, C is a middle term it should not occur. So, now, this should be the case all A's are B's. So, now, this 1 all A's are B's is wherever the minor term occurs minor term occurs in this 1 this particular kind of premise AOB. So, now this and this are incomparable to each other. So, denied at the contradiction leads to some kind of conclusion which contradictory to the minor premise. So, what is that we have d1 we are just trying to prove by contradiction that. So, this is the conclusion that follows from this particular kind of thing AOB and BAC only this follows from this 1.

So, since we have come across rule c we are stating that this can only be proved by some kind of indirect method and all. What is the indirect method? First what we have d1 is we take we took the negation of the conclusion as your first premise and added it to the major premise. And then we let to it leads to some kind of conclusion which is in comparable with this particular kind of thing AOB. That means, you are this premise is wrong and all that should be this 1 AOB and BAC and AOC. So, now, how it gets reduced to this particular kind of thing is what we need to find out. So, in 1 particular kind of thing will try to prove this particular kind of thing.

Also in the case this particular kind of thing we can prove this is what is Bocardo which can be proved in this particular kind with. So, this already con we have converted into some kind of A A A proposition and all. So, now the only thing is this that we need to see.

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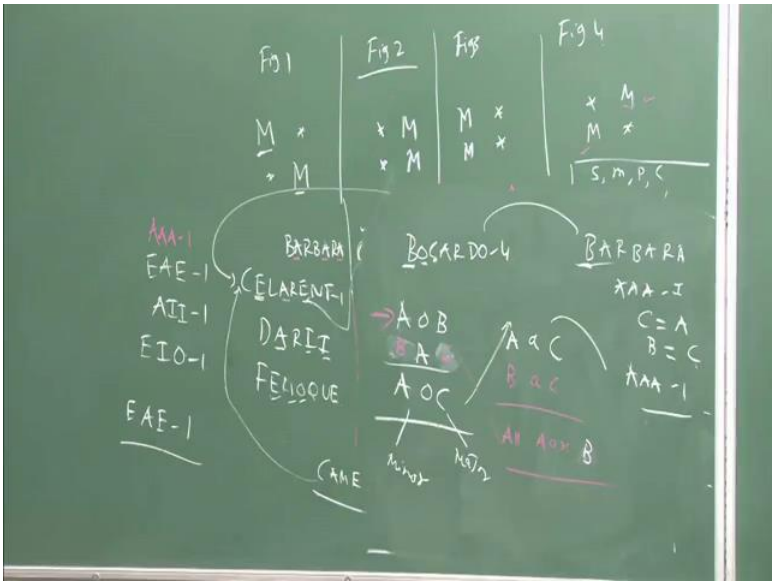

So, now let us just let me finish this particular kind of thing this is not still in A A A A proposition 1 and all. So, now we need to apply some kind of rules that we need to use. So, that is this thing instead of B's you take into consideration letter C. And instead of C you take into consideration what happens here this should like this middle term should be like this. You take C as A A and then B, wherever B is there you replace it with C and all. So, now this becomes this A A now, so once again no this will not apply here.

So, this is an A A A proposition, but somehow this has to be converted into A AA 1 and all we need to use some kind of rule. So, that we can convert this thing into A A A proposition and all. But, in this case what we have d1 simply is this that 1st we have taken the negation of the conclusion and this is what it is the case and then we added it to major premise.

We showed that, we got this particular kind of thing which seems to be contradictory to you are minor premise and all. That means, AOC should be wrong and all it should be; that means, negation of the conclusion leads to contradiction. That means, you can not negate the conclusion and all AOC follows and all from this particular kind of thing. That means, we showed this conclusion followed from the premises by using some kind of indirect method. And also now we will move on further little bit and then we will see

what other are we can do based on this particular kind of thing.

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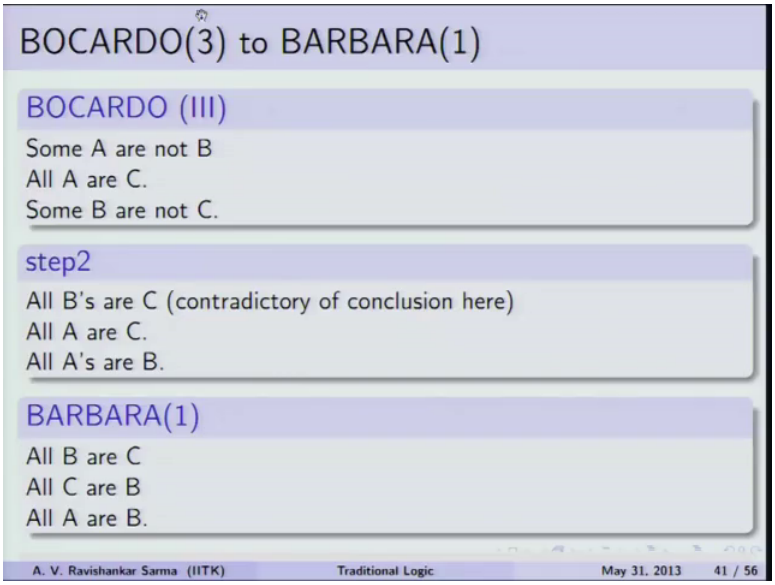

So, this is what we have d1 already. So, now all B's are C's all A's are C's now, all A's are B's. So, now ultimately this reduces to this particular kind of thing all A's are B's.

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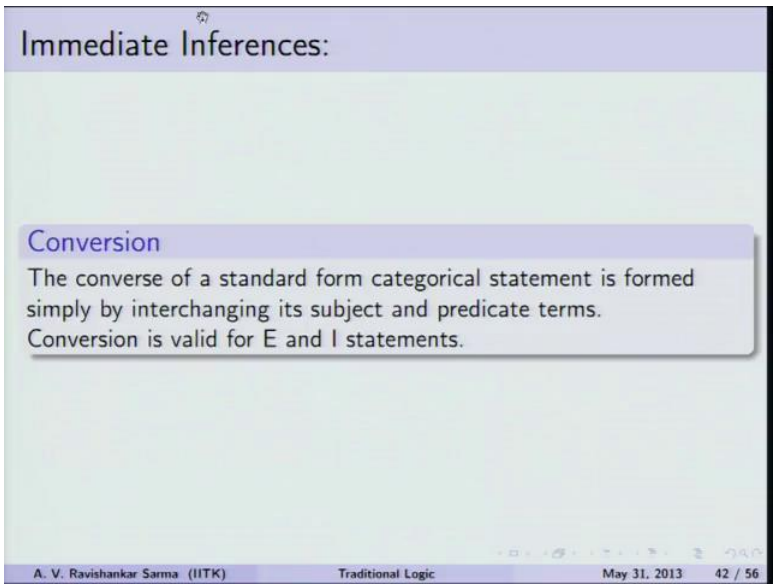

So, now so far we discussed about how the syllogistic poem behaves and all there are certain things we will still needs to be discussed in greater detail especially whenever the C occurs and all. How do we prove how Bocardo kind of thing can be reduced to Barbara etcetera on it needs to be dealt in greater detail etcetera? So, now there are some kinds of immediate inference rules. That means, if you have A E I and O how this a converted into some kind of i proposition or E is converted into I proposition and etcetera and all. So, that is what we come to know in these 3 rules and all.

So, there these 3 rules are like this conversion rule the converse of a standard form categorical proposition is formed simply, by interchanging the subject to predicate thing and all. Wherever you have a subject you replace it with the predicate then it will become a conversion kind of rule only E and I proposition can be converted. That means, suppose if you have a proposition called no cat's are dog's. It can be converted into no dogs are cats and all in the way some cat's are dog's means some dog's are cat's and all. But, it cannot be apply to O proposition and S proposition because the meaning changes and all, so that is what happens and all.

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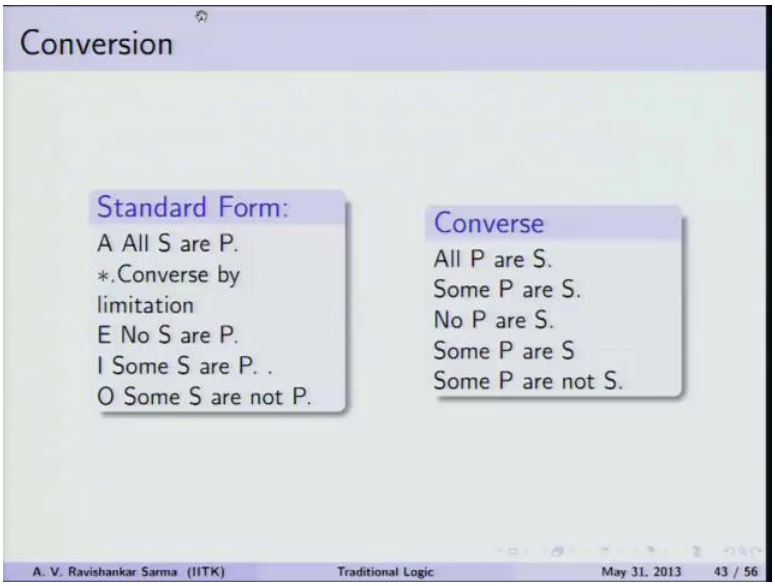

This is what we have in the standard form all S are P. So, this no S are P and some S are P and all this things are converted into this particular kind of thing. All S are P is

different from all P's are S that is way it cannot be reduced to all P's are S some P's are some S are P is converted into some P's are S. That means, same as that particular kind of thing and is a same way some S are not P's converted into some P's are not S and all which is which is totally different from some S are not P.

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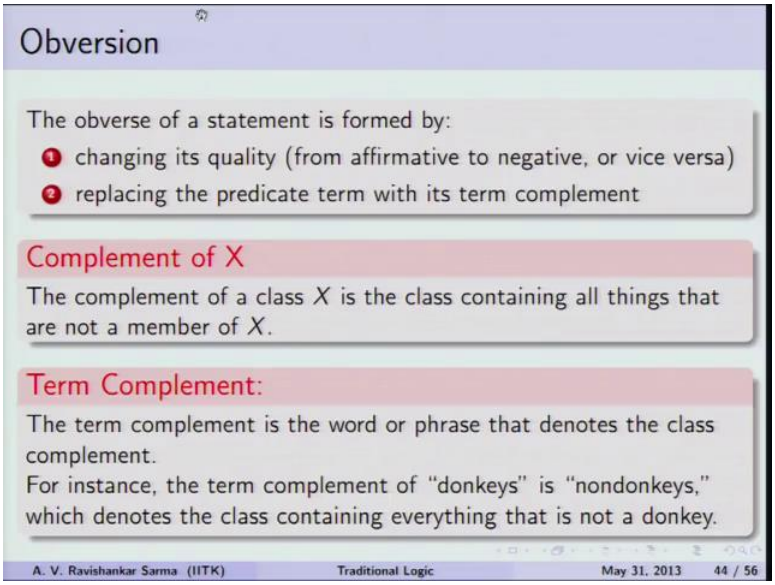

So, now conversion applies to only E and I proposition now that is an important operation which is very important; especially when whenever you are syllogism C not in standard format.

We need to apply these rules and all for example, if you say all cats are non fish and all. For example, if you say that particular kind of thing non fish is different to some kind particular kind of class which is completely excluded from what we call it as fish and all. So, 1 minus whatever you consider as fish and all that is considers non fish and all. So, the aversion consists of 2 steps and all.

So, what you will do in the aversion is first we will change the quality and all for example, if you have all X are Y you change it to no are y and all in the same way if you have some X are Y. You change the quality to some X are not Y and all in the second step what you will do is you will replace the predicate term with this corresponding

complementary. For example, if you have letter called fish you will place the letter fish that in the predicate with non fish are non cat's non dog's etcetera. The complement of X is this thing complement of X is a class containing all things that are not members of x and all.

1 minus X is considered to be the complement of this 1. So, the term complement is a word which or phrase which denotes the class called complement and all for instance donkeys if you say. And it is complement is non donkey's and all in the same way cat's means non cat's and all the once which are not cat's is considered to be non cat's and all. 1 minus that that particular kind of class and all. So, aversion consist of 2 steps first you change the quality all x are Y's to no X are Y and then it changes to no X non Y and all.

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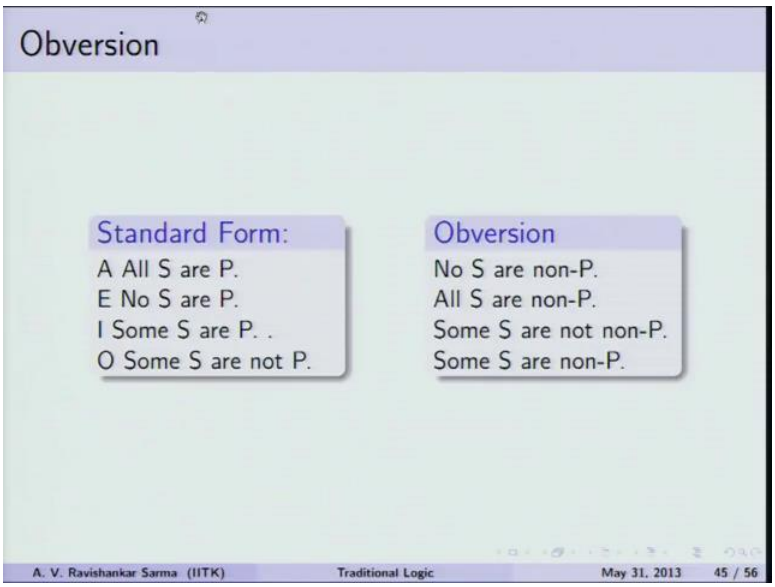

So, this is what happens all S are P changes to first to no S are P and then the second step it change to no S are non P in the same way E proposition no S are P. And the first step it changes all S are P and all in the second step it changes to all S are non P; because predicate is replaced by its complement and all. So, non P replaces P in the same way in the case of some S are P in the first step of aversion it changes to some S are not P. Now, in the second step need to replace P letter P with non P and all.

So, that is why it becomes some s are not non P's and all. So, this the 1 which happens an aversion applies to all the categorical proposition and all. That means, we can have immediate inferences based on aversion in this format A can be change to its inversion that is; no S are non P 1 as the same.

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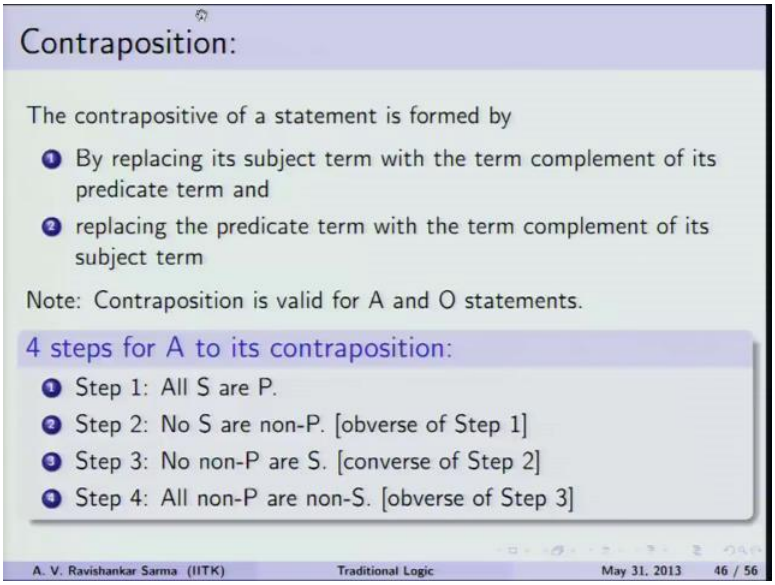

All aversion applies to all kinds of categorical propositions there is a third rule which is called as contraposition rule contraposition rule is formed just by replacing the subject term. With the term complement of its predicate term and we replace the predicate term with complement its subject term.

So, it includes 2 steps and all for example, it is simply like in all of contraposition and all P impress Q means implies not Q implies not P and all. So, for example, if you have something called all S are P. So, there are 4 steps for a to its corresponding contraposition and all. So, this change to first thing is used aversion rule. So, then it becomes you have change the quality of this 1 then you have put complementary of the particular kind of thing no yes are non P's and all.

So, now, we use some kind of conversion on this particular kind of thing because no S are non P same as no non P's are S and all. So, that is why the step number 3 no non P's

are S and al, now we have converted P's into S and all. We replace subject term with predicate term with a subject and all now in the 4th step here all non P's are non S and all.

Now, again we used aversion rule and then we converted in to this particular kind of thing and all non P's are non S. So, what is that we have d1 here there are some 4 step per a to be converted into its corresponding contraposition But, in simple terms we have used all kinds of operations are ultimately we converted all S are P in to all non P's are non S which is considered to be the contraposition of that particular kind of thing.

So, contraposition is valid for only A and O proposition; that means, suppose if you infer from a you infer all non P's are non S. That is considered to be valid and from the O proposition. If you infer some something called some non P's are non S and all for example, from the proposition some S are P's you infer some non P's are non S and all.

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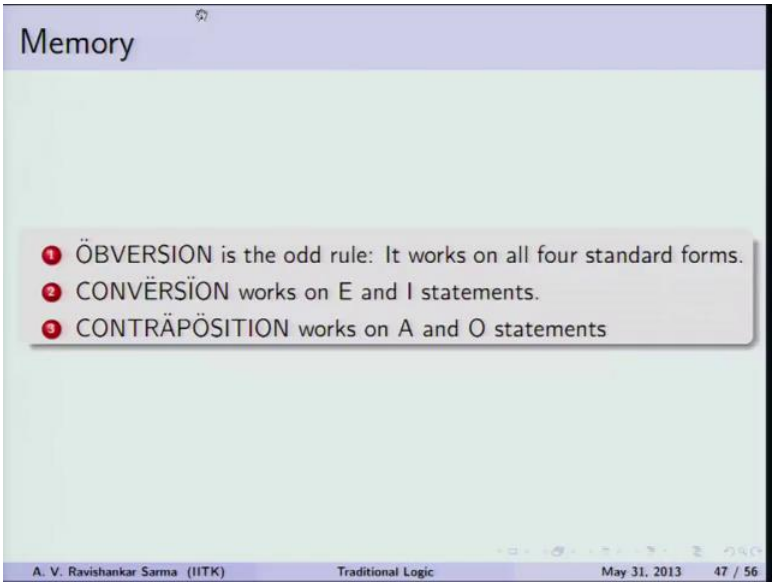

So, then also it applies some non P's are not non S and all in that case it is considered to be valid and all. So, there is way to memorize this particular kind of thing that dots over that particular kind of thing is the 1 which need to take in to consideration. The first 1 is the odd rule which works for all kinds of 4 standard forms and all. So, any proposition

can be reduced to its corresponding aversion that is considered to be a kind of valid inference and all. And conversion we need to see the once the letters that are with double dots and all it applies to only E and I propositions; it is the way to remember it.

So, we need to observe those vowels which with stars and all which dots are there in the contraposition. It applies to A proposition and O proposition and all. So, in the later contraposition we need to observe the vowels which occur there off course O is the vowel which occurs here. But we need to ignore that 1 just for the sake of remembrance only there is no cutleries which is used here for the sake of memory.

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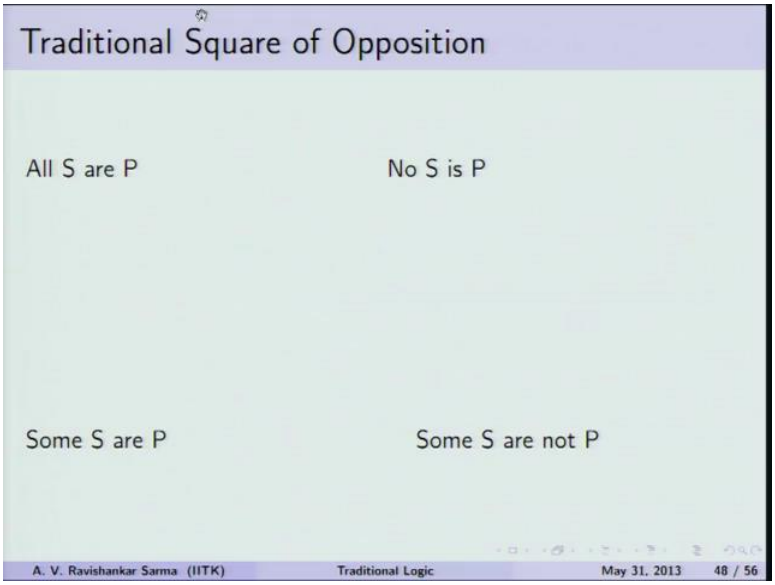

We are using this particular kind of thing and all. So, this what is considered to be square of opposition where the diagonals are considered to be contradictory to each other. Whereas, the once which are at the same level are considered to be in the first level. It is considered to be contrary to each other and then the square of opposition will be like this.

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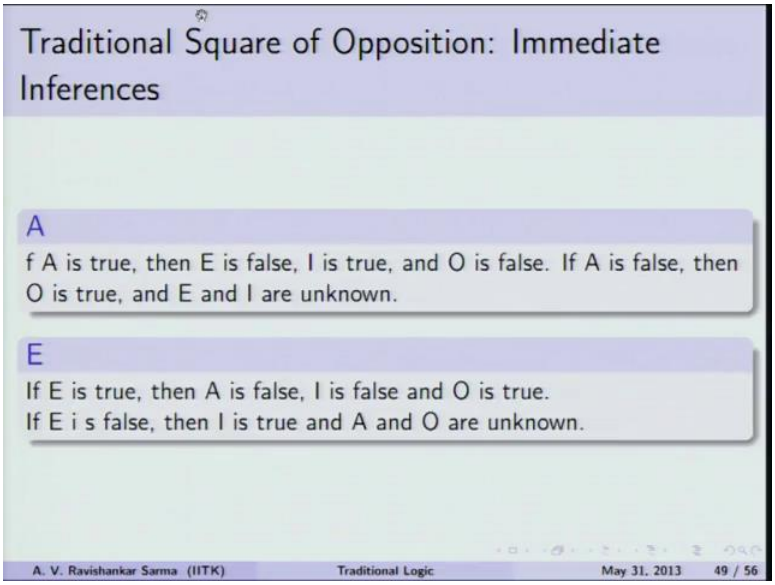

So, it can be in this particular kind of thing and all if a is true then; obviously, E has to be false and all; that means, A and E are contradictory to each other. If I is true that is some X or Y is true then; obviously, its negation some X are not Y is; obviously, it has to be false and all. So, if A is false then; obviously, O has to be true because A and O are contradictory to each other.

So, in the same way this tells us how A E I and O are related to each other in the same way if E is true then; obviously, it is contradiction A has to be false. If I is false then O has to be true and if E is false then it is negation. It is contradiction that is I which occupies the position of a diagonal which has to be true and if a is true I if A and O A is true and O, in case of O it is unknown now. So, this is what happens in the case of square of opposition in simple net.

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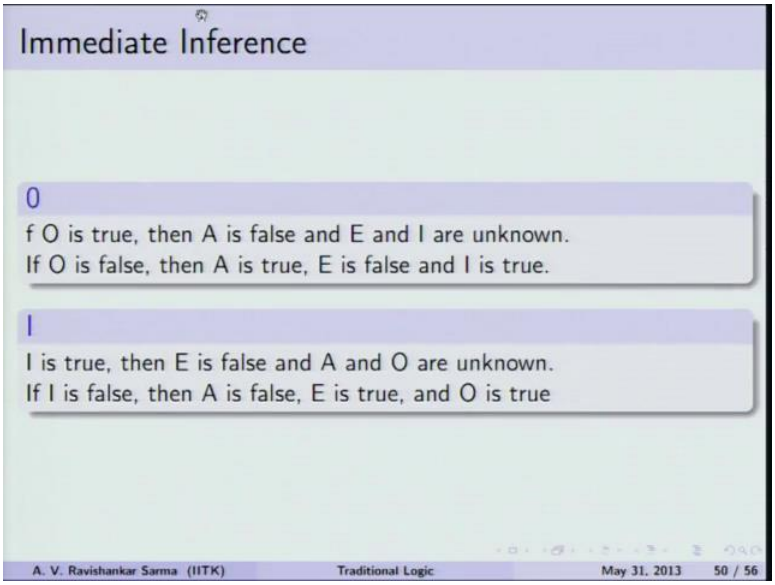

Shall I will end this lecture by stating that, these are the some of the important relations between A E I and O. So, this is the famous square of opposition.

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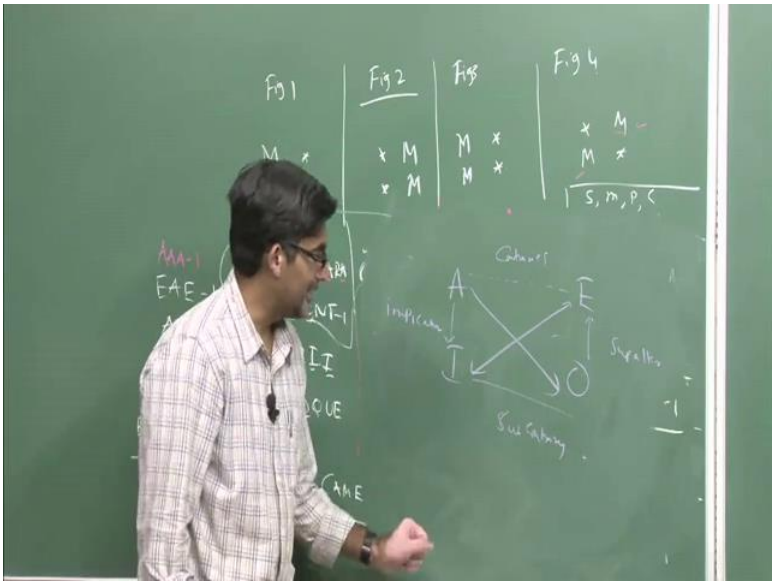

So, which is like first we need to write all the universal proposition like this A E and we have I and O and. So, A and O are contradictory to each other I and E are again

contradictory to each other. And then there are some other kinds of relations between these 2 things. So, these are contraries contrary to A and E contrary to each other and I and O are called as sub contrary. And then this is called as implication and all this subaltern, superaltern etcetera. Depending upon the arrow which is there so; that means, all this things are related in this particular kind of way. So, now we quickly need to know what we mean by contrary contradictory etcetera and all this tells us how A and E are related to each other.

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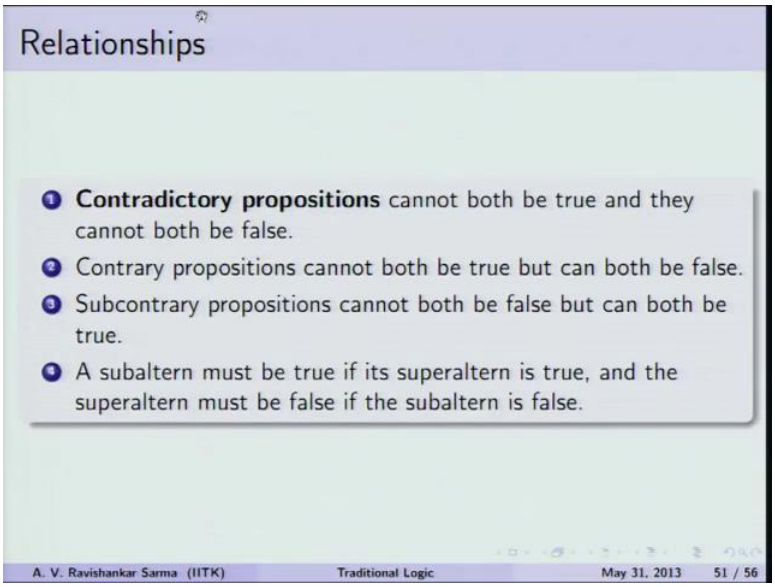

So, now in a quick net shell; so, 2 statements are considered to be contradictory. If both cannot be both can a contradictory propositions cannot be both true they cannot be both false as well. That means, 1 proposition is true another proposition has to be false contrary proposition cannot be both true, but they can both be false and all. So, these things can both be false and all if 1 is false and another 1 also be false, but both cannot be true and all, but in the case of sub contrary propositions I and O.

So, the in this case it can both be false, but it cannot be both be false, but can be both be true and all that is some cat's are dog's. And some cat's are not dog's can be both true and all, but both cannot be false and all. And subaltern must be true if it is superaltern, is true and the superaltern is false. If the subaltern is false and so, these are the relationship

between A E I and O. This tells us how these categorical propositions are related to each other.

So, in this lecture what we are seen is simply this that we have seen we have analyze the syllogistic poem in greater detail. And then we have seen how 1 imperfect mode can be reduced to another 1. And then we also discussed about 3 important operations aversion conversion and contraposition. And then we have seen what we mean by contradictory contrary and how when we say that it is sub contrary and when it say sub alternate etcetera and all.

So, Aristotle theory of logic gives us some kind of grater analysis of these categorical propositions. But it has its own limitations when it comes to hypothetical syllogisms are some kind of complex kind of syllogisms which involves more than 3 terms; Aristotle logics may not work. Modern logics and there are certain things which are easy to do in modern logics. So, with this we will end this lecture.