NPTEL

NPTEL ONLINE CERTIFICATION COURSE

Discrete Mathematics
Graph Theory - 1

Cycle and circuit

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Consider this graph with 5 vertices and these edges,
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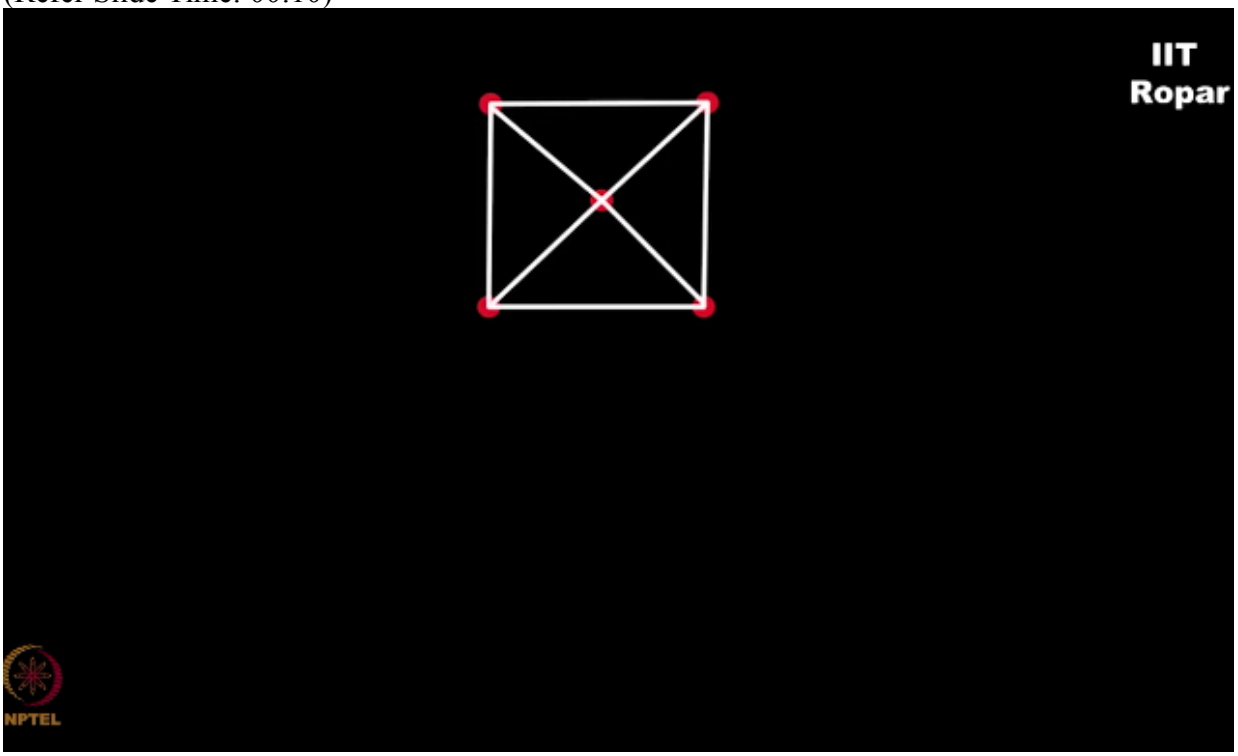

now let me label it as A, B, C, D and U,
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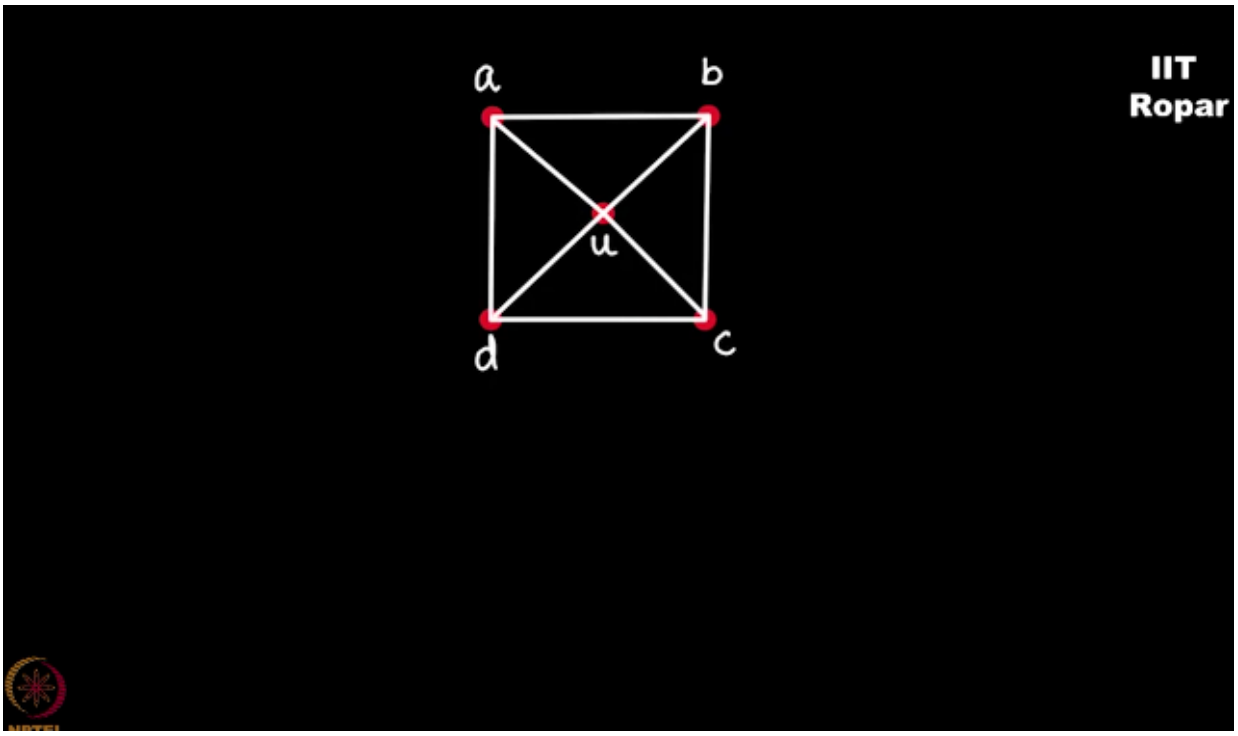

can you tell me a trail starting from A and ending in B, other than A, B, if you all had A, B in your mind please it certain B,

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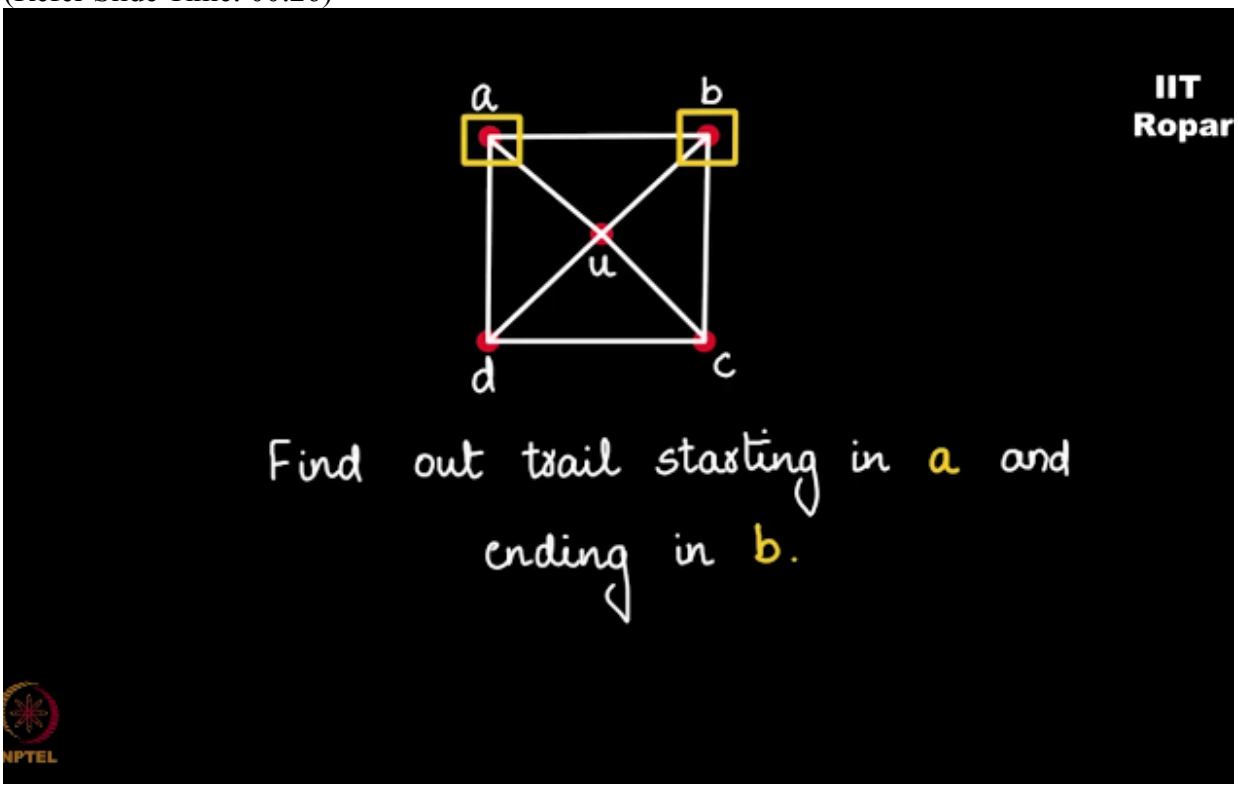

and some other trail starting from A I'm going to B. Let me write that down A, U, C, D, U, B,

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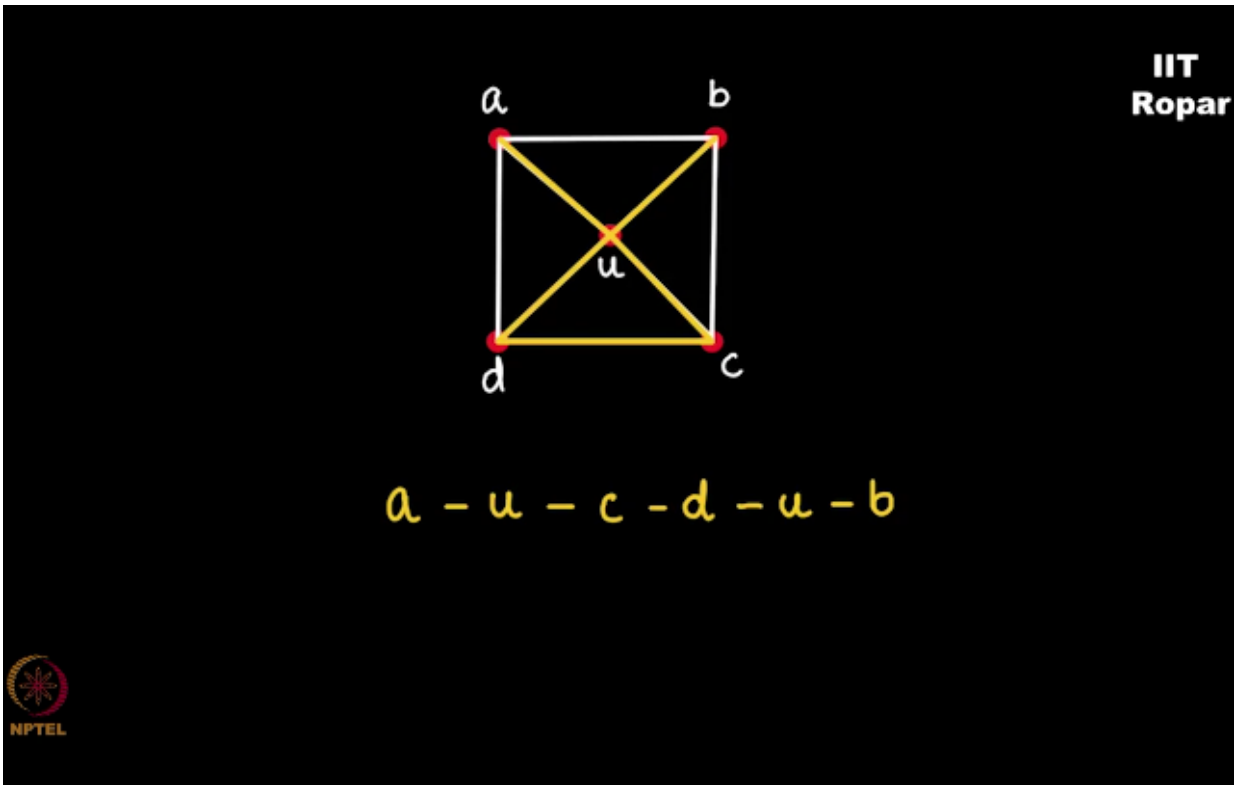

yeah, if you remember I can repeat vertices, but not edges and this is a trail.

Now what if I say that I want to closed trail, what do I mean by that? Start from A, comeback to A, and take a trail in middle, give me a trail, what will you do? Do the same thing, A, U, C, D, U, B and comeback to A,

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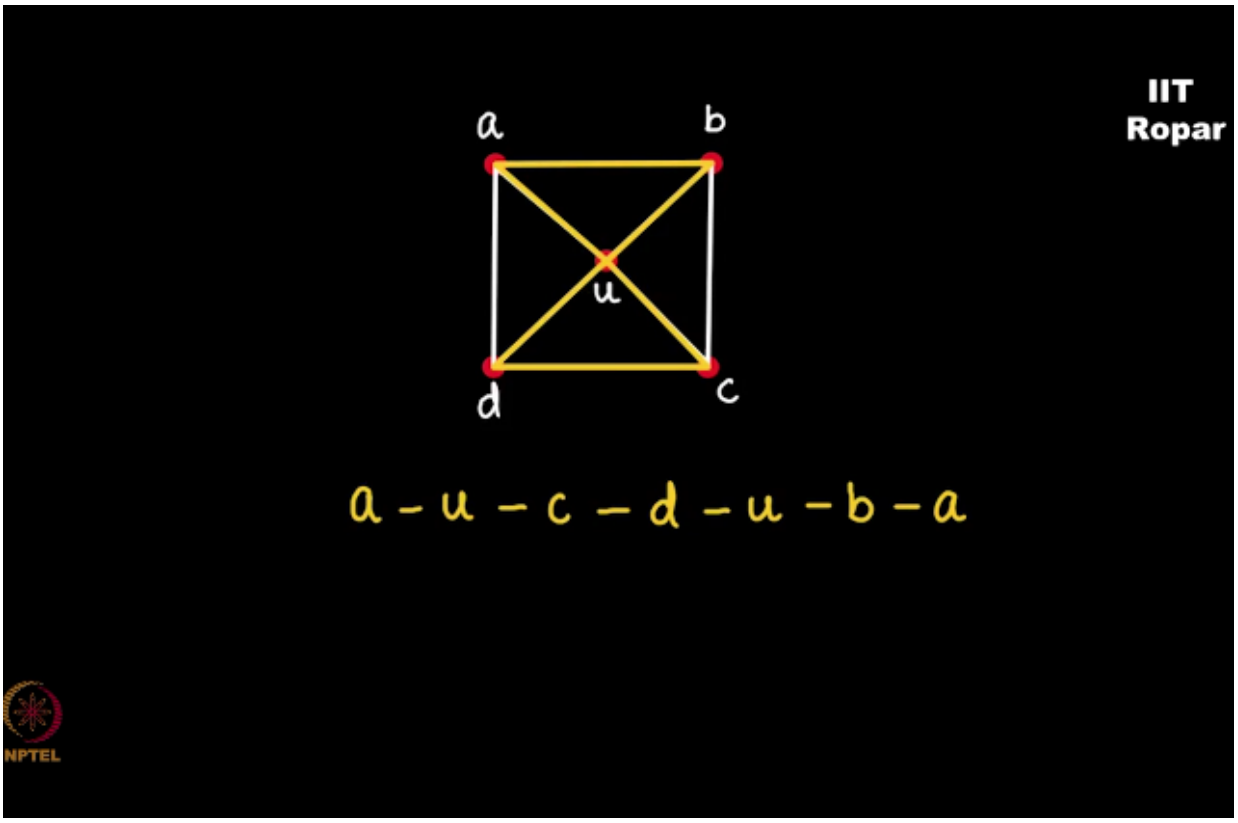

yes this is a closed trail, how does it look like? Let us draw that, it looks like this, right.

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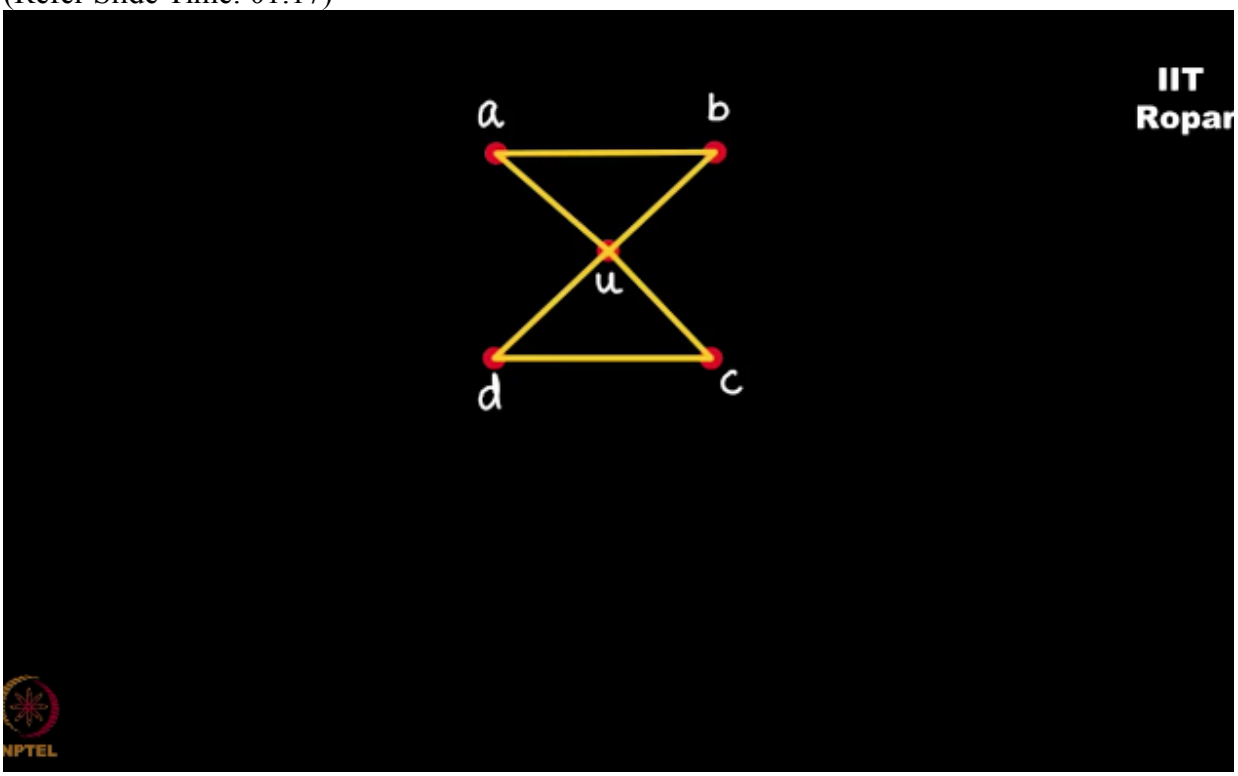

Now there is a special name for this it is called as a circuit, this is called as a circuit,

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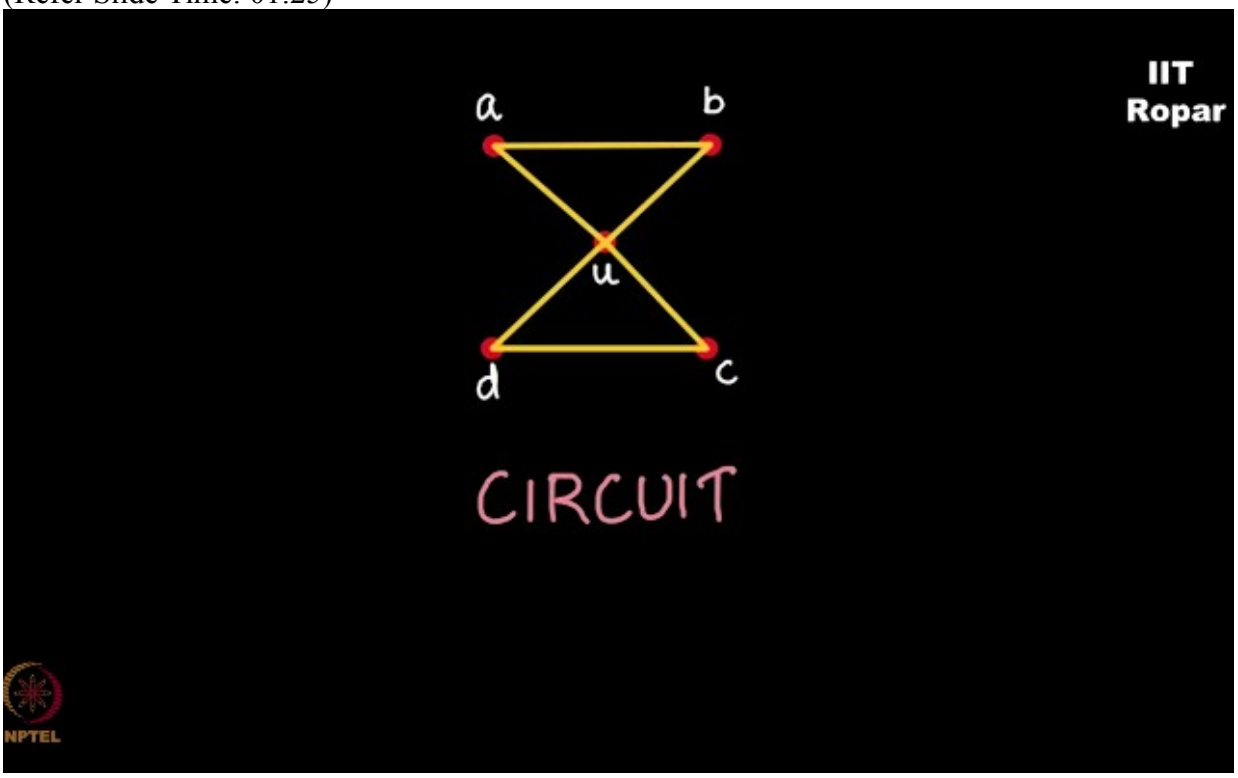

now keep this aside, give me a path from A to B, what does a path from A to B? You should not repeat vertices which means you can, you will obviously not repeat edges,

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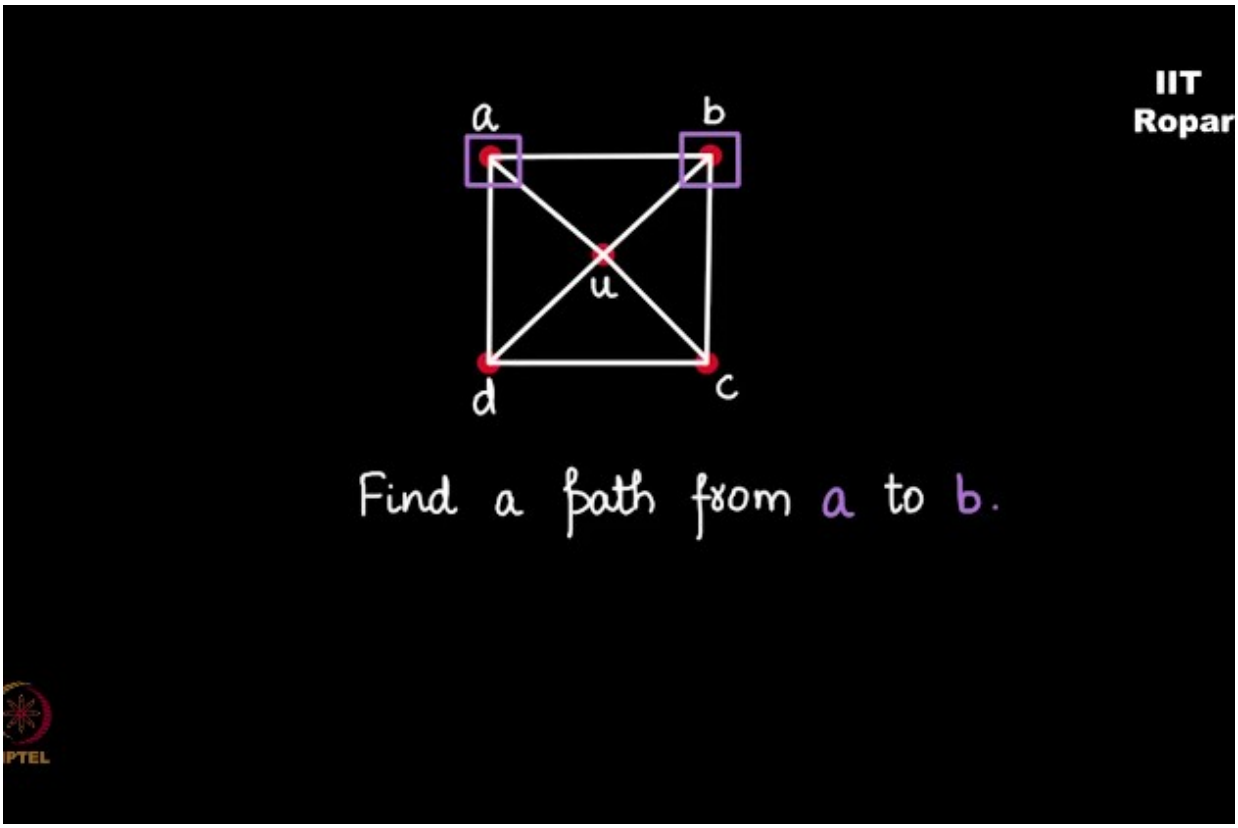

so path from A to B will look something like this A, U, C, B this is a path from A to B.

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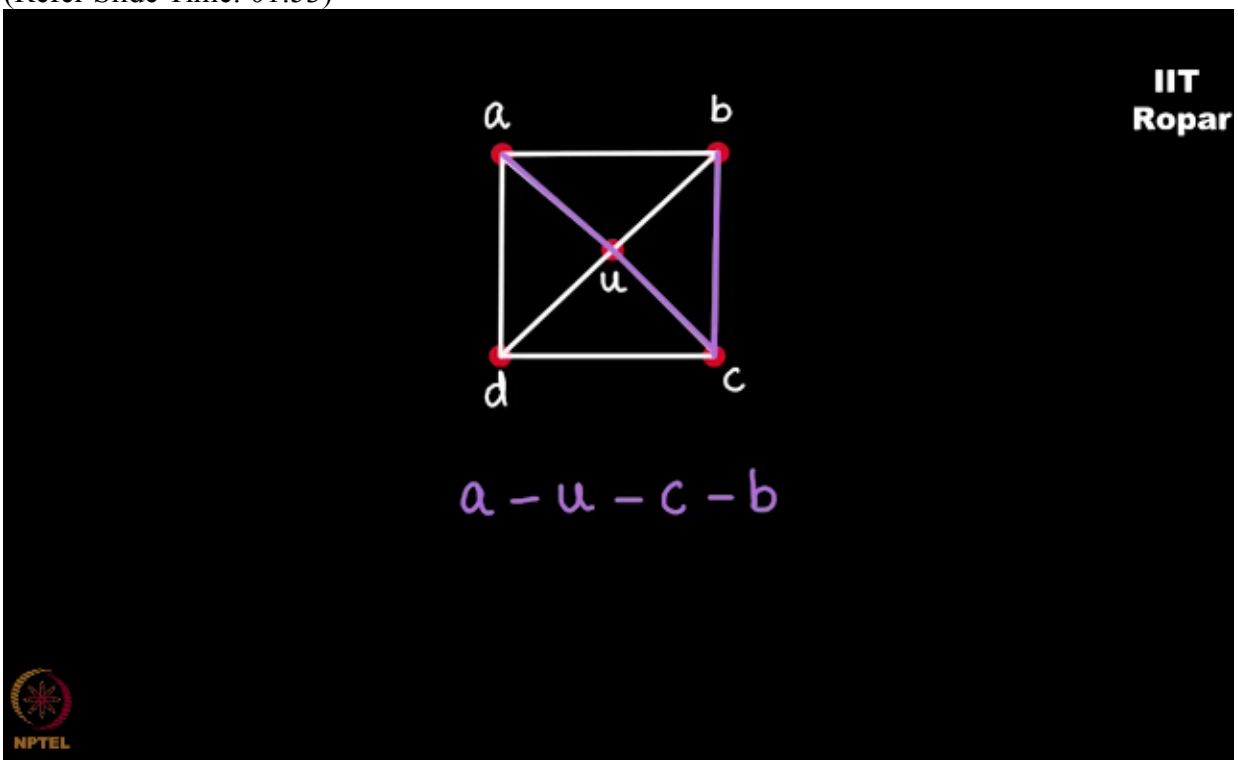

What if I say that I want a closed path from A to A, start from A take a path comeback to A it will be A, U, C, B, and A, that's it,
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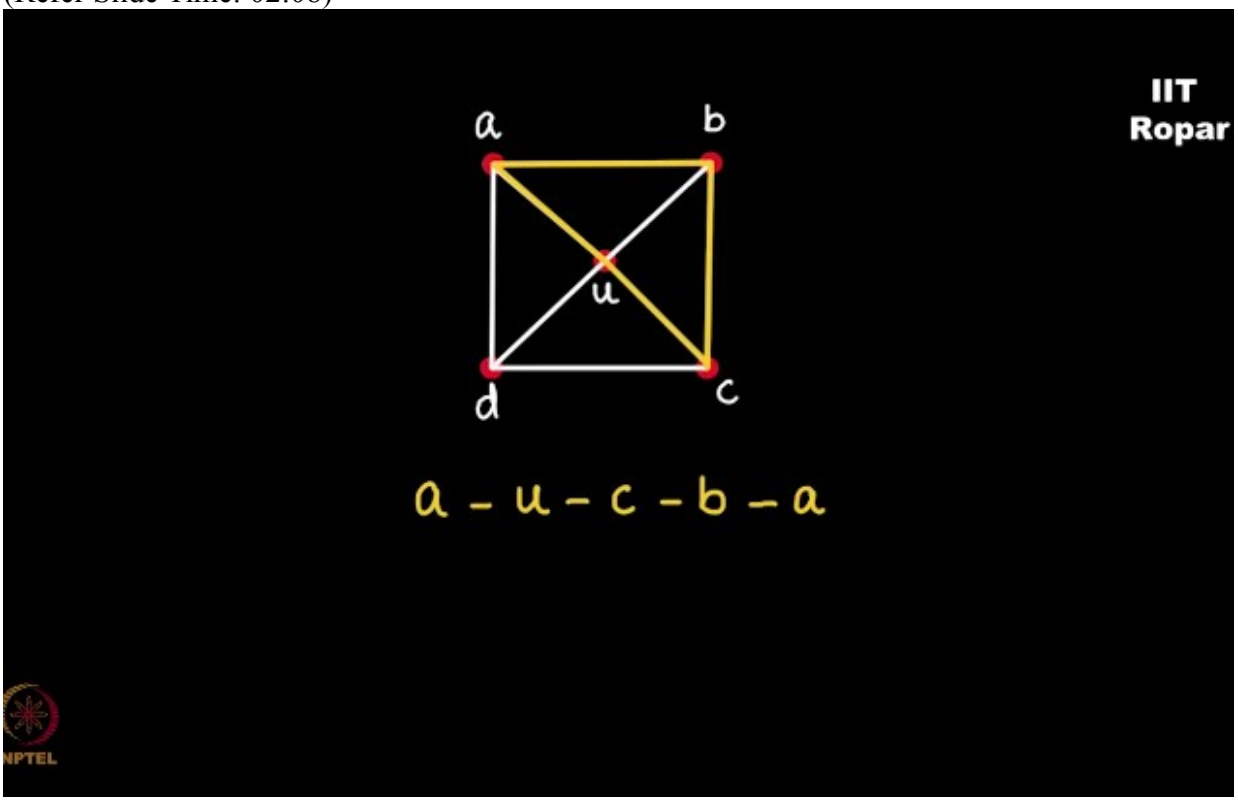

so this is a closed path from A to B I have already mentioned closed path in the previous videos this is called a cycle.
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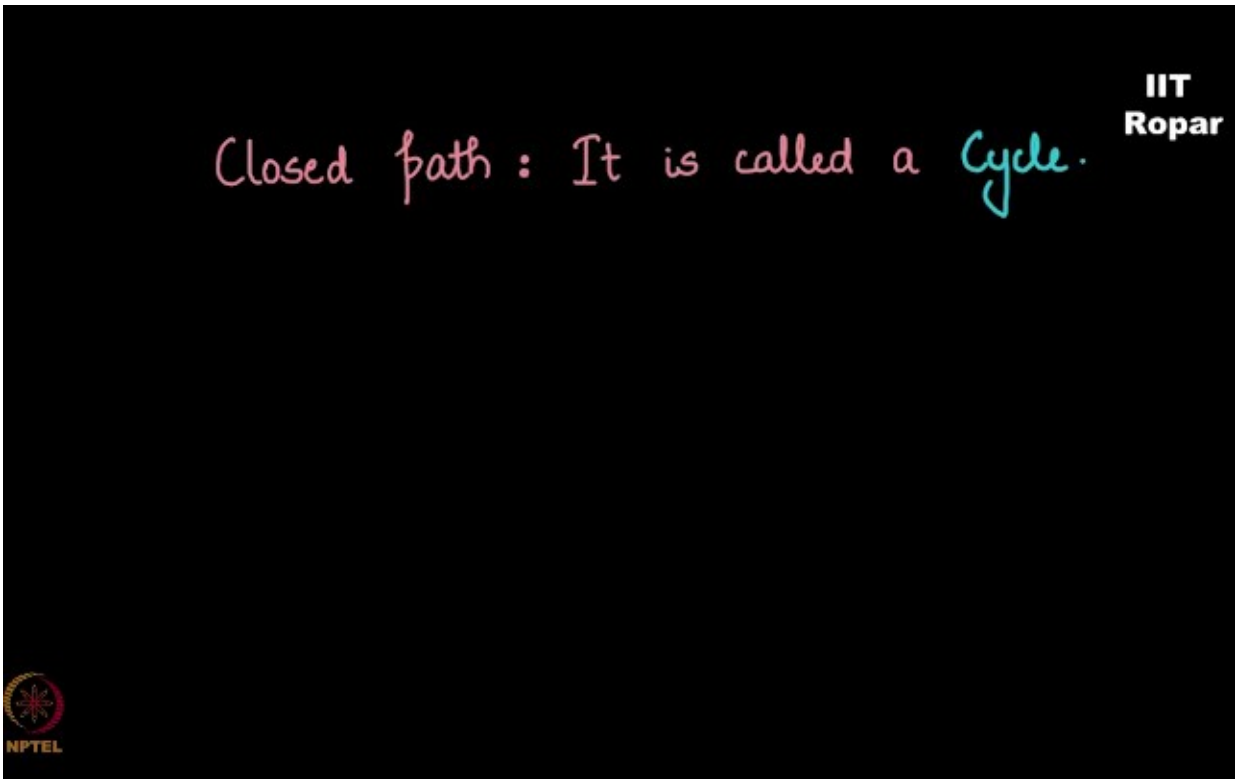

Now do you see something? Well let me draw this cycle here, this is the cycle which we were discussing about, yes,

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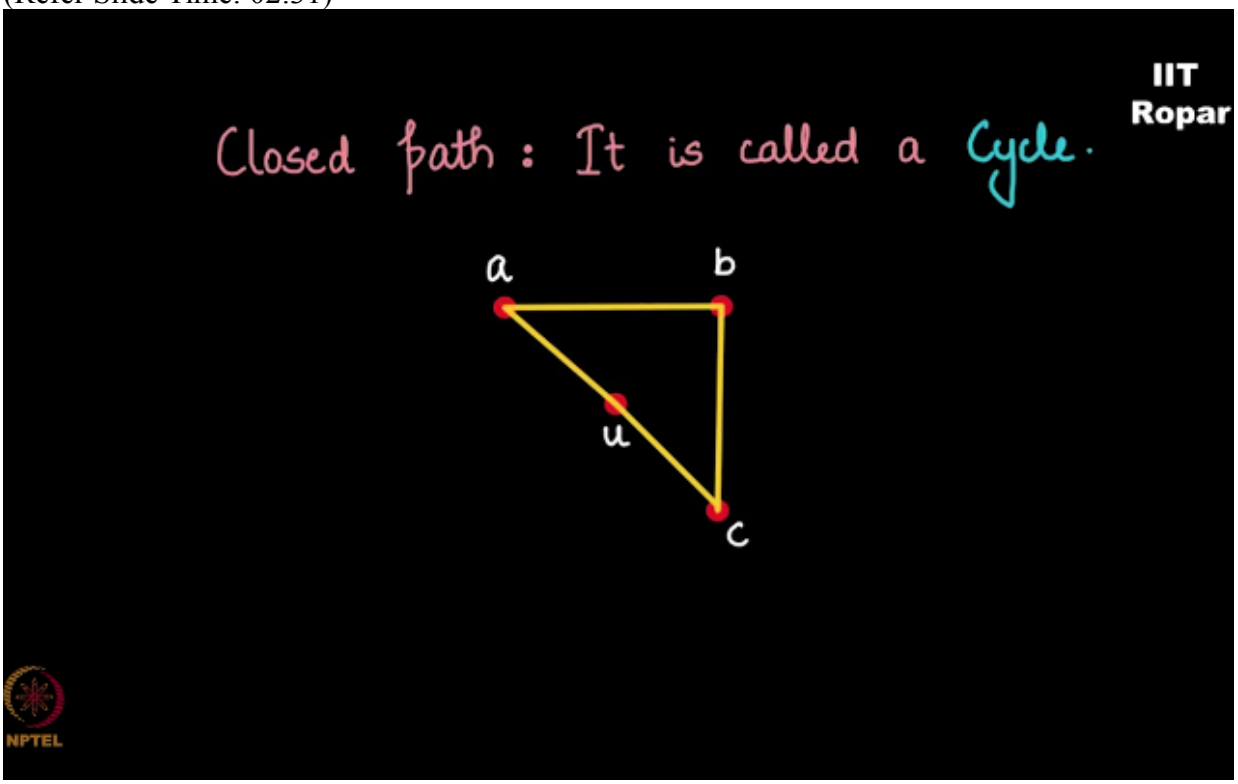

now let me compare a circuit and a cycle,

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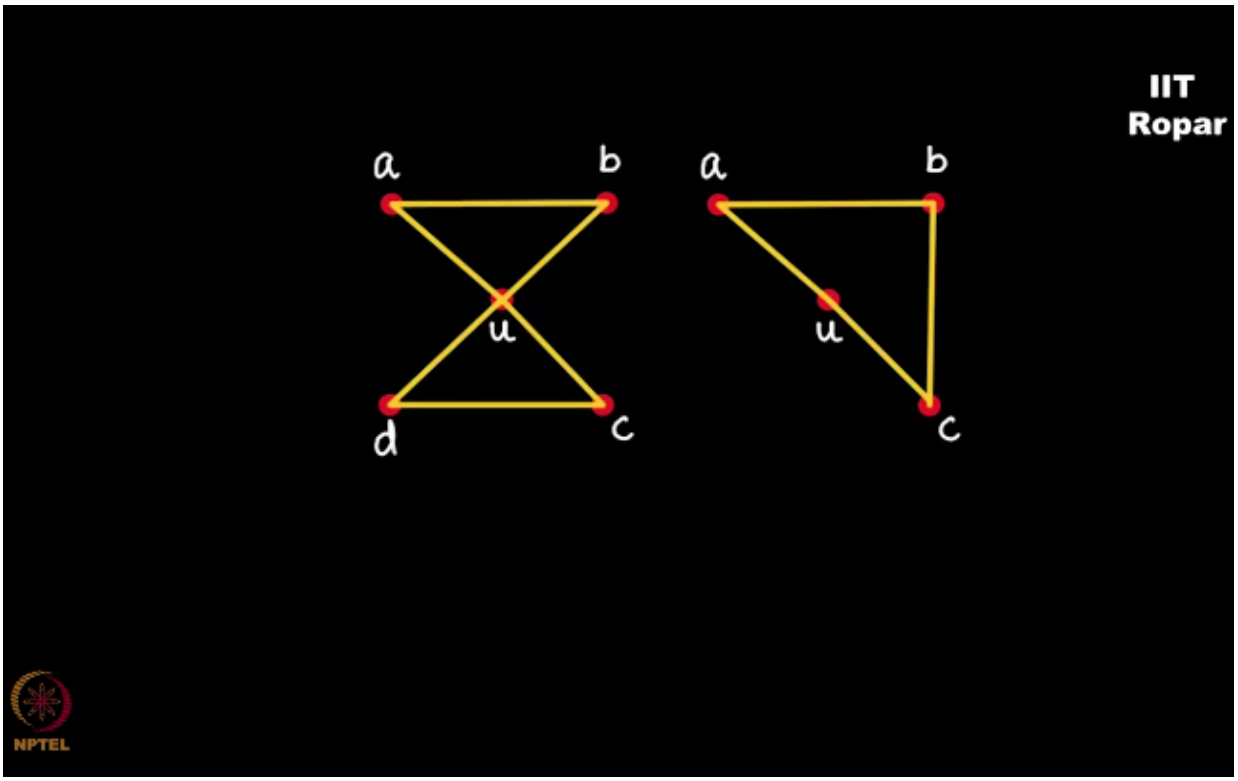

do you see that a cycle is a part of a circuit, that a circuit cannot be a cycle, in a circuit as you know you can repeat vertices but not edges,

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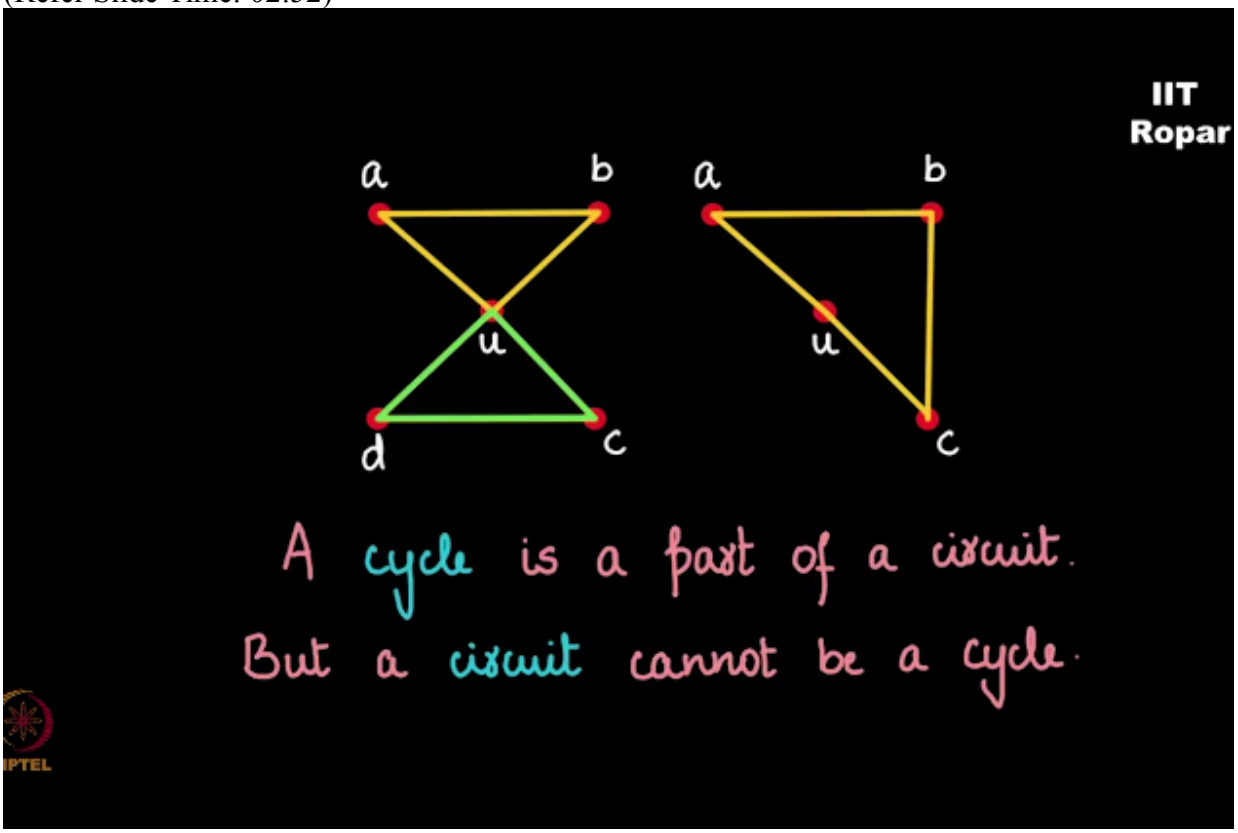

and in a cycle it's like just a path you will not repeat vertices and hence not edges, so this is a circuit and this is a cycle, please observe the subtle difference between a circuit and a cycle it will be used from now onwards very frequently.

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