NPTEL

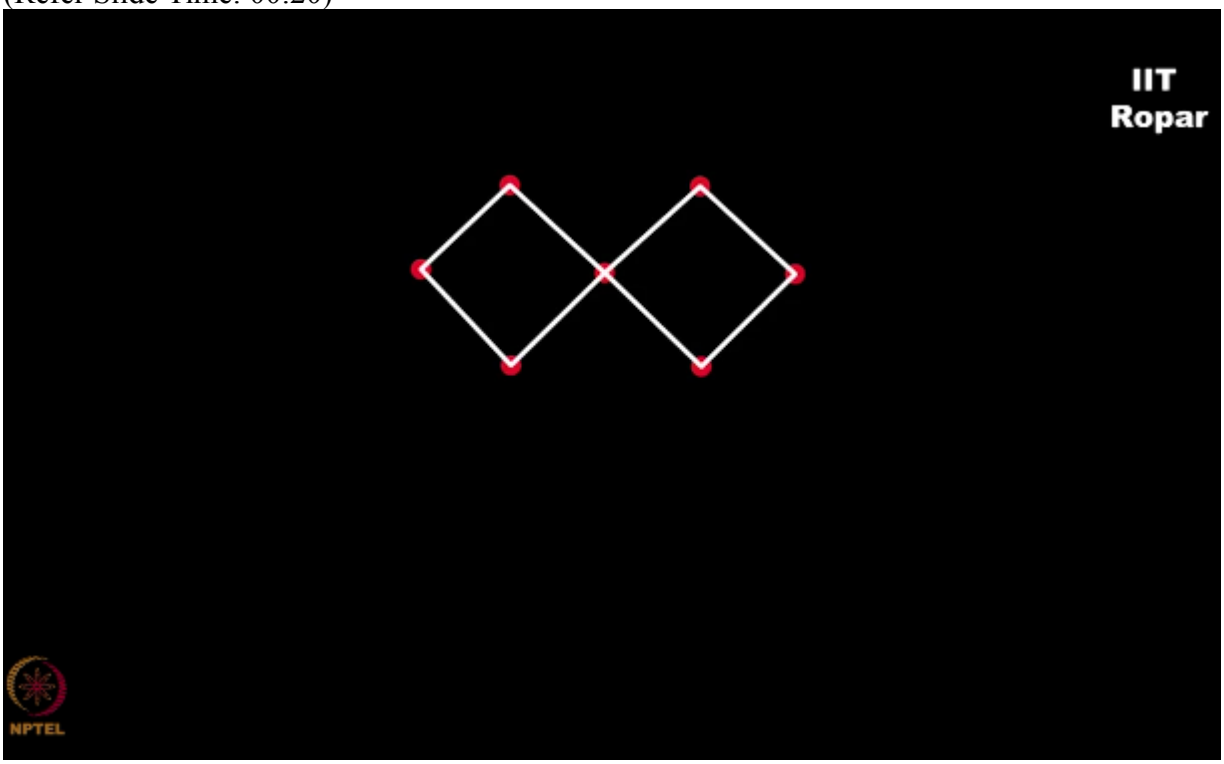
NPTEL ONLINE CERTIFICATION COURSE

Discrete Mathematics
Graph Theory - 1

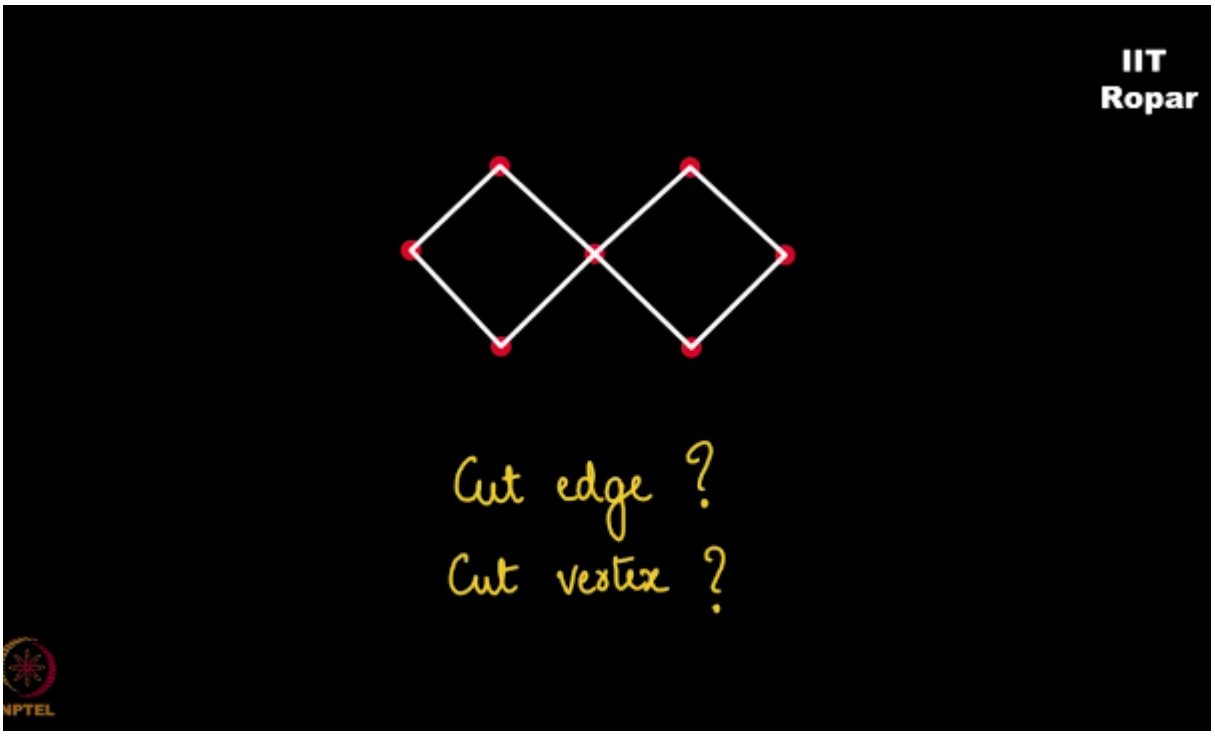
Cut edge

By
Prof. S.R.S Iyengar
Department of Computer Science
IIT Ropar

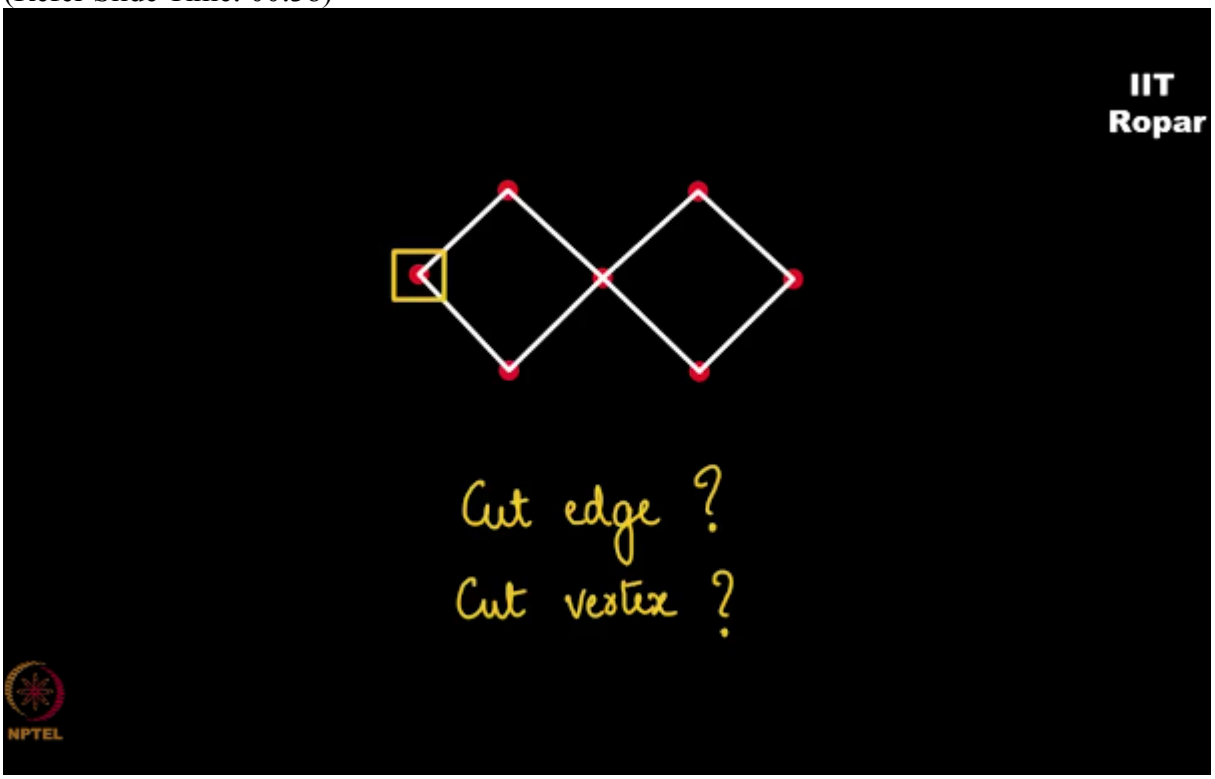
Well we have seen what our cut vertices and cut edges, with this examples it will be more clear, so consider this graph on 7 vertices I have drawn this graph here,
(Refer Slide Time: 00:20)



now can you tell me which is a cut edge or which is a cut vertex here, rather and you can tell me both if they exist.
(Refer Slide Time: 00:31)

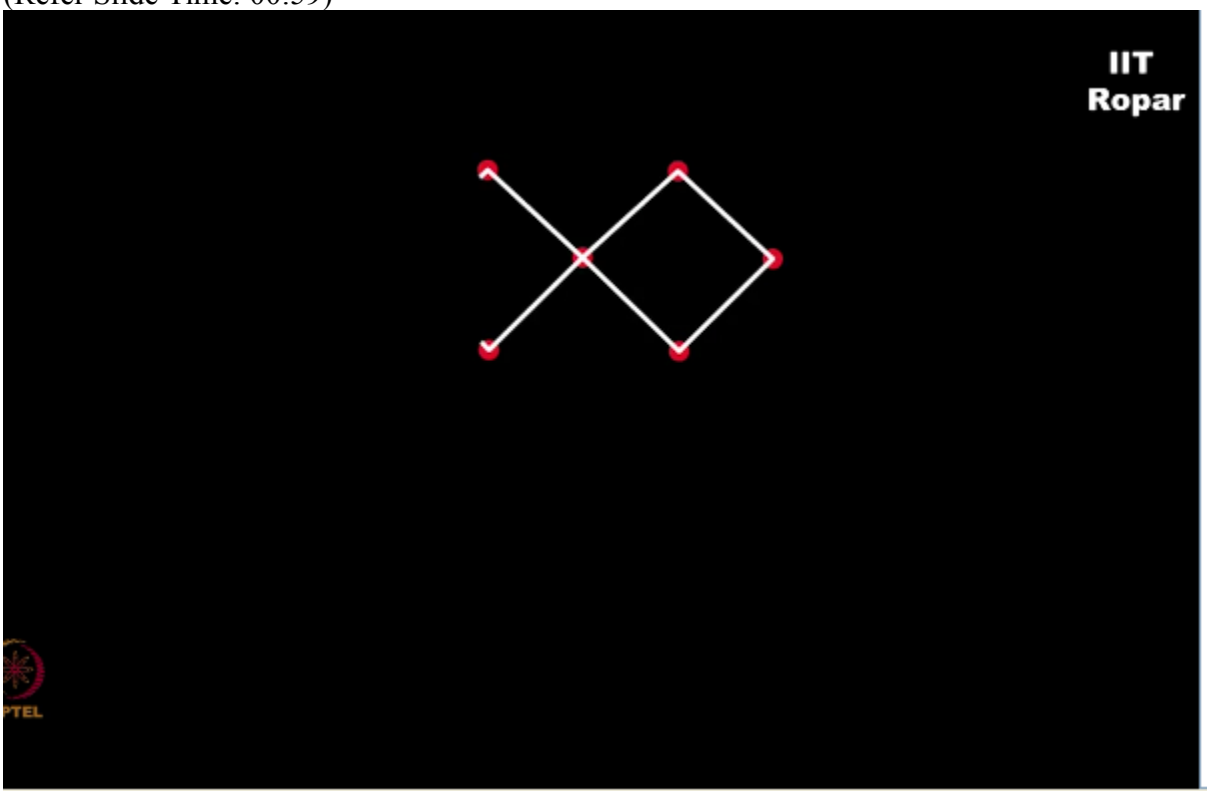


Now, is this vertex a cut vertex? By the removal of this vertex
(Refer Slide Time: 00:38)

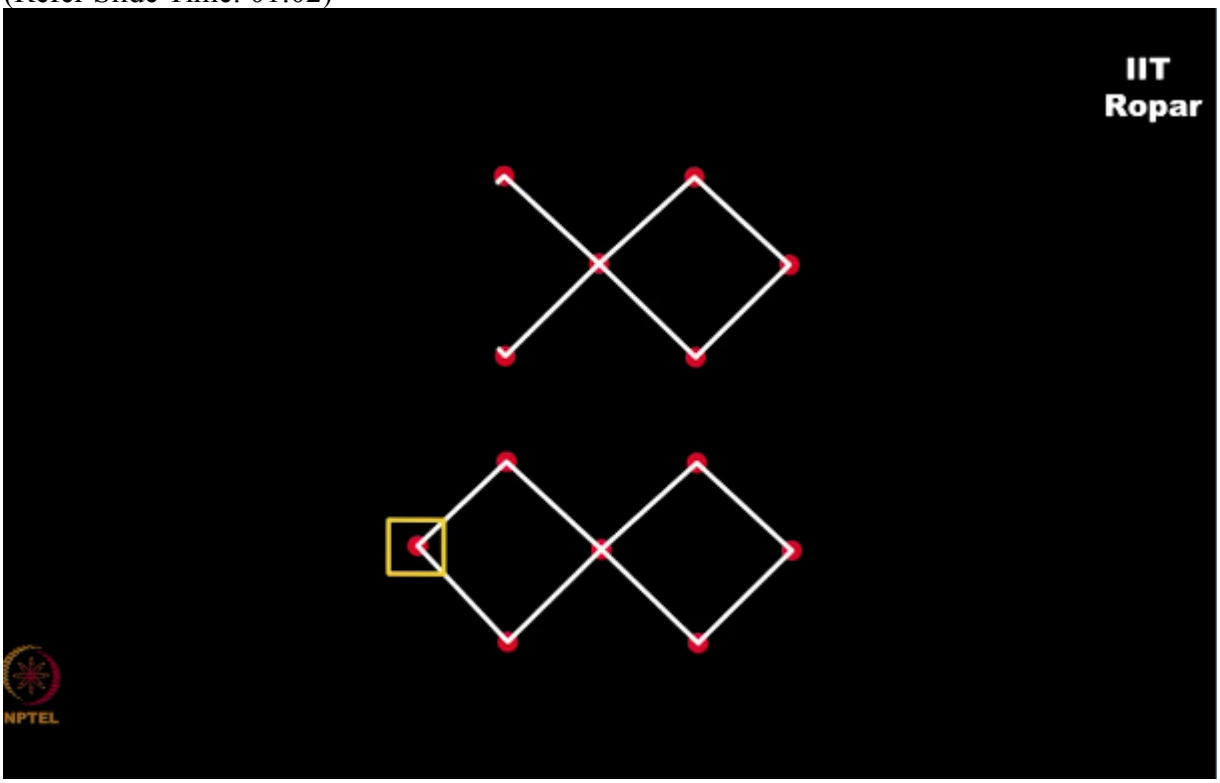


will the graph become disconnected? Please note if you remove a vertex all the corresponding edges of, which are connected to that vertex also get removed, okay.

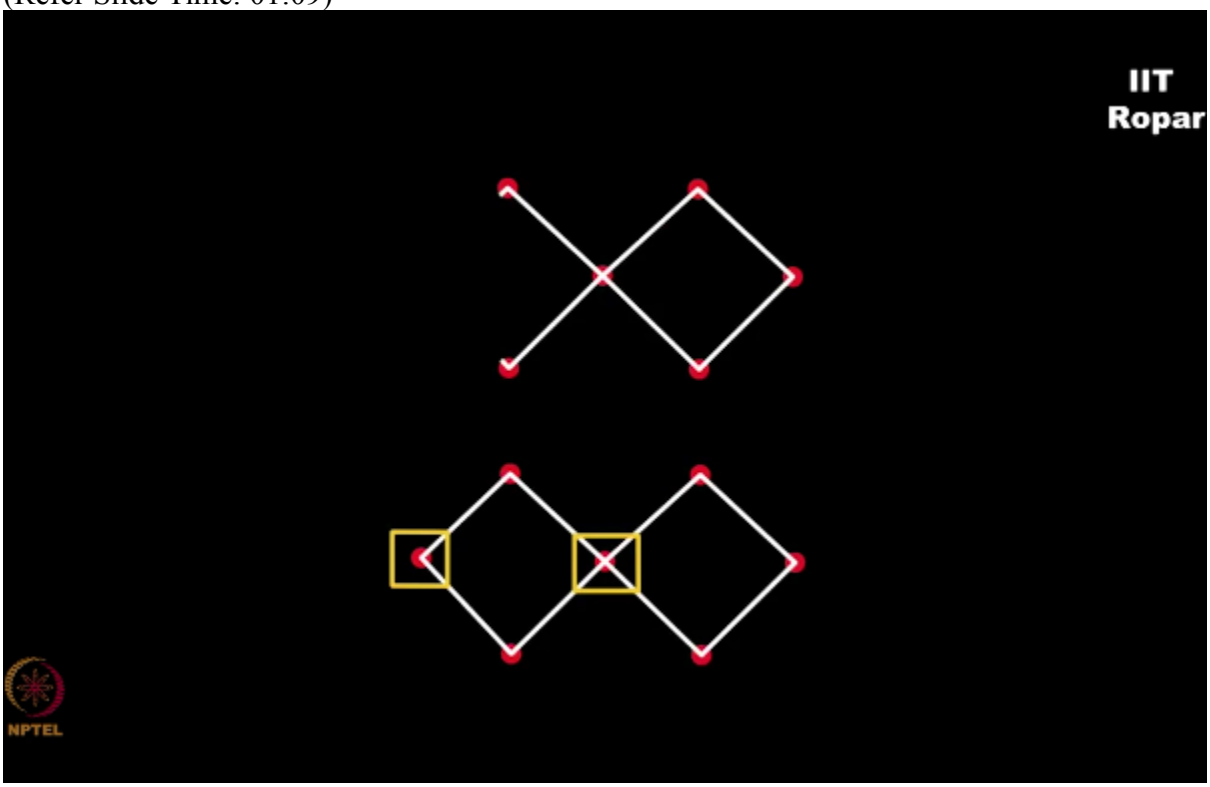
Now if I remove this vertex what is the graph going to look like? It's going to look like this,
(Refer Slide Time: 00:59)



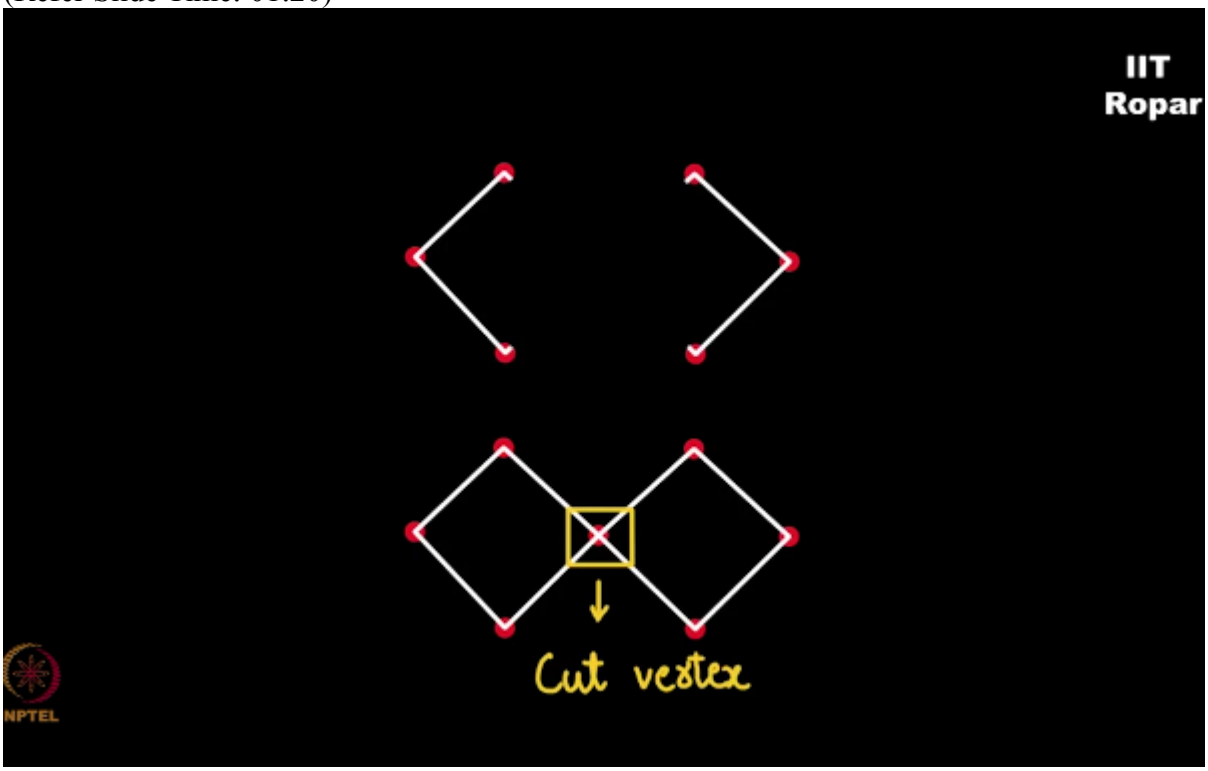
this is a connected graph, this vertex hasn't made any difference
(Refer Slide Time: 01:02)



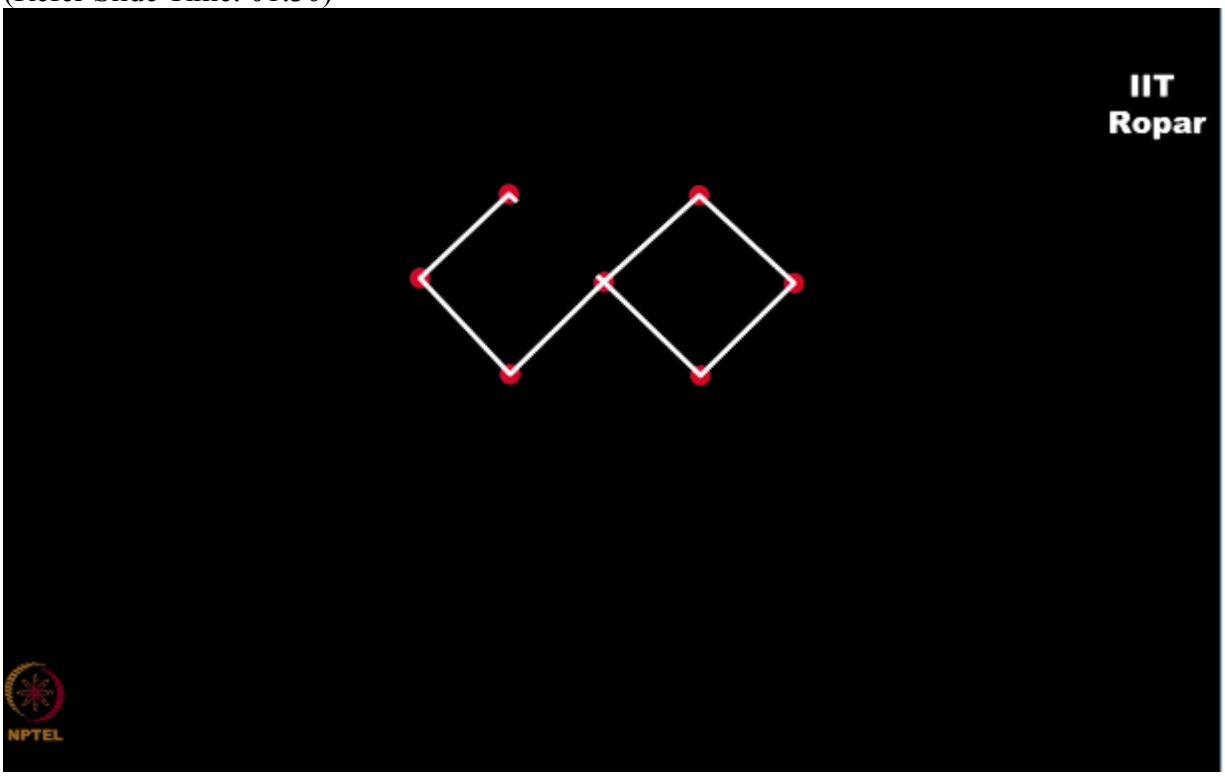
hence this is not a cut vertex, but if I remove this vertex
(Refer Slide Time: 01:09)



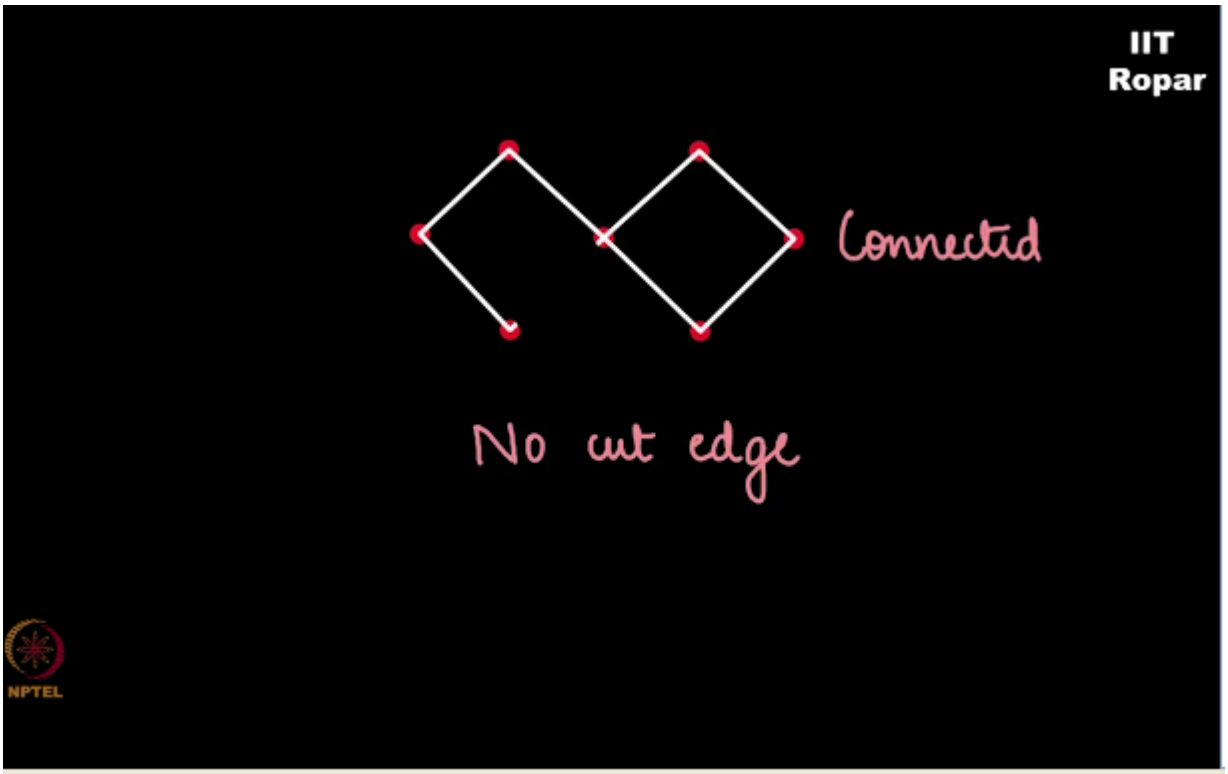
the graph will certainly be disconnected and it will look like this, it has two components and hence this vertex is a cut vertex.
(Refer Slide Time: 01:20)



Now do we have some cut edge here let us check, if I remove this edge the graph will look like this
(Refer Slide Time: 01:30)

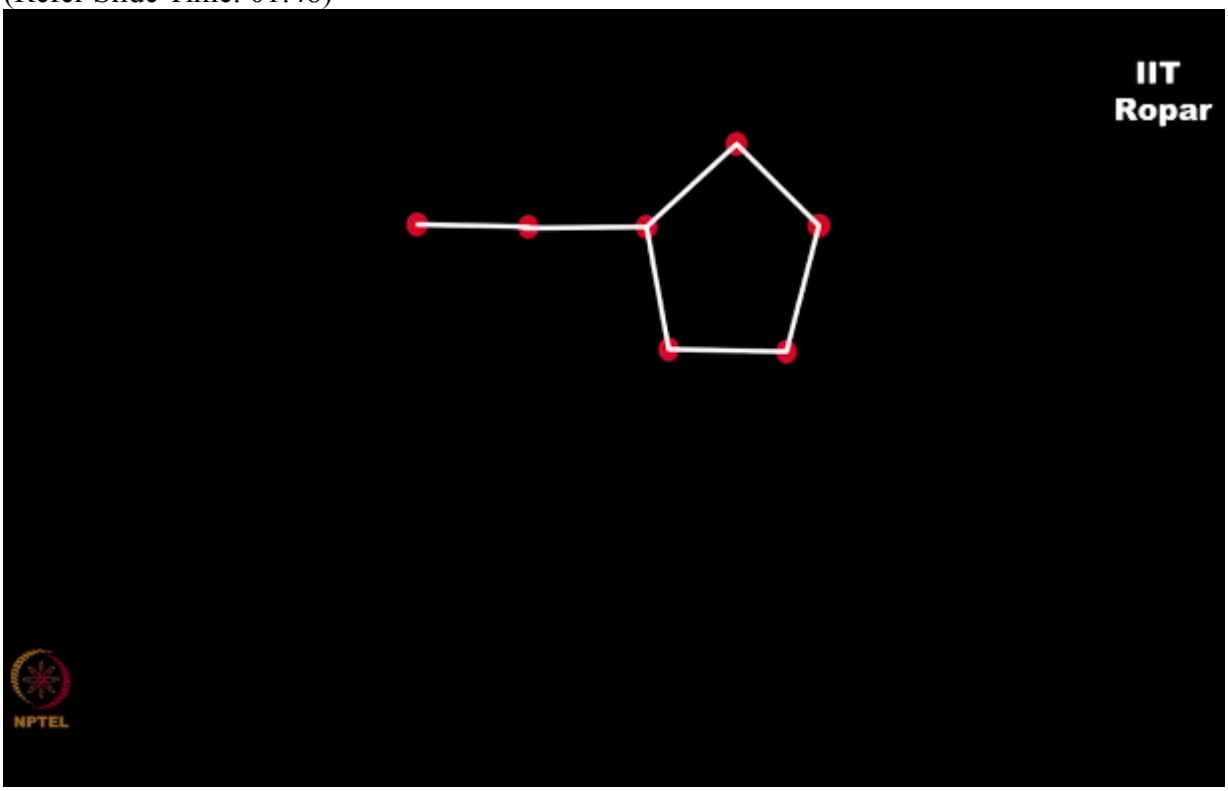


it is connected hence it's not a cut edge, if I remove this still it remains connected, do you observe that there is no cut edge here,
(Refer Slide Time: 01:43)



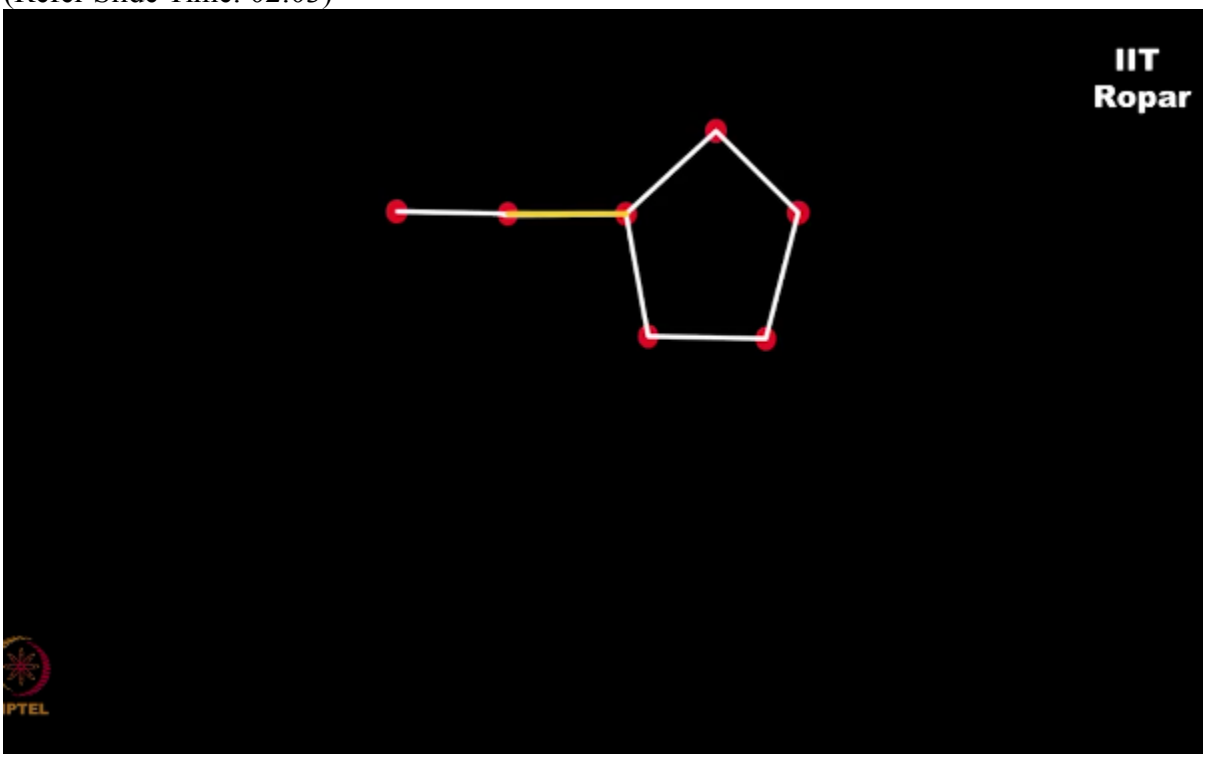
there is only cut vertex, but no cut edge in this graph.

Now let us take this graph
(Refer Slide Time: 01:48)



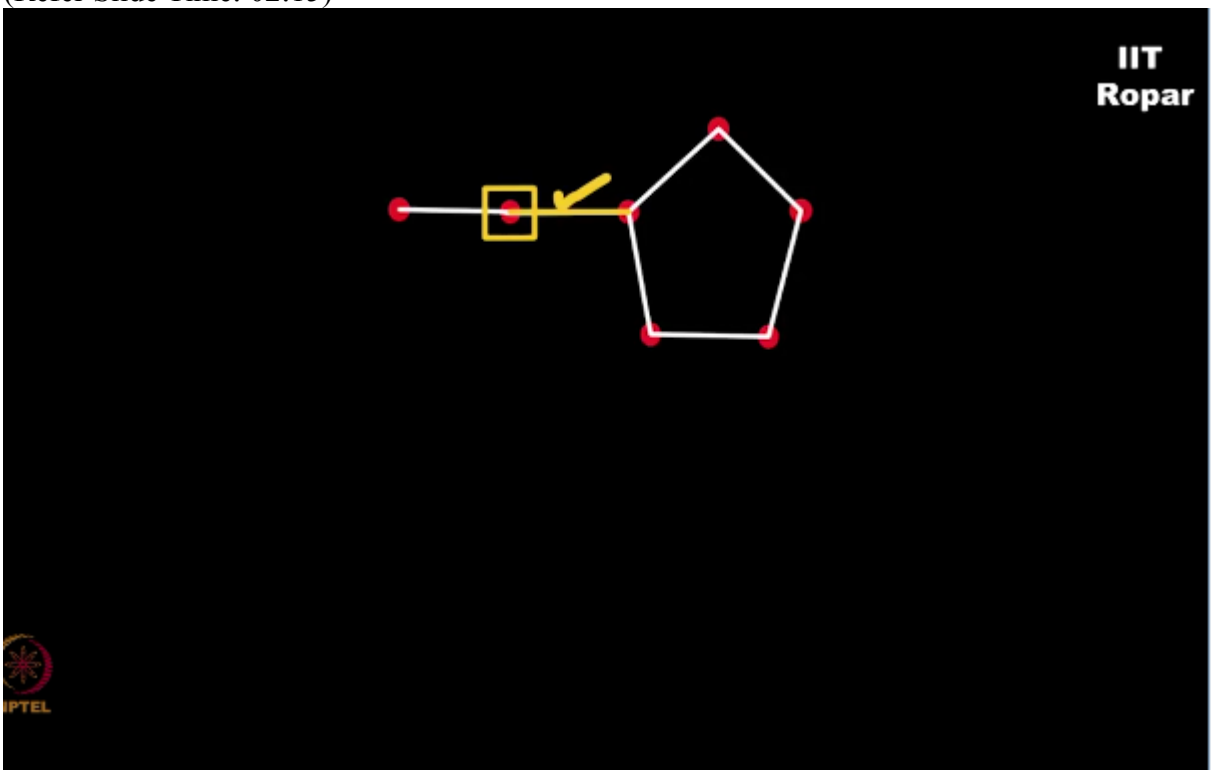
if you can quickly tell me which is the cut edge, I think it will be this edge this edge acts as a cut edge here

(Refer Slide Time: 02:03)

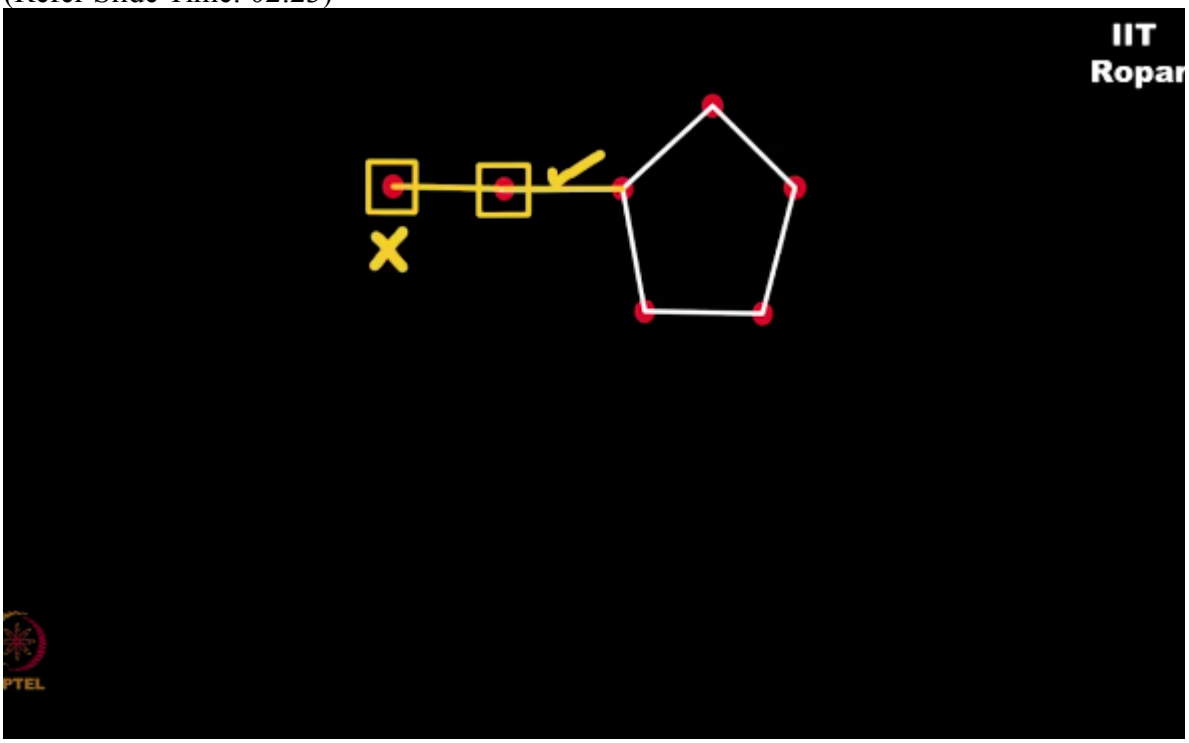


by the removal of any other vertex, any other edge the graph doesn't become disconnected, this acts as a cut vertex here and this is a cut edge

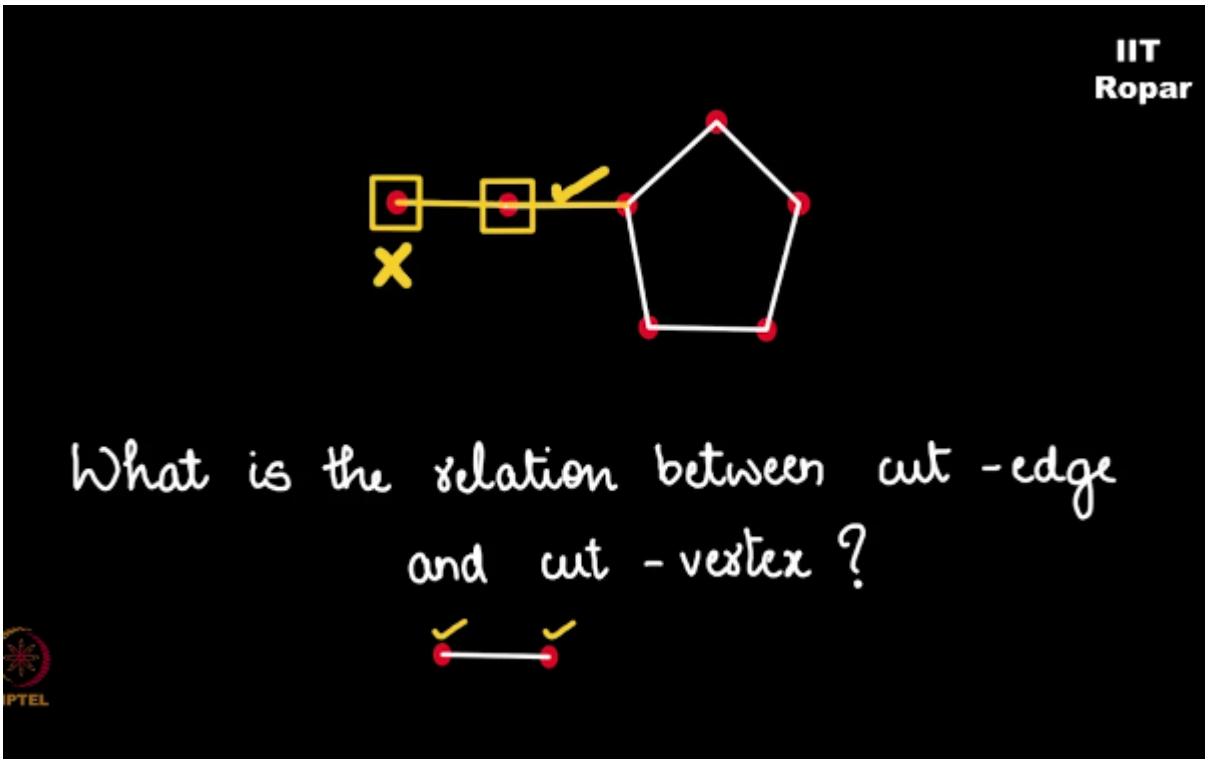
(Refer Slide Time: 02:15)



in this example, this is another cut edge, but this is not a cut vertex.
(Refer Slide Time: 02:23)

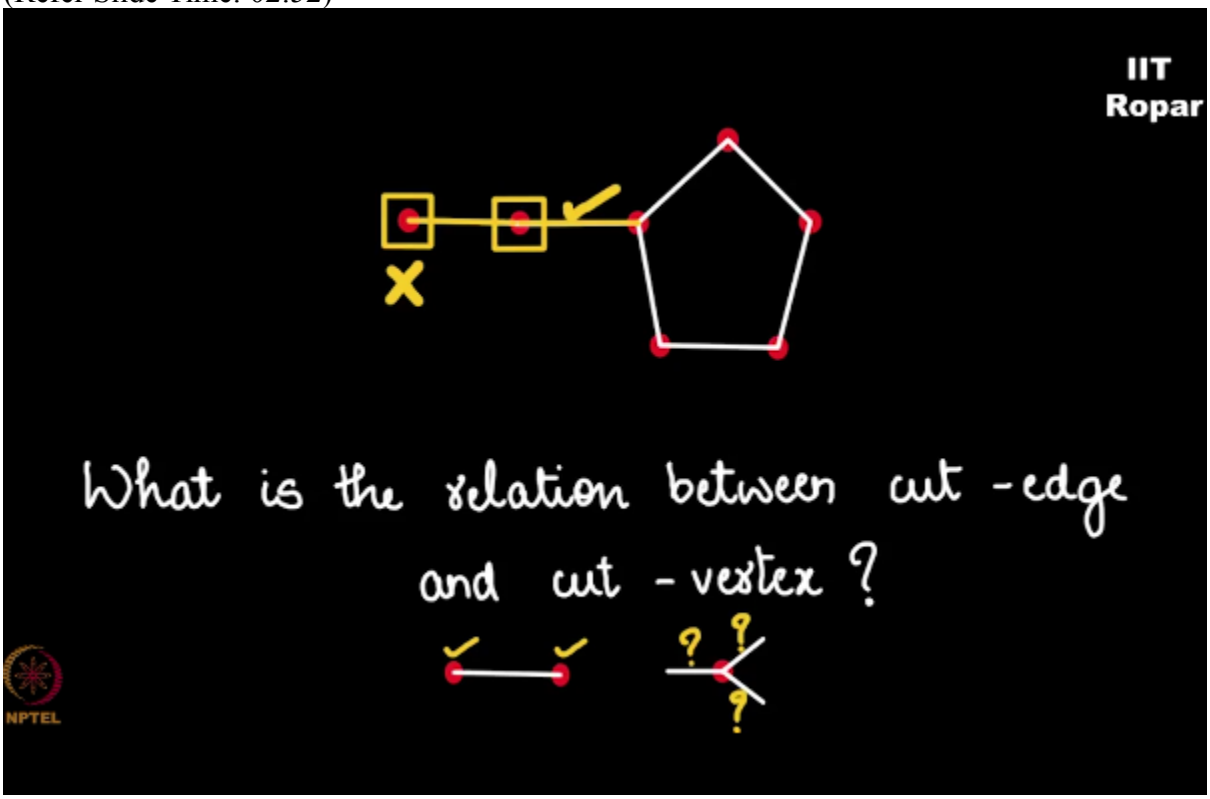


Now this example I have motivated you to think of one nice question here, can you tell me the relation between a cut vertex and a cut edge? Now if this is a cut edge in some graph will these vertices be cut vertices,
(Refer Slide Time: 02:41)



is it always true, or if this is a cut vertex in a graph will the edges connected to it be cut edges,

(Refer Slide Time: 02:52)



again is this always true in general, try to think about it.

IIT MADRAS PRODUCTION

Founded by
Department of Higher Education
Ministry of Human Resources Development
Government of India

www.nptel.iitm.ac.in

Copyrights Reserved