NPTEL

NPTEL ONLINE CERTIFICATION COURSE

Discrete Mathematics
Graph Theory - 2

Complement of a Graph - Illustration

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We have earlier addressed what is the complement of a set, back then in set theory, now when you take a universal set and you have some elements as a part of set A, you can tell or you can find out what is A complement.
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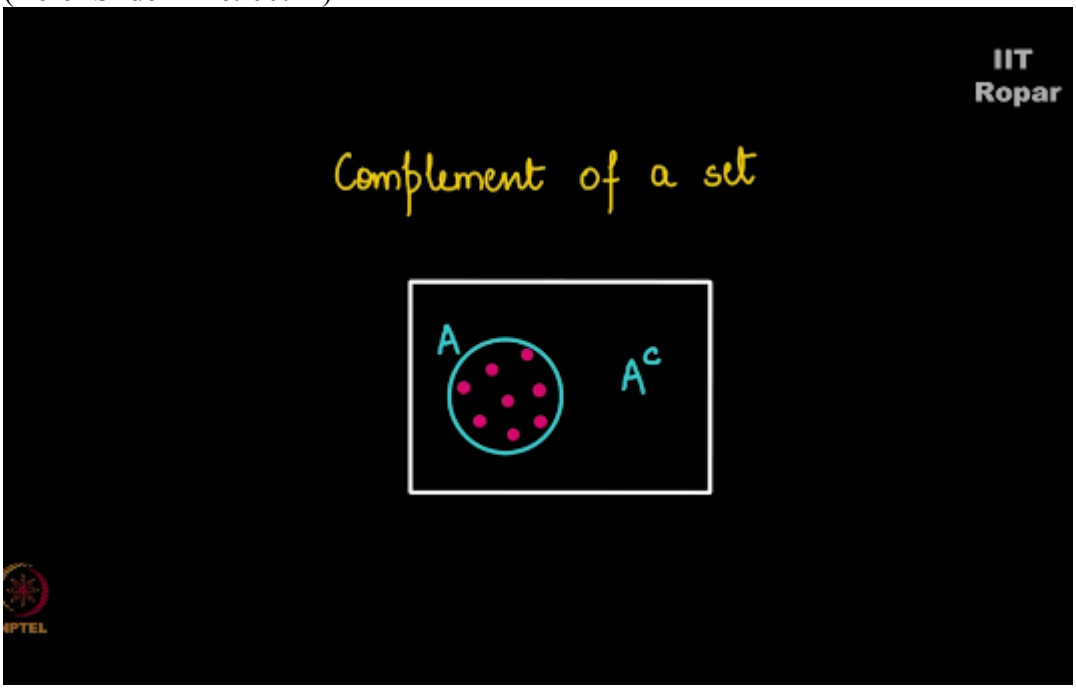

Now coming to graph theory what can a complement of a graph mean, consider this graph C4, you see some edges here,
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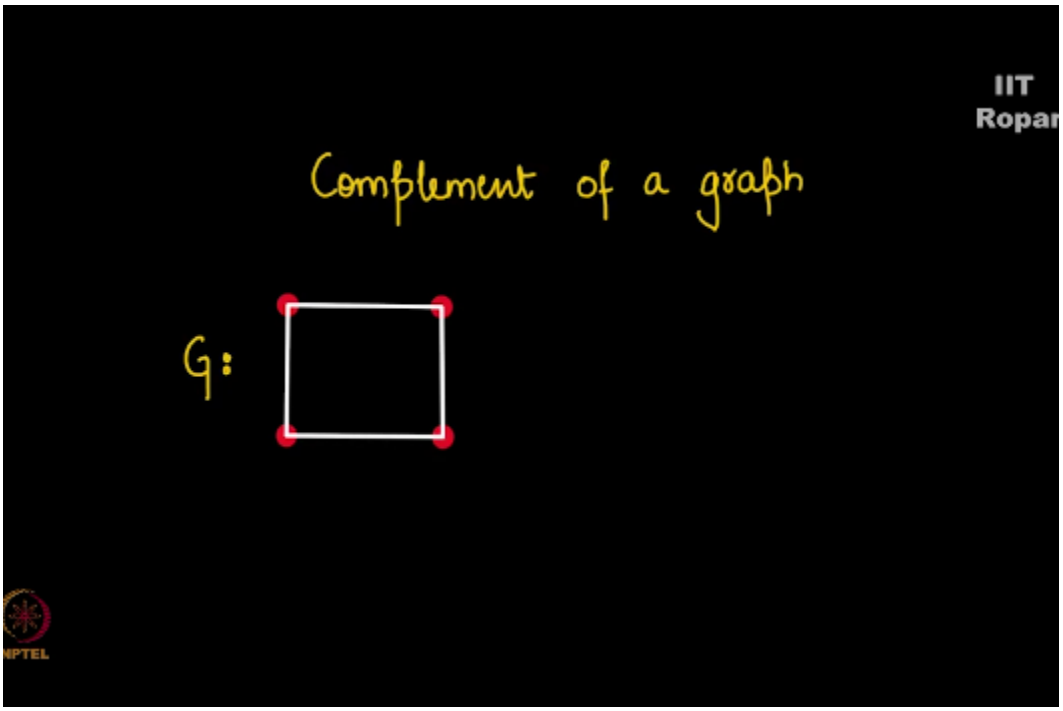

the complement of this graph is this,

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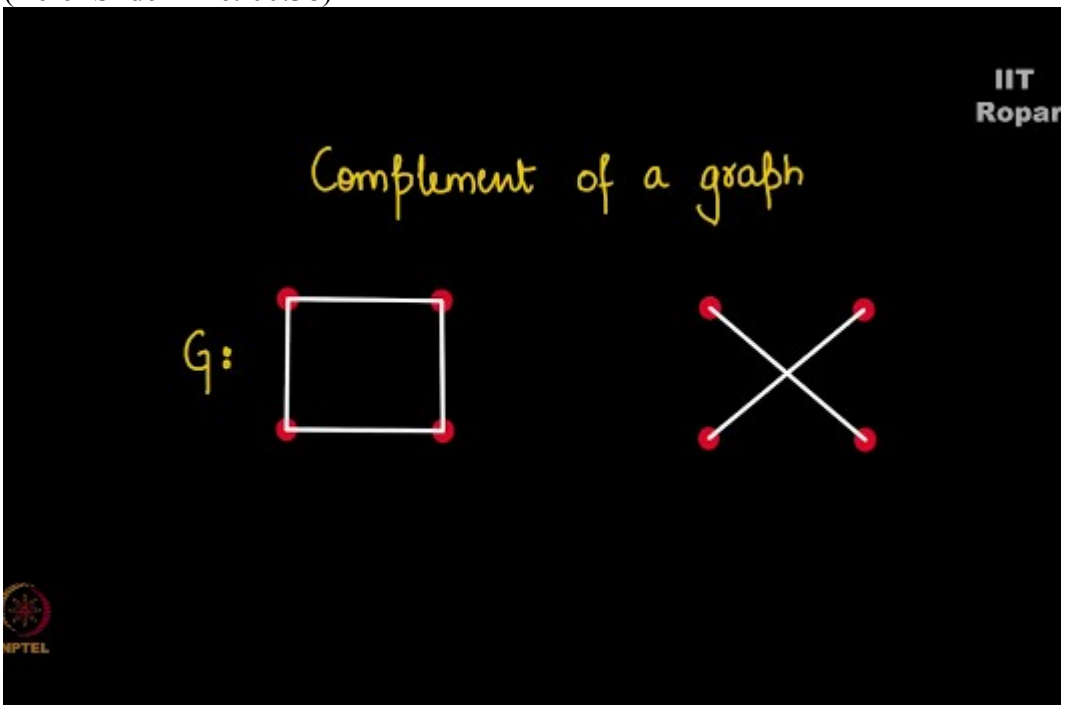

these two edges are missing in G and hence they'll be present in G complement, the notation will use for G complement is either this or this, both of them are fine.

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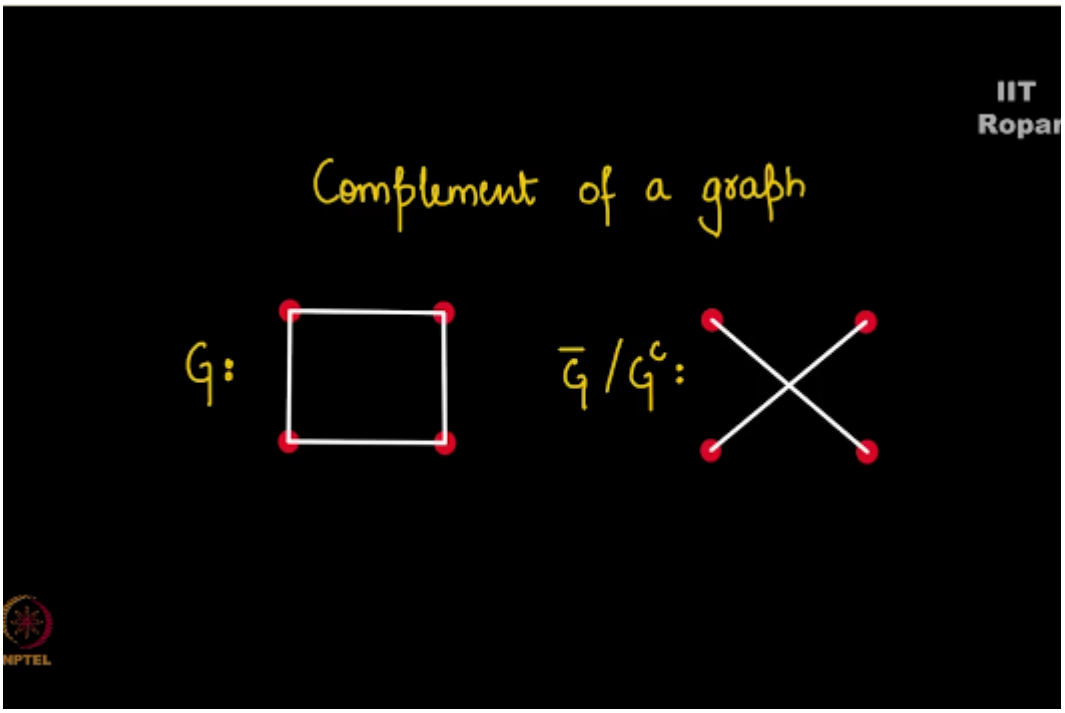

Consider this graph of 6 vertices and these edges, let us construct a complement of this graph, this edge is not there, this one, this one, this one, and so on and these edges are not there in G, and hence will be present in G complement.
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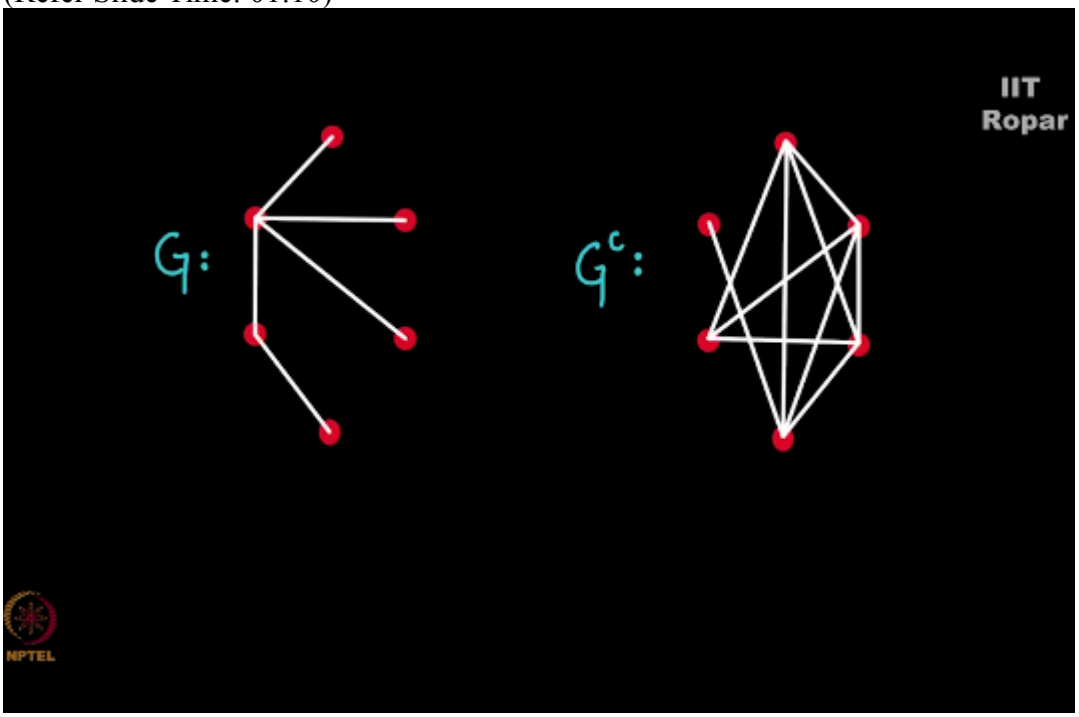

Let us take a minute to observe the edge between the vertex 1 and 4 here,
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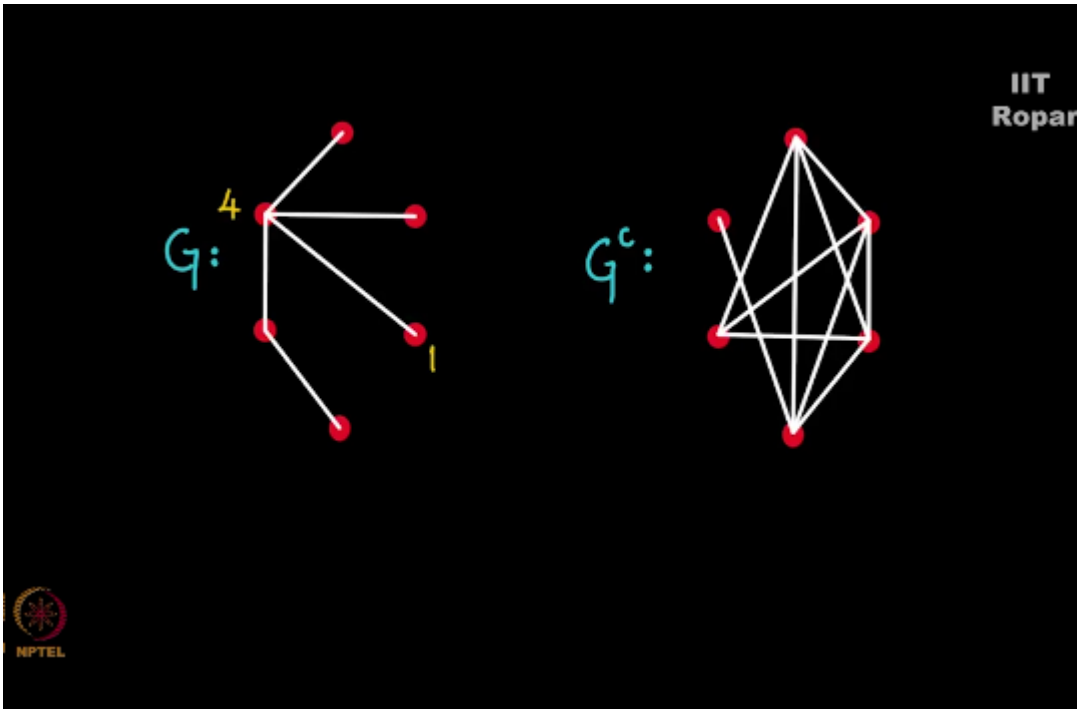

and in G complement there is no edge between 1 and 4, and this holds true for every pair of vertices. So the only important point in the complement is the edges which are present in G will not be present in G complement and the edges which are not present in G will be present in G complement.

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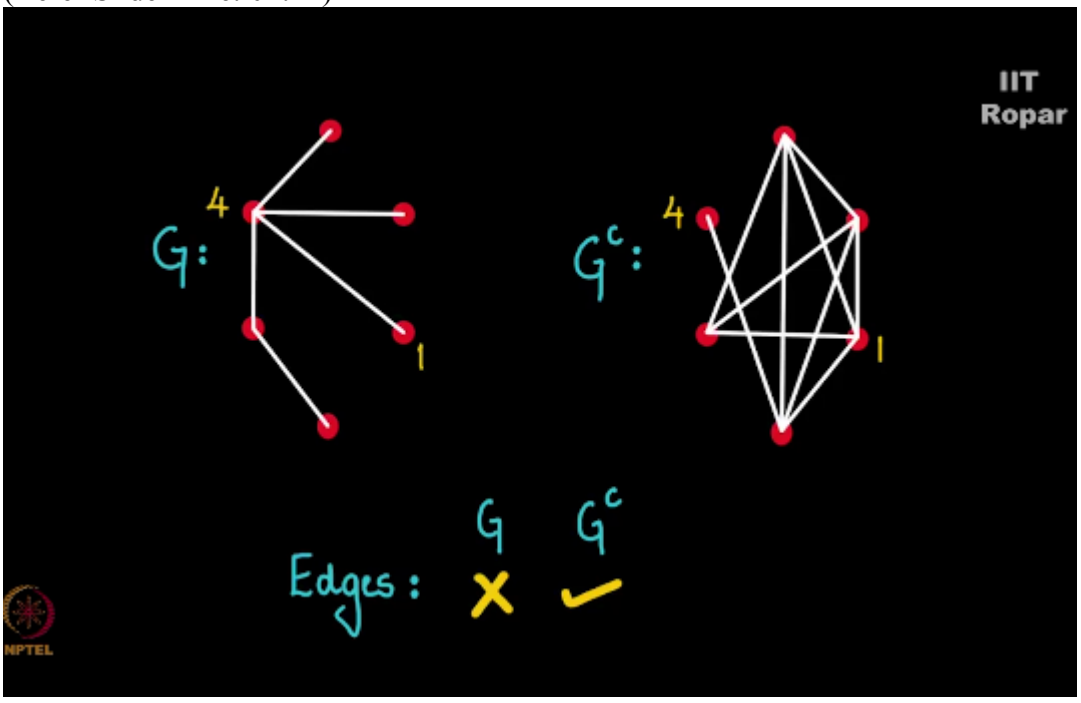

Now you take a complete graph this one on 5 vertices.

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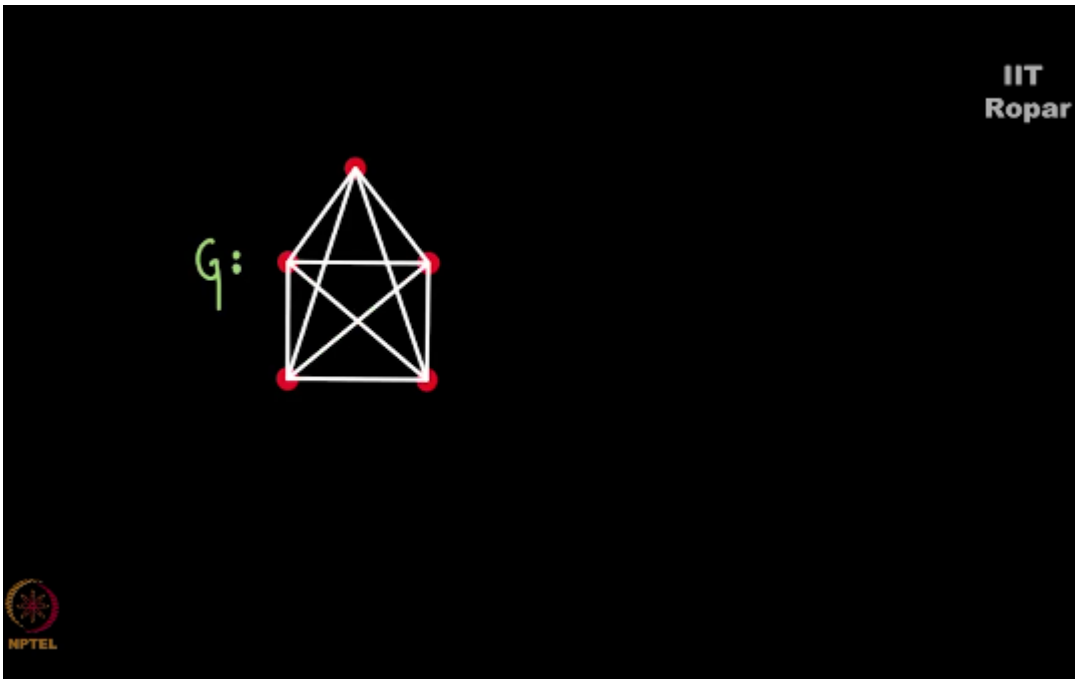

Well, it is very obvious to observe that in G complement there will be no edges, why? You will have only isolated vertices because a complete graph has all the edges you see, it is being exhausted completely, and hence in complement there will be no edges,

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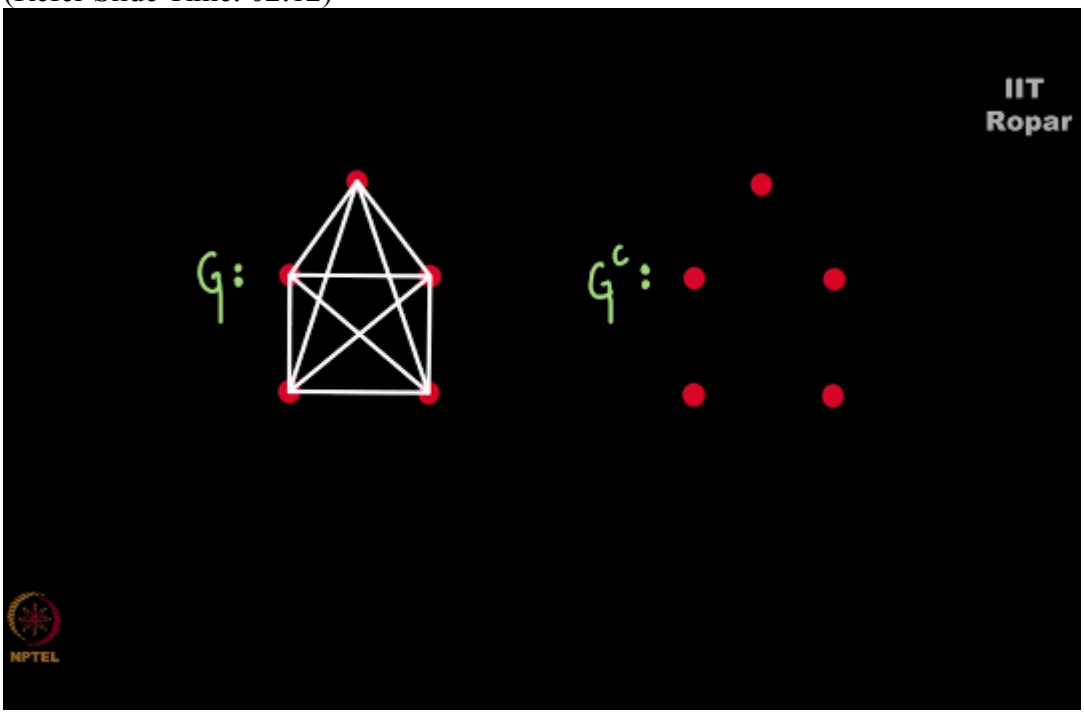

so the complement of a complete graph is always having only n number of isolated vertices.

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