Project Management for Managers
Dr. M.K. Barua
Department of Management
Indian Institute of Technology, Roorkee

Lecture - 46
Slacks & Floats- II

Hello friends, I welcome you all in this session. In previous session we were discussing about how to calculate slack and floats and we have seen different characteristics of those 2 important concepts, and we did solve one example also and we calculated all those 3 floats. Now let us take one more example in which we will calculate the remaining float also which is the safety float right.

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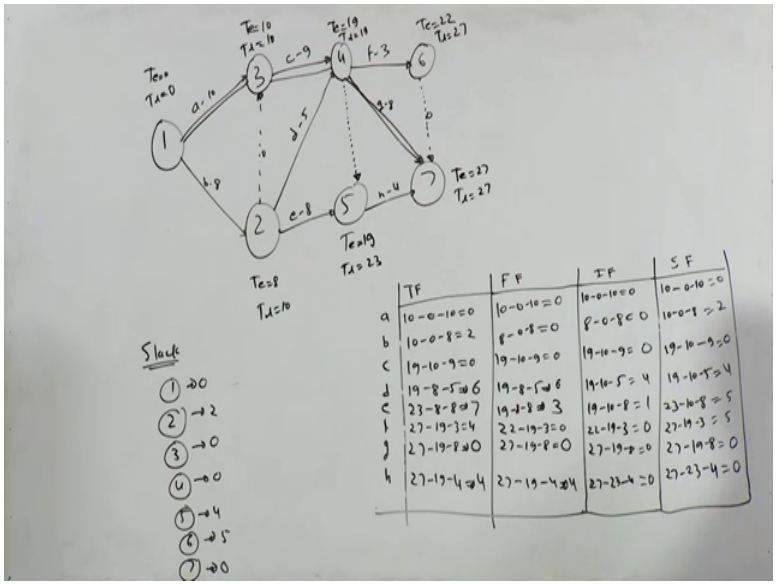

So, the example is like this, this is the 3 event number 2 event 4 event 5 event 6 and event 7 and this event is the last event right.

So, activity a is taking 10 days, activity b taking 8 days, activity 2 to 3 is a dummy activity right 3 to 4 is activity c is taking 9 days, 2 to 5 is activity e and this is taking 8 days activity 4 to 6 is a its taking 3 days, activity 5 to 7 is activity h its taking 4 days, activity 4 to 7, 4 to 7 is this activity g its taking 8 days. So, this is a dummy activity occur its duration is 0 right and there is one activity 2 to 4 its activity d and its taking 5. So, a b c d e f g and h right. So, these are different activities.

Now, we will find out floats right. So, first of all let us calculate all Tes and TLS right. So, Te at this point is 0, Te at this point is 8, Te at this point is 10 right. So, if you go from this part this would be 8, but we will take the longest one right then you have got Te at this node is its 8 plus 8 16, 8 plus 5 is 13, 10 plus 9 is 19 right when T is 19 at this node Te at this is at this node is 22 right and Te at node number 7 would be now there are several possibilities right 16 plus 4 20, 22 plus 0 22 and 18 plus 8 is 27. So, Te is 27.

Now after calculating all these Tes let us calculate TLS is 27 right. So, at this node Tl would be 27 right Tl at this node would be 23, 27, minus 3 is 24 and 27 minus 8 is nineteen. So, Tl would be 19 at this point right.

Now, Tl at this node would be simple its 27 minus 4 this is 23 right now Tl at this node can be calculated from 3 sources right first this second this and third is this right. So, 23 minus 8 is 15, 19 minus 514 and let us first calculate Tl at this point. So, Tl would be 10 here right.

So, now from here at this point from this source 23 minus 8 15, 19 minus 4 14 and 10 minus 0 is 10. So, Tl would be 10 and this node right and finally, Tl here would be from this it would be plus 2 and from here it would be 0. So, with this we are calculated all these TLS and Tes let us calculate recalculate Te at this point. So, this is it and in fact, there is one more dummy activity 4 to 5. So, when you have got these dummy activity the T value will change over here right and what would be the T value from here it is 16 from here it would be 19 right. So, infect it all depends on how these nodes are connected right. In fact, without dummy activity also the Te was all right.

So, now let us calculate all these float right. So, the first of all slack like all the at all these nodes at first node it is 0, second node 0 no its not 0 it is 2 right at node 2 it is Tl minus Tes 2 right. At third node 0, forth node 0, fifth node fifth node it is 4 right sixth node 0 and seventh node 0 right like you know at node 6 its not 0 right it is 5 yeah it is 27 minus 22 right. So, this is 5. So, these are different you know slack values right all those nodes right. So, which are critical activities you can easily identify 1 to 3 right 1 to 3, 3 to 4 right 4 to 7 right.

Now, let us calculate floats right. So, you have got total float and these are different activities a b c d e f g and h right. So, total float for activity a Tl minus Te minus duration. So, 10 minus 0 minus 10 this is 0 for activity b Tl minus Te 10 minus 0 minus

8. So, this 2 for activity c c is here Tl minus Te right Tl minus Te. So, 19 minus 10 minus nineth is a 0 at d Tl minus Te right. So, Tl is 19 this is d Tl minus Te minus duration. So, this is 6, at e Tl minus te. So, this is 23 minus 8 minus 8 16 right. So, this 16, 23 minus 16 is 7 right for f f is here right Tl minus te; so 27 minus 19 minus 3. So, this is 4 right activity g Tl minus Te is 27 minus 19 minus 8. So, this is 0 h Tl minus Te 27 minus 19 minus 4, this is this total is 23. So, this is 4. So, this how you can calculate total float for all these activities right

Now, let us calculate free float free float both T is right. So, T in free float you will you got Tej and Tei right; so T of y succeeding activity T of preceding activity right. So, let us look at this. So, Te is 10 here. So, Te 0 here right 10 minus 0 minus 10. So, this is 0 right for b 8 minus 0, 8 minus 8 this is 0 right for activity c this 19 minus 10 minus 9 this is 0 right. So, we are focusing only on T is right. So, for activity c, T here T here and duration right for activity d, d is this right. So, Te is 19 and Te is 8 minus 5, 6 right for free float of activity e. So, this is 19 minus 8 minus 8 right this is 3 for activity f, f is here right. So, this is 22 minus 19 minus 3 this is 0. For activity g you got 27 minus 19 minus 8. So, this is 0 for activity h 27 minus 19 minus 4 this is 4.

Let us calculate independent float if and what if this is Tej minus TLI. So, tee of ah successor event and Tl of preceding event right. So, Te minus Tl right, so Te minus Tl . So, for a Te minus Tl this is 10 minus 0 minus 10 this is 0 then Te minus Tl right this 8 minus 0 minus 8 for c again T minus Tl right. So, 19 minus 10 minus 9 right we will for right all these values after some time right so, for example, now for d activity Te minus Tl. So, 19 minus 10 19 minus 10 minus 5 for e e is here right so, Te minus Tl 19 minus 10 minus 8 for activity f Te minus Tl. So, 22 minus 19 minus 3 right then for activity g ta minus Tl. So, 27 minus 19 minus 8 and finally, for h it is Te minus Tl. So, 20, 27 minus 9 23 minus 4 right so, this is 0 this is 0 this is 4 this is one this is 0 this is 0 and this is also 0 right.

Let us calculate safety float safety float is what Tlj Tli right. So, we will take only latest time right for activity a 10 minus 0 minus 10, for activity b 10 minus 0 minus 8, for activity c 19 minus 10 minus 9 right, for activity d you have got 19 minus 10 minus 5 right for activity e is here right. So, 23 minus 10 minus 8, for activity f it is 27 minus 19 minus 3, then for g it is 27 minus 19 minus 8 and finally, for activity h is 27 minus 23

minus 4. So, this is 0, this is 2, this is 0, this is 4, this is 5 right this is 5 this is 19 and 8 this is 27. So, this again 0 right this is also 0.

Now, this is how you can calculate safety float. Now if you look at independent float and safety float your all your having safety float values more than independent float values it means, we can say that safety float values cannot be less than independent floats value because this is the shortest float amongst all these forth floats right. So, this is how you can calculate floats for a given network right.

Let us move on to couple of limitations of networks. In fact, we have make several assumption.

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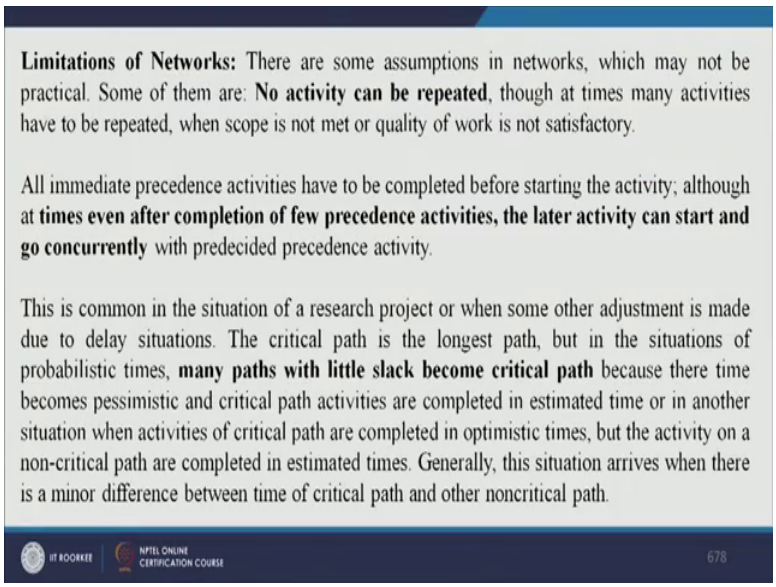

When you are drawing networks one of the assumption is that no activity can be repeated, but it happens several times you know a project that you do repeat activates right. So, that is a kind of limitation of network. In the second problem is that all immediate infect we assume that we assume that we will start these succeeding activity once all the preceding activities are finished. Now this is quiet and unrealistic assumption in real life you can have different situations. It is possible that lets say for projecting in which there are 3 preceding activities and one succeeding activity.

Now, it is possible that you have started all the preceding activities and after one week of starting of all those 3 preceding activities, you may start succeeding activity it is possible

right. And we have seen case of laddering right in fact, wherein we did break connectivity into sub activities right. So, that is what you can say that you can resolve this particular limitation using laddering right.

So, at times even after completion of few precedence activities the later activities can start and go concurrently right. Now it is it is possible especially in pert network that if there is a critical path then you may have a situation where the difference between critical path and non critical path is very small. And that non critical path may become critical if you change the time estimates. So, let us take an example to understand this point.

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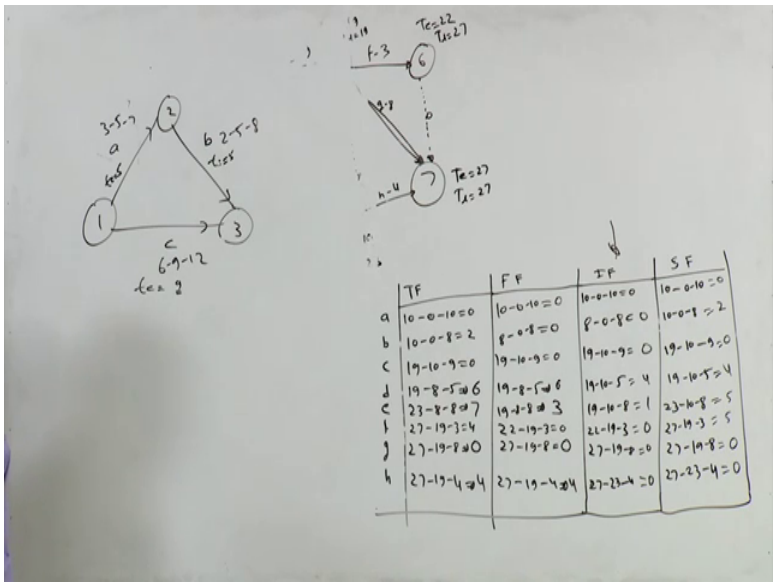

So, let us say you have a got a network like this right and there are 3 activities a b and c and the time estimate are 3 5 and 7, for this it is 2 5 and 8 and for this it is 6 9 12. Now which path is critical path just look at this it is like this. So, this is a pert network you need to calculate expect value right. So, this is 3 plus 7 10 plus 5 into 4 right. So, this is thirty divided by 6. So, 5 would be the expected time for this right Te is 5. Te for this would be 5 this 2 plus 8 and plus 20 30 by 6 is 5 right.

Similarly, here it is 18 plus 36 divided by 6 that would be 9. So, critical path is this path right, but let us say there is a situation where you may have a situation where you are completing these 2 activities at they are optimistic time, but you are competing this activity at its expected time right in that case the critical path will change. When I say

when these 2 activities are completing at their optimistic time it means 3 and two. So, this is 5 and this is 9. In fact, if you take optimistic times of all this 3 activities then in that case this path would become critical path not this path.

So, whenever there is little change there is possibility of change in critical path, these another drawback right. As I said that activity generally takes beta distribution, but if it does not take beta distribution then you will have a problem right and if the situation is uncertain then it is good to simulate duration of the activity. In one of the very very important assumptions in network is that you will have only one ending node, now that is true if you are successfully completing the project, but in reality you do not complete all under project all 100 percent projects in time right. You will have many projects you know leaving in between in those situations you will have several ending events. So, in case of partial success you will have several ending events.

So, let me ah summarize before starting for a time and cost relationship. In fact, I would like to summarize especially a we have talked about probability issues in networks. So, we did calculate what would be the total probability of completion of a project within a given a particular you know time. We can do one more thing in the examples which we have see what we did we have calculated that what is the probability of completing this project in this much time vice versa can also be done. You may be given the probability and you will have to calculate the completion time for example, if I say let us say the Te of the last node in a network is a let us say 30. Te is 38 means its expected time is 30. So, project would be completed in 30 days its probabilities 50 percent.

Now, I may ask you a question if the probability of completing a project is 60 percent then how many days it will take a completely different question, though we did not take we did not work out question like this, but you can always come of it such questions. Then we have seen of course, a simulation of activities and it was a quiet a haptic task, but since you have got computers you can right program and you can simulate duration of an activity 1000 of times so, that you will have a precise time estimate.

In today section we have seen couple of important points related to slack float and different limitations of network techniques and these floats also. So, with this let me let me complete this particular section here itself in next section we will discuss something called time and cost relationship which is again and important knowledge area of project

management. So, to give you an idea about next topic you have got cost right whenever you do a project you need to involve cost and there are different types of costs and there is relationship between time and cost, and this relationship is generally inversely inverse relationship.

So, when you know increase the cost you know you know it did depends again I want is that there is only inverse relationship or direct relationship it depends on situation, and it depends on cost also what cost you are talking about. Generally it happens that whenever you increase the length of a project cost also increases right and we will see this topic in detail in next section.

So, with this let me complete the session here itself.

Thank you very much.