Project Planning & Control

Prof. Koshy Varghese

Department of Civil Engineering

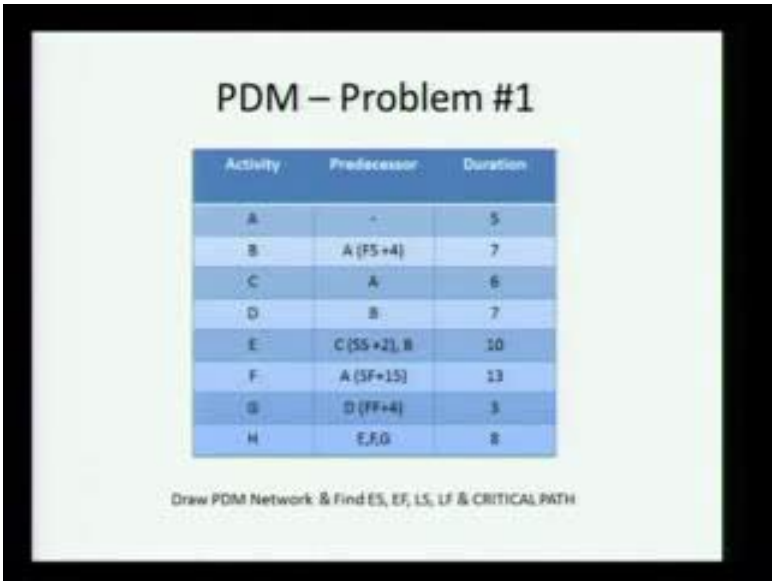
Indian Institute of Technology, Madras

Lecture – 42

Lesson - 03

PDM - Problem 01

(Refer Slide Time: 00:18)



Let us take up a problem, which we would like to which will solve using, there is relationships. And, so you have here all these activities A to H, when we say, predecessor, it means A, so for B predecessor is A with finish start with a lag of 4 and the duration of B is 7. So, what I want you to do first is draw the PDM, once you draw the PDM we will see, I will show you what network we have and then, go ahead and start doing the analysis.

Student: Sir, did A start, in the F A relationship start to finishes ((Refer Time: 01:04)).

Which one?

Student: F and E, F, A is a predecessor.

A is the predecessor.

Student: Yeah, they start to finish means A start to F finish.

Yes, F can finish 15 , if it is a 15 days lack.

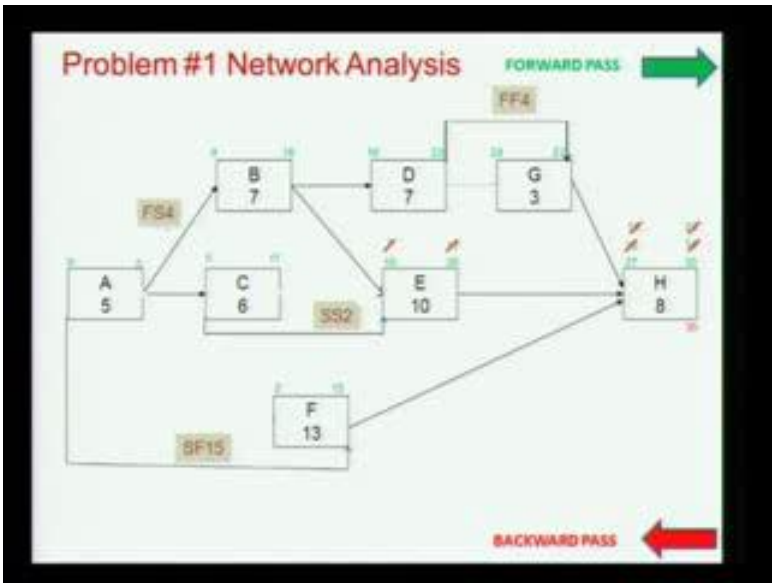
Student: After A starts.

After A starts.

Student: The A finishing, what is the F finishes first no. A will finish after F finish.

There is no finish relationship, A will start F can finish only 15 days after A starts and when we are talking about ABCD projects and says, now finish start or start finish, it is not. I mean it is just a little bit of a kind of a twist in the way you think, but when we get into the real world and tried to actually put something in a finish, start-finish ((Refer Time: 02:04)) it is quite common.

(Refer Slide Time: 02:21)



We will do the analysis, I want you to make I mean it is your, first is the representation. Representation is okay, any questions on the representation. So, we now do the forward pass, the analysis goes on, so this is the early start, early finish this becomes 9, because.

Student: Finish-start with the lag.

This is the finish start with the lag yes, it goes to 16, here we start say 5, 11, 5 plus 6, 11 this is normal finish start. So, 16, 23 now, here this is the start, start; see, so E has two options right now it is going 5 plus 2 is 7, E also has a 16. The second, so 7, 17, 16, 26, so the 16 is the max. So, 16, 26 takes the, is the values, which we considered. Now, I am going back on this. So, here is the start finish relationship A has started on 0, F can finish by 15.

Now, how do I calculate the early start of it?

Student: Minus 13.

Minus 13, if by some chance F; say if duration of F was more than 15, what could it mean.

Student: ((Refer Time: 03:51)) 0, put 0

So, if you want to B on a reasonable calendar A would have to start on a positive; not on a 0. So, here we say F has to start it 2. So, G there is no, so G is going here actually there is no arrow here, it is a 27, 24. And then, we finally, come down here all of these are at 27.

Student: 27, 35

27, 35 these are the options we have. 15, 23, 26, 34 and 27, 35 is the option we see, but this will take care of the forward pass. Now, coming into the backward pass we have the 35, 27 we take 27, 24, we bring here 27 we carry out 27 here 14, 27, 17. Now, going back here we have to go with the 27, it is going to go back to 23 and 16, now here we had 17 going with this going back on the start-start with the lag of two relationships we come to 15 and 21.

Now, here we have two options, we have 16 and we have 17, so we have 17, 10 or 16 9 minimum 16 10. Now, we come down to A, three path, three options.

Student: 0 and 5

So it is 0 and 5

Student: ((Refer Time: 06:01)).

What is your, so what it means is that see 15 days after A starts only F can finish. I am giving you it as a logical relationship, I am not trying to put a situation and which this can happen, I am just telling you this is the logical and I explained earlier that this is not a common situation, so we have only doing it for the logic in that in the network. Any questions? So, you can see that 28, do the analysis as compared to an AoN you have to be very careful as to how we go back and forth on relationship and you will find and in this particular case, so what is critical.

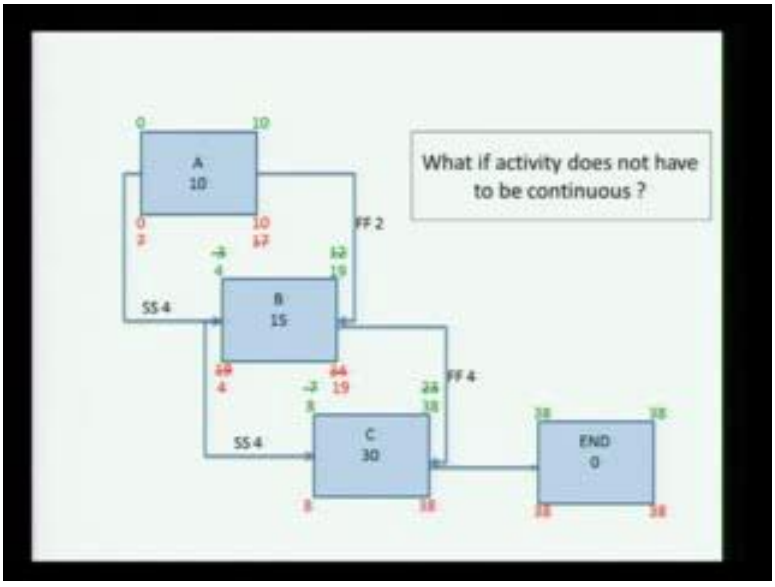
Student: ABDG.H.

ABDGH and in the next lecture we will see how the criticality is not sometimes the start or the end, so you know it can be for example, in this particular case if you can change

duration like we discussed earlier, it is only the finish of G that is scripted. The start of G is not on the critical path, so to say. But, because we are holding the duration as continuous days this start is becoming holding with the finish. Any other questions? But, so dealing with this complexity is support to give us a lot of advantages of flexibility.

So, the trade of it in flexibility and complexity is where some people find yes, the complexity is okay, it gives me, it really represents my projects with minimum number of activities and I am able to use it properly. Any others find that no, I rather go back to finish start activity on node and I can understand my project more intuitively with that. So, these are two schools of practice which we continually keep discussing and dividing. Now, we come to this question which was the rest, what if an activity does not have to be continuous.

(Refer Slide Time: 08:25)



So, here we have this is very similar to our earlier example of excavation, laying pipe and backfilling. So, you can see these values which you have gone through and here we are saying that, so you with 0 to 10 and so this is the forward pass, these values give the backward and I am not getting into the detail. And as discussed earlier if for example, what does this mean, this means what is the critical path here, let us look through.

A starts at 10, A starts at 0 finishes at 10; B starts at 4 based on the start away and it right now, it goes all the way to 19, what if I and C starts at 8 based on the start of B and goes all the way to 38. Why should B finish at 19? Should A start at 4 for the project to finish? So, project duration is 38, I do not want to stop I do not want to change the project

duration. If A does not start at 4, what happens?

Student: The early start means, it is the earliest you can start now.

Right.

Student: So, 4th day is the earliest you can start.

Right, what the way A starts at 5, what happens to the project.

Student: project gets delayed, but it is not the earliest start. Like the name resembles the earlier start.

No, no earlier start. No, what is the earlier B can start now.

Student: 4

I cannot start B before 4, what if I start B after 4.

Student: Project gets delayed.

Project gets delayed, so start of B is critical, let me go to the end of B and now we are taking away this continuous activity. Let we go to the end of B, end of B is not critical, it can end at 34. Do all of you see that? So, in my AoN if for the actvity, start was critical end was critical, because here my relationships do not necessary go through the activity they go with the start and with the end of the activity. So, I can have situations where the starting an activity is critical and if I am willing to delay , change the duration; the end does not necessarily become critical.

Student: Actually the early start and early finish, those meanings said what is the earliest it can start, what is the earliest it can finish.

Right.

Student: 19's is that day earliest street can finish, but it can continue until that if 4, so I really project can continue up to 35.

No, no, but not project can continue what a trying to do is a comparison between this an activity or node, so if we did this what you say this. So, in this case we assumed activity and node in the float on it when I start floating on activity what happens. So, here due realize is a start has no float the finish has float. So, that is what we are trying to, to kind of understand here.

I agree with a definitions, but here is a an activity where the start has no float, but the

finish has float. So, the definition this becomes the definitions becomes valued only when a I can stretch an activities what I can say I going to be doing at in paths if you have to finished continuously, then we have back to the kind of the AoN kind of definition. So, the original precedence diagramming method was designed with this is method.

So, that we could make use of starts and ends as separate events and we could than try to get the best of the activity on aero techniques, which heads start on a end of separate events and the activity and node technique which was more introduce once. Now, again like a said before judgment is on the practices some practices are with there are many practical with say I would still rather use only activity are node and finished start because that much no intuitive for me to work out.

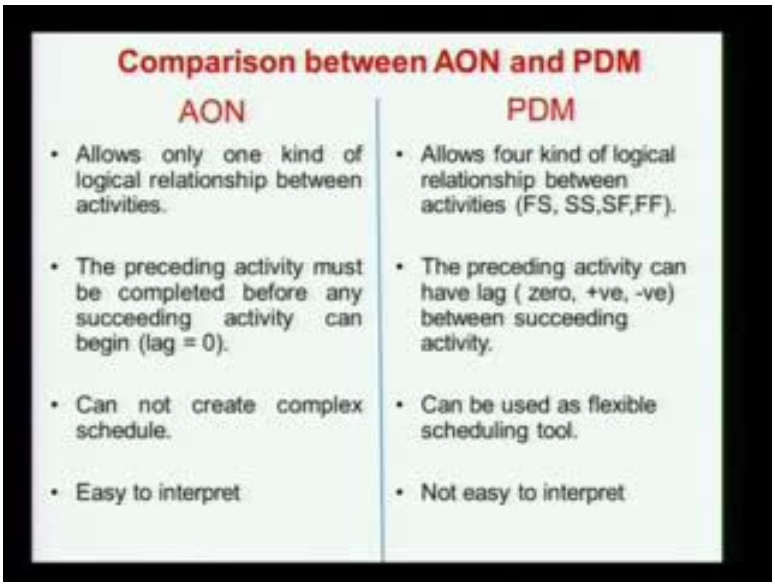
Student: Does it gives more flexibility while leveling resources as compare to.

Certainly that certainly there is no flexible to there is lot no flexibility in the there is a lot no flexibility, but when you have 1000 of activities and very many types of relationships in addition to the algorithm being flexible and giving your lot more room for discussion making your have to be show the representation is aureate and that is where this runs in to issues. And even the way the algorithm like we I discussed algorithm is implemented in different packages you need a package to be able to do this professionally it varies.

So, for example, micro soft project will not allowed to do multiple relationships likes provided do to allowed multiple relationships. So, micro soft projects says no I am do not you deal with complex city of this I have early want single relationship, but then in the process you remember to what happen we land of with dangling activities and other kinds of problem, which we have to overcome, then we putting dummy activities.

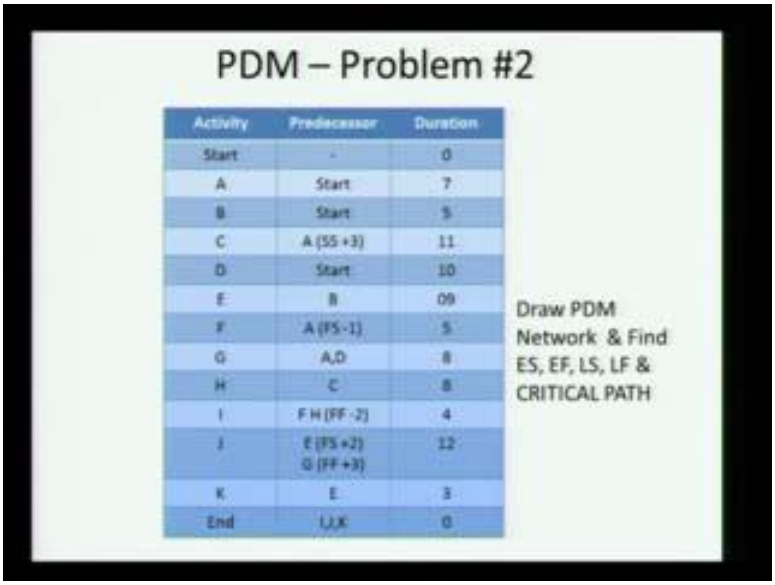
So, this was the state to the act enough as of enough the version 10 of whatever now whether they going to change it not be going we do not. So, this is the uncertain the which PDM causes and there is a lot of discussion on it and in fact, the person they the people who originally develop PDM size its being it is used in such non standardized twice that it is probably time its set come up in develop stranded for a PDM which does mean system.

(Refer Slide Time: 14:55)



So, we will discusses more on this issues has bee are in to the tools and it is packages, so we do a comparison between the two. This we know this allow only one kind of relationship this PDM allows enough three additional types. Here we know the preceding activity must be completed before any succeeding activity can start here you have enough lags and leads which you can add cannot create complex schedules. It is easy to interpret can be used as flexible this lot of flexibility add the enough complex city can be address by the flexibility, but sometimes it is not to easy to interpret.

(Refer Slide Time: 15:38)



So, I will give you this problem and we will solve it in the next class, but this is something, which I would like it work on.