Project Management for Managers
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Lecture – 33
Project Time Management – Introduction

Good morning friends, I welcome you all in this session. In this session we are going to talk about project time management. You must be aware that in the very first session I told you that project management should be thought according to 10 knowledge areas. I have also told you that for a group of people project management is nothing but arrangement of finances. For some people it is pert CPM right. Those who have done let us say be in mechanical engineering or industrial production engineering, they would have studied project management only on the basis of pert CPM and crushing right.

So, it is not like that, in true sense one should study project management according to those 10 knowledge areas which I have discussed in very first session right. And just to remind you those 10 areas are pert right. For example, project integration management, risk management, time management, human resource management, then scope management, stakeholders management, quality management, communication management, cost management right. So, these are different 10 knowledge areas, and in each area there are different processes. So, approximately there are 53 to 57 processes, I had shown you a slide in which our knowledge areas were there along with processes.

If you look at all those knowledge areas then each area has got certain inputs, tools, techniques and outputs right. So, it is called ITTO. So, as far as project time management is concerned I will show you a slide wherein I have talked about what are different inputs to this particular knowledge area, what are different tools and techniques one can use and what are different outputs right.

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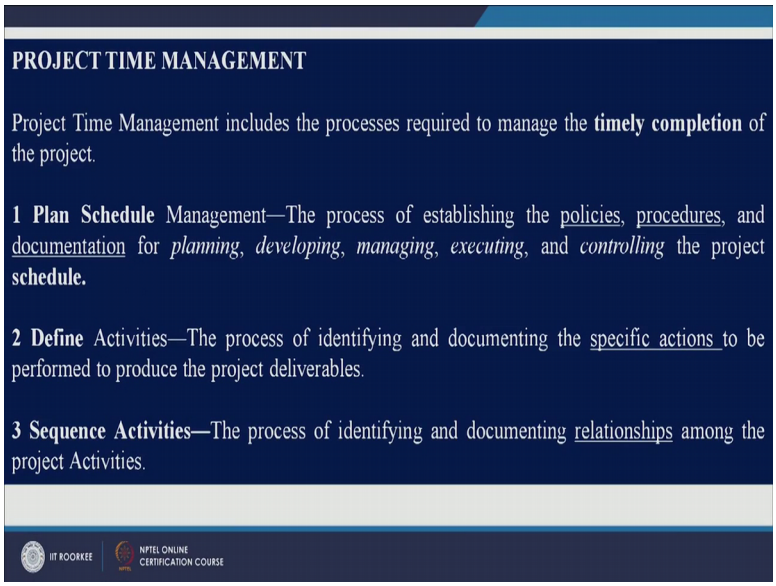

So, let us get started with this particular knowledge area, it is called project time management again, very important area similar to other areas. So, in project time management there are 7 different processes. So, the first one is plan schedule management.

So, you need to plan your schedule, and for this you need to you know establish different policies, procedures, documentations, and you do all these things for planning developing managing executing and controlling the project schedule right. So, first of all go for plan schedule management right.

Once you are done with this you need to define activities, what are different activities you are going to perform in your project? So, you just identify those activities first, document those activities and then list down those activities. The third point is sequence activities, now in second step you have you have defined activities, now you need to sequence them which activities to be performed first which activities to be performed after first activity and so on right. Again very important step, so you need to define relationship between 2 activities or in other words you need to define what is the presidence a relationship right.

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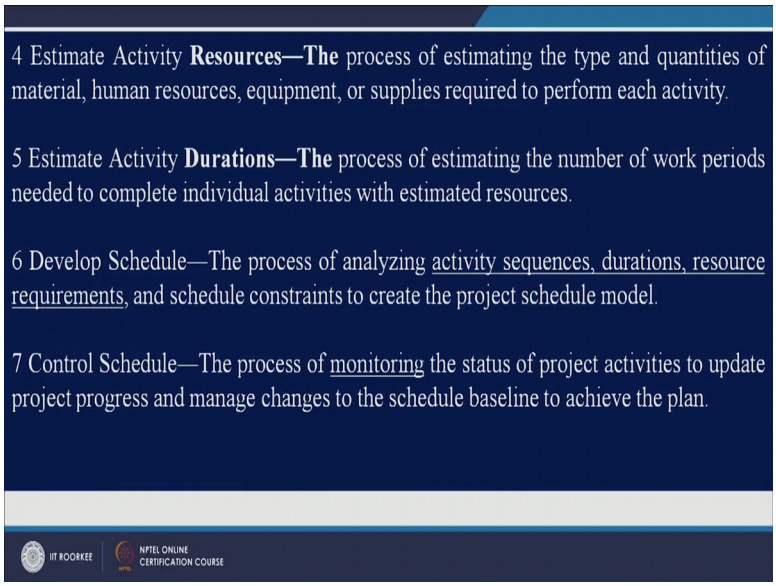

The fourth point is estimate activity resources. When you have listed down all the activities you will have to perform those activities and for performance of those activities you need different resources. So, depending upon activity you need to estimate how much resources you would be requiring for that activity. And the resources could be in terms of let us say, let us say time is a resource right. So, time man machine you no equipment material and so on. So, estimate how much resources would be required to complete that particular activity. Now there is a direct relationship between activity duration and resources required to complete that activity.

So, once you are done with estimation of activity resources, you should also estimate what would be the duration of the activity. Now duration of activity can be decided on the basis of let us say if you have perform the similar activity in previous project. So, you know to some extent how much time this particular activity will take right. Otherwise there are some other methods right. So, you should identify how much duration that activity will take.

Now, there is a direct relationship between resources and activity duration right. So, if you assign more resources to an activity it is duration will decrease naturally, right and vice versa. So, after estimating duration and resource requirement you should develop schedule means when you will start a particular activity and when you will end that particular activity right. So, sequencing you have already done right, in the third step

right. You have already sequenced those activities now you have to develop schedule right. So, you need to you know, come up with what is the start time what is the end time right. And once you are done with the schedule development control schedule right. Since you have you have developed schedule you need to control, in terms of what? In terms of whether it is going as per plan with respect to time and with respect to budget right. So, it is a monitoring process which is to be done carefully right.

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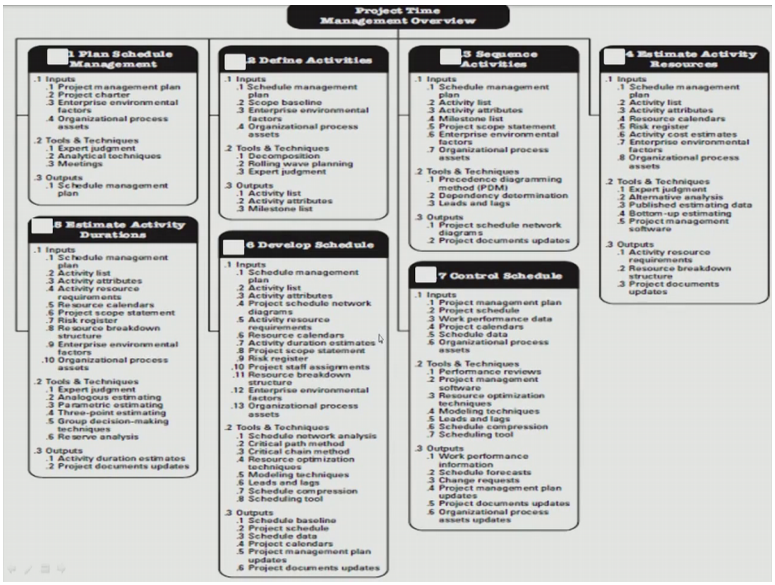

So, let us look at these are different processes in project time management area. If you look at first process which we have just discussed schedule management. So, these are inputs there a 4 inputs in this particular process right. So, let us say the first input is project management plan. So, first of all you should have project management plan, then only you can prepare schedule management right.

The second is project charter, the fourth one is organizational process assets right. So, if you give these inputs then you will get at the end of the day output right, and the output is nothing but schedule management plan. And for this output you need to apply certain tools and techniques as I said it is ITTO. So, I stands for input. T is for tools and techniques, O is for output right. So, to prepare schedule management plan you need to use these tools and techniques. For example, expert judgment you can use an analytic techniques, you can use meetings right. So, if you use these tools and techniques you will get at the end of the day output right. So, once your plan schedule management is ready,

this second processes is define activities right. Which we have just discussed and for defining activities these are different inputs. So, there are 4 inputs right. And there are 3 tools and techniques. So, let us focus more on tools and techniques.

So, for defining activities, what you want? You want decomposition you need rolling wave planning you need expert judgment right. And then at the end of the day you will get activity list right. Then you have got sequence activities, you just keep in mind that the input from first process is there in second per second processes, the all the inputs from this are here in sequence activities right. So, it has got 7 inputs 3 tools and techniques let us look at what are the tools and techniques of sequencing activities right. So, it is called precedence diagramming method, you have got dependency determination and leads and lags we will discuss in detail leads and lags right. And at the end of the day you will get project schedule network diagrams right.

The input from this will go to this right. The forth one activity estimate activity resources. So, the tools and techniques which we would be using to estimate how much resources are needed for a particular activity expert judgment as I gave you an example alternative analysis you have got published estimating data you have got bottom up estimation project management software right. So, similarly you can see the fifth process sixth and the finally, control and schedule. So, what are different tools and techniques for project controlling for project controlling we have got several methods right. So, tools and techniques performance reviews, project management, software resource, optimization techniques, modelling techniques, leads and lags scheduling comparison and scheduling tools right. So, this is just one slide in which I have shown you, the processes of time management similarly, you have got processes for other 9 areas as well right.

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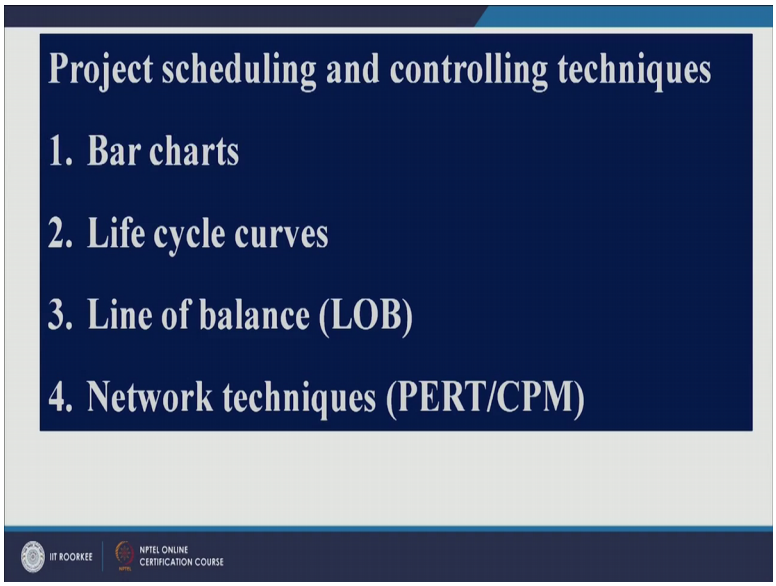

So, now let us start in detail about this particular topic. So, there is some there are different project scheduling and controlling techniques. What is project scheduling? Project scheduling is you are coming up with a schedule in which you will give that this particular time and activity will start and at this particular time activity will stop right. So, it is called project schedule right. And you need to control your project right. So, there are different methods of project controlling right. For example, project scheduling in project controlling for example, bar charts the simplest method of project scheduling and controlling is bar chart. So, you will have a bar chart in which you will have different activities and you will come to know whether a particular activity is started or not started right. If it is started then how much how much you know portion of that activity has been completed.

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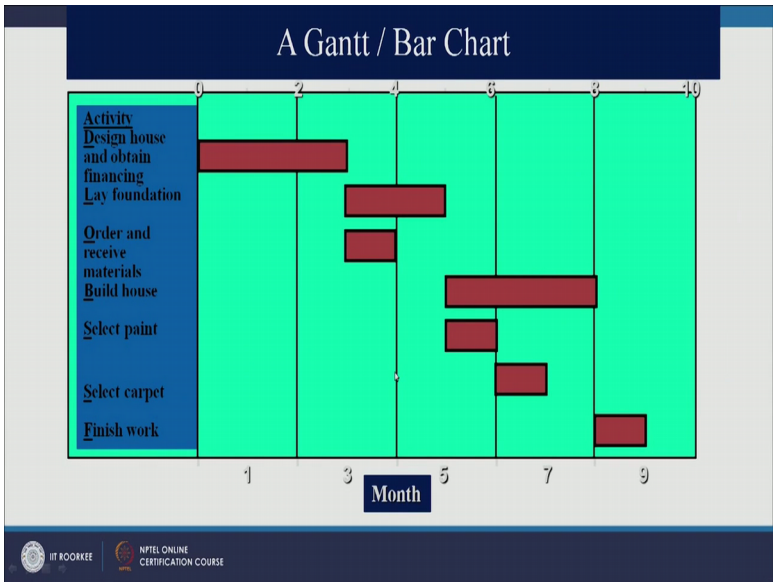

Then you have got a life cycle curves of a line of balance and then you have got network techniques, like pert and CPM right. So, let us look at what is bar chart also known as Gantt chart. Earlier this chart used to be very effective tool for controlling project right. So, let us say in this bar chart there are 5 activities. So, the first activity is design house and obtain finance right. The second activity is lay foundation, the third is order and receive material right. So, you are constructing a house and these are different activities right. So, designing house lay foundation order material build house, select paint, select carpet and finish work right. So, total there are 6 activities right.

So, design house it is starting at is 0 unit of time and it is completing at let us say 2 point or let us say 3 months right. So, after 3 months this activity would be completed right. So, once this activity is finished you are starting the next activity which is lay foundation right. So, starting at the beginning of third month and going up until fifth month right. So, the duration of this activity is 2 months right. Similarly activity this order and receive materials starting at the beginning of third month right. So, it is up to you right. For example, this activity is ending here at the end of third month right. So, this activity starting at the beginning fourth month right, 4 to 5 right. The duration of these activity is again 2 month right. Similarly this activity order and receive materials starting at starting at the beginning of fourth month right, and ending the last day of fourth month right. So, similarly you can have other 4 activities. So, this is nothing but a simple bar chart which

will give you when an activity has started and when an activity is has when it has been completed right.

It is in fact, by looking at bar chart in fact, you really do not know whether this activity is over or not. Because we do not know what is the actual duration of this activity right. So, in a sense we can say that it is giving you what is the progress of what is the progress level of different activities right. So, this is bar chart, as I said it is also known as Gantt chart right.

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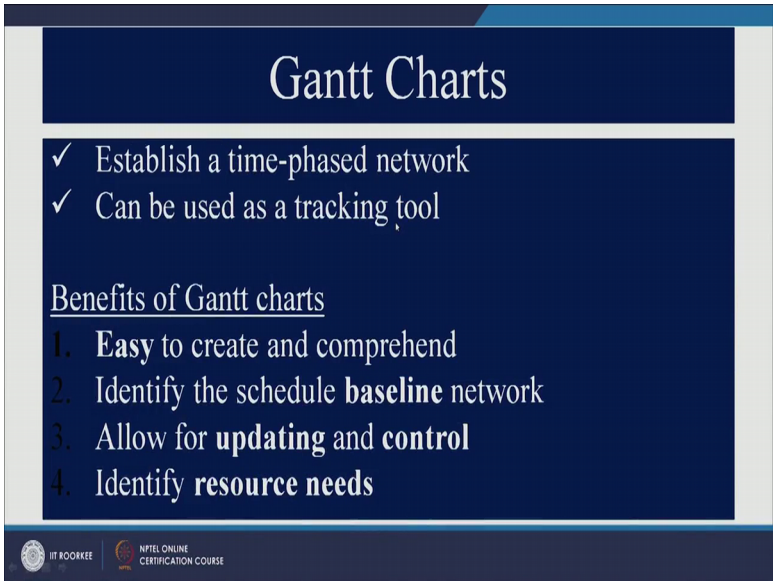

So, it can be used as a tracking tool as I already told you, tracking tool of what? What we track generally? We track how much progress an activity has achieved right. Then there are a couple of benefit is of this particular chart. It is easy to create and comprehend, identify the schedule baseline network, allow for updating and control. So, if you have a bar chart in the beginning then again it is up to you how frequently you are preparing bar chart right. It can be let us say every month or every 6 months or it can be let us say, if you are achieved a milestone right. So, you can come up with a new bar chart once you achieve a particular milestone right. So, these are couple of benefit is of Gantt charts.

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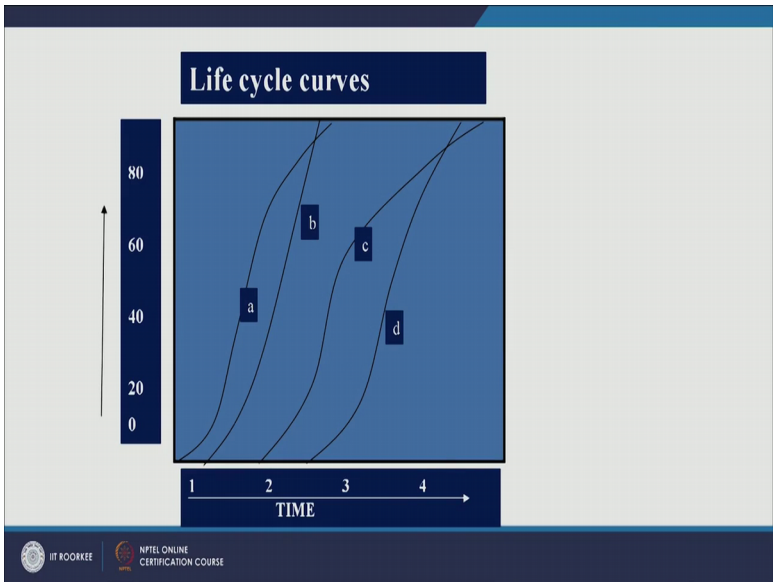

Now, apart from Gantt chart you have got another tool it is called life cycle curves, it is similar to bar chart. It also gives you the progress of a particular activity are different activities. So, let us say there are 4 activities a b c and d. So, activity a started at let us say, one unit of time and it is progressing like this right. So, let us say this is hundred percent right. So, this activity has been completed at what time you just draw a line from here right. So, it is approximately let us say 2.75 months right. Similarly activity b started at this point and it is it is progressing like this right. So, if you look at these 2 activities a and b, activity a is started before activity b activity b started after activity a, but activity b finished before the completion of activity a right. So, you can have a situation like this. Similarly you can have activity a and d right.

So, let us see if I want to know at a particular time what is the progress of all these activities right. So, I will draw a line like this right. A perpendicular line to horizontal axis right. Let me draw line like this from here to here right. Isn't it? From here to here right. So, at this point what is the completion of activity c? You can draw again line like this. So, it is approximately let us say 78 percent right. For this particular activity this the point. So, this is again let us say 64 or 65 percent. So, using lifecycle curves you can know the progress of a project right. Line of balance is also a method of monitoring project of the progress of a project, but we use allow the in those situation where your output is very slow right. For example, if from a plan from a let us say from an assembly line you are coming up with one product every month right. So, for situation like that

you use line of balance right. So, again let us say there are 4 activities detailed engineering, ordering, delivering and construction right.

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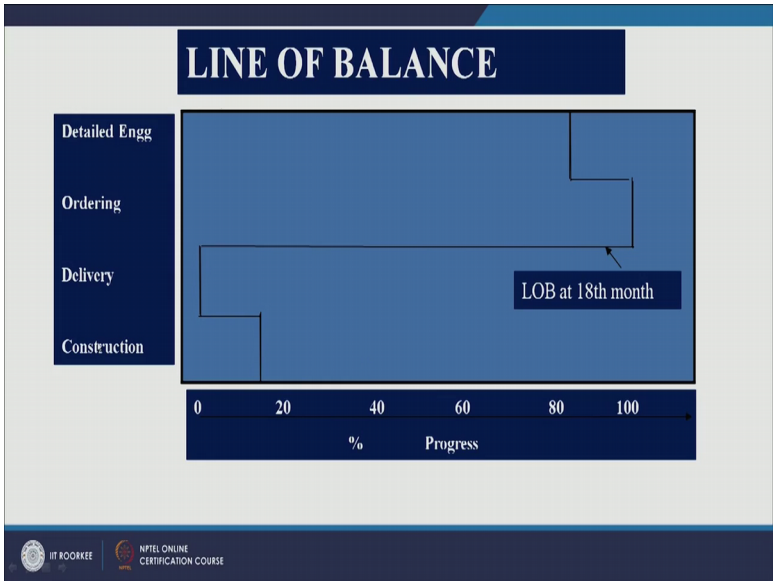

So, let us say if you and this is nothing but progress of these activities right, n horizontal axis. So, let us say I want to know what is the status at the end of 18, 18th month right. So, detailed engineering. So, this much work has been completed in 18 months time and this is approximately let us say 82 percent right. Similarly for ordering almost hundred percent work is done right. For delivery it is not yet started right. It is 0 percent construction let us say 18 or 19 percent right. So, this is LOB when we use a LOB when your output is slow right. So, these are couple of techniques of project monitoring right.

Now, if you look at all those techniques which you I have just talked about, specially bar chart and life cycle curves, they have got one big drawback. The drawback is that bar chart does not show you the presidents relationship, how activity a is related with activity b activity b related with c and c and d and so on right. So, this precedence relationship is a big disadvantage of bar chart, so to overcome that particular disadvantage. In fact, people have come up 2 major techniques and they are called CPM networks and pert networks right. Developed by DuPont Company and NASA right.

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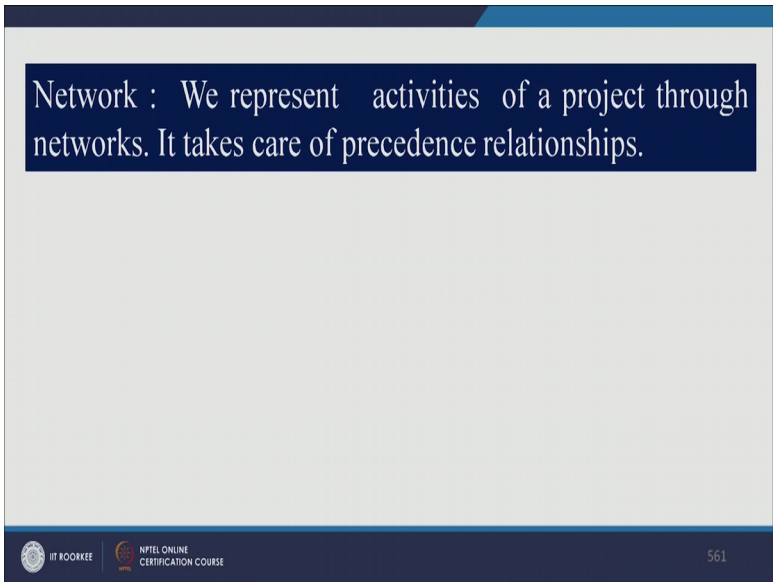

So, network is nothing but a collection of different arts and nodes right, in a project. So, we will draw a project or we will draw different activities using network right. So, a network will the represent at the end of the day a project right. So, we, what is network? We represent activities of a project through networks it takes care of presidents relationship right. So, there are basically 2 types of networks, you have got CPM network and the other one is pert network. And their the major difference between these 2 is of time duration. In CPM network the time duration of the activity is deterministic. When I say deterministic means, it is fixed it is known a priory. Just to give you an example.

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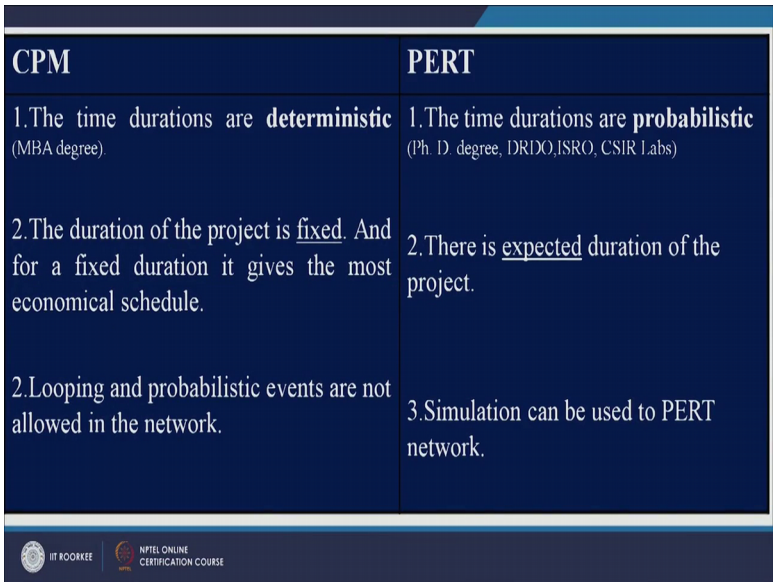

Let us say we have got different programs like BTech, MBA, PhD and so on right. So, MBA program is a 2 year. So, every student knows that he will get degree if he clears all the courses in 2 years time right. So, duration is fixed right, but if you look at PhD program, let us say most of the research oriented projects in our country and across the world. We exactly do not know how much time those projects will take or those activities will take. So, the time duration are probabilistic in nature. This is the major difference between these 2 networks right.

So, let us say a project of DRDO, ISRO, CSIR labs and so on all research institution. You really do not know how much time a particular research will take right. So, you just know the probabilities, that it will take one year probabilities fifty percent it will take 2 years probabilities sixty percent and so on right. So, this is a major difference between CPM and pert networks right. So, the duration of the project is fixed and for a fixed duration it gives the most economical schedule right. There is expected duration of the project. So, you will have different at time estimates right. Looping and probabilistic events are not allowed in network; however, in similar in case of pert simulation can be used to pert network. Simulation as I said we use in highly uncertain environment right. So, we will see more about these 2 types of networks.

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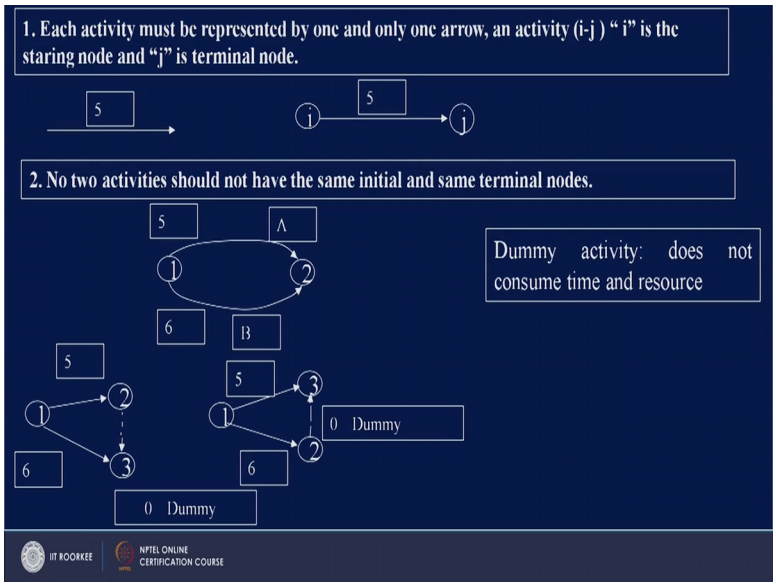

Let us look at how to draw a network because unless and until you draw your network properly you cannot solve a question. You really do not know, you really cannot calculate how much time a project will take right. So, first of all each activity must be represented by one and only one arrow right. An activity i j for example, activity i j, i is the starting point and j is the terminal point. So, let us say there is an activity i j right; as duration is 5 months or years or minute or whatever it whatever is your time unit. So, i j is an activity. So, it is, we represent an activity by an arrow right. And keep in mind that it is direction is also from this side to this side right, left to right. You should not draw a network having direction from right. To left right. So, this is a general rule right.

So, once you are done with this the second step is no 2 activities should have the same initial and same terminal node. So, node 2 activities should have actually this is should have it is not this is not here right. So, no 2 activities should have the same initial and same terminal nodes for example, let us look at this particular network right. In this network there are 2 nodes right - node 1 node 2. And there are 2 activities activity a this activity a right, this is activity and activity b right. So, this is activity b and you have also been given duration of activity a is 5 minutes and duration of activity b 6 minutes right. So, this is not the right method of you know preparing network right.

So, in a so, situation like this you need to come up with something called dummy activity right. Dummy activity is an activity which does not consume any resource including time

right. So, dummy activity we insert in a network just to see that your network is properly prepared right. So, you can change this network like this. So, activity 1 2 is this activity 1 3 is this, and 2 to 3 is dummy activity right. Or you can prepare this particular network like this. So, you have got 1 to 3, 1 to 2 and 2 to 3 is dummy, you just see the duration of this dummy activities 0 right. Other things will remain same right. So, to avoid same initial and terminal nodes we use dummy activity right.

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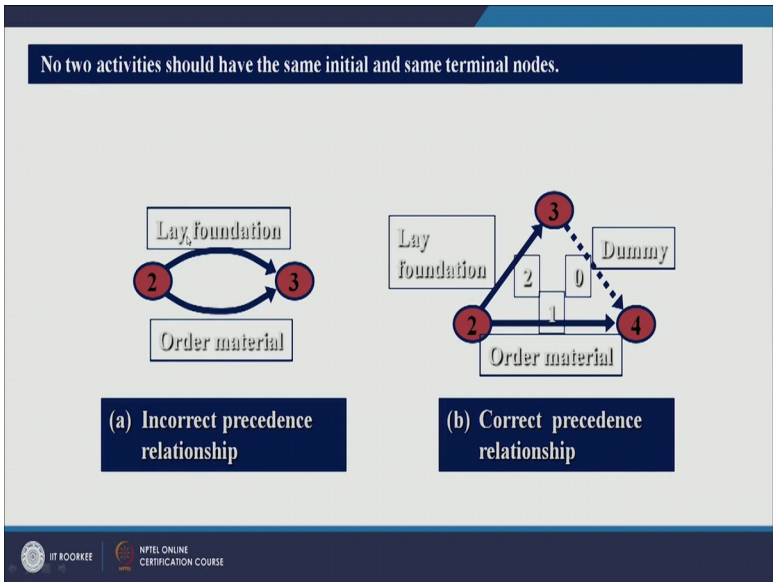

Let us look at some other points let us say one more example. So, there are 2 activities laying of foundation activity 2 3, activity 2 3 order material right. So, as I said you cannot have same initial and terminal nodes right. For this these 2 activities you have got same initial and terminal nodes right. So, this is this is incorrect presidents relationship right. To correct it you just add one dummy activity like this, so activities. So, dummy activity 3 4 is getting represented by dotted lines right. And it is duration is 0 and for other 2 activities durations will remain same right. For our order material it is 1 minute and for lay foundation 1 minute or 1 month or 1. Year right.

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So, let us take an example of software project and we will try to draw a network right. So, first activity is business requirements. You identify what kind of business you are going to perform by right. Or you want to take up number 2 conceptual design proof of concept risk analysis and so on right. And finally, the last activities deploy right. Deployment of let us say man power right or deployment of resources right. Let us say deployment of software product at the client side right. I think that would be the best. So, deploy means deploy the software it plants site right. So, the first activity is business requirement right. So, this is business requirement.

Second is conceptual design right. Third is proof of concept, fourth risk analysis, fifth not fifth the last one was deploy analysis right.

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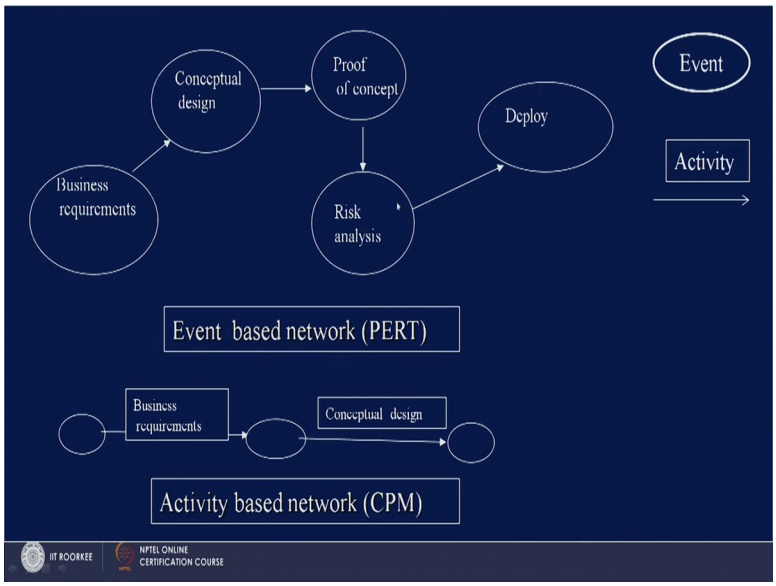

So, if you look at this particular network we have got we have used arrows and circles right. So, we will call all those circus events and all those arrows as activities right. So, this is the difference you should keep in mind. So, while drawing a network you have got different nodes and different activities right. So, this network is known as event based network. Now what is event based network? In event based network what we do we take let us say, this is your first event right. A business requirement conceptual design, so we represent activities by using circles right. So, rather than using activity on arrow we use activity on node right. This also known as activity on node type of network representation. There are 2 types of network representation, activity on node and activity on arrow. So, this is nothing but node type of network representation. So, business requirement and all other you know activities which we are representing in these circles right and this last one right. So, this is known as event based network it is called pert right.

So, pert is an event based network and CPM is an activity based network right. So, the same network right. You can draw using network representation technique known as activity on arrow right. So, we are representing activities here on arrows right, not on nodes right. So, this is your first activity business requirement second activity conceptual design third is third you can draw right. You can draw remaining activities right, so proof of concept and so on. So, this is CPM network or activity based network right. So, let us

look at couple of more examples. So, let us say you are making a product it is call it let us say p. So, manufacture P manufacture Q and then assemble table right.

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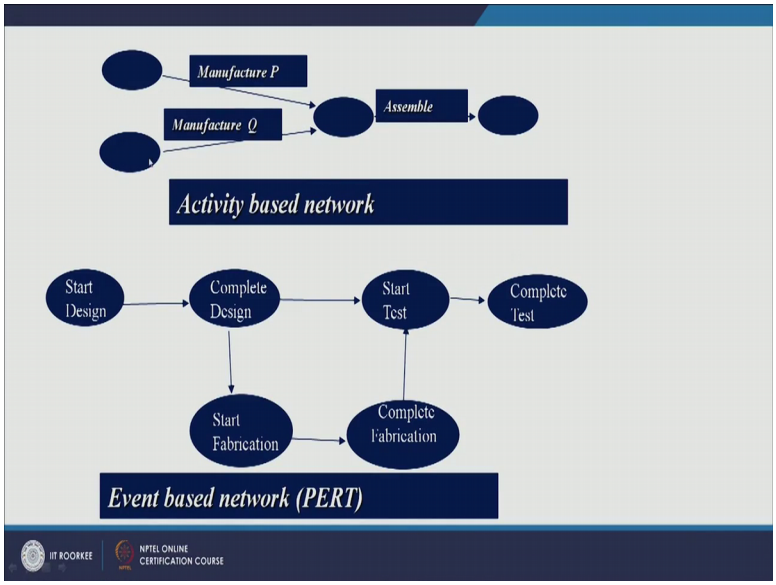

So, activity P is what manufacture P activity, this activity is manufacture Q and this is assembly right, so how many activities 3 activities right. So, activity based network right. Similarly one more example of pert network.

So, let us say your first activity is start design complete design, but rather than using on activity on arrow type of representation, let us use it on activity on node type of network representation right. So, start design complete design right, start fabrication start testing or let it will be like this. So, after design is complete the next the point is start test complete fabrication in complete test right. So, what is the difference? In pert network you just have start and finish right, start and finish right while activity network represents the things which are happening right. These are starting and ending points in pert network right. You are started something and you have completed something it does not tell you on ongoing things right, in a project right. So, this is a major difference between let us say, this is CPM network and this is pert network right.

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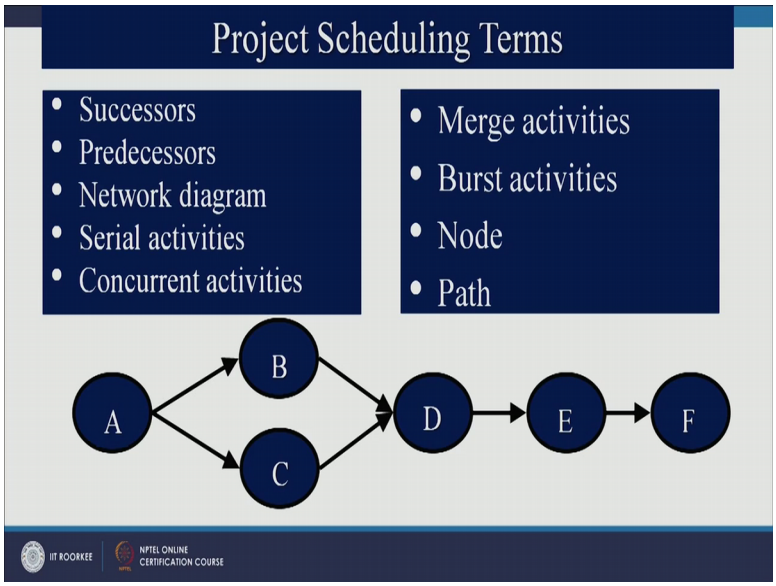

Now, there are different terms which we use in project, but you have got let us say successors or successor activity. So, let us say you have got 2 activity P the next is Q. So, activity Q would be successor activity P is predecessor activity right.

A network diagram this is nothing but a network diagram right. So, in a network diagram what you will have you will have different activities and different nodes right. So, you can have different types of activities in a network right. You can have serial activity right. P Q R and so on right. One after one another activity right. You can have concurrent activity it is 2 activities going on simultaneously right. So, let us say for example, activity A B, A C, both started simultaneously right. You can have a situation like merge activities right. Where you can have a node where several or multiple activities are merging in that particular node right. Burst activity from one node there are several activities coming out right. Then you have got node of course, I have told you what is node and path is nothing but this right. So, you can have a critical path I will tell you what is the meaning of critical path in a project, right.

So, with this let me stop here thank you thank you very much for watching this session. In next session we will deal with some more points related to networks right.

Thank you very much.