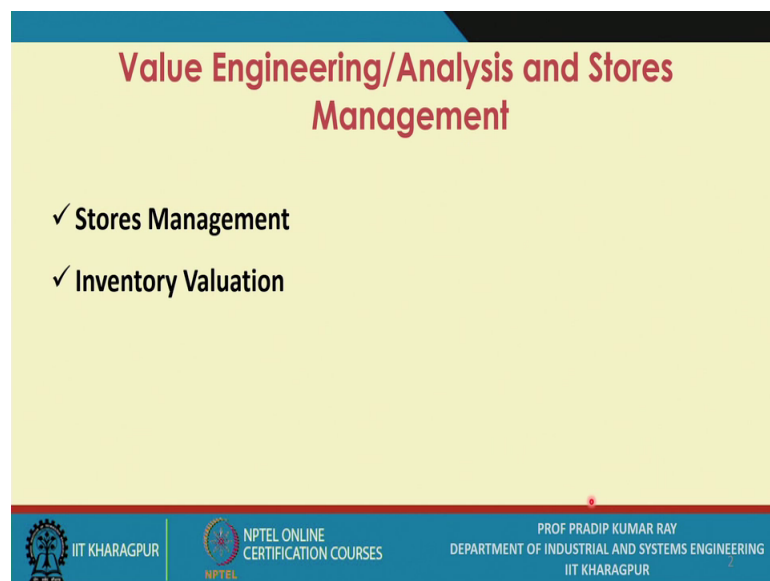


Management of Inventory Systems
Prof. Pradip Kumar Ray
Department of Industrial and Systems Engineering
Indian Institute of Technology, Kharagpur

Lecture - 54
Value Engineering / Analysis and Stores Management (Contd.)

So, during this lecture session, I am going to discuss a few important issues or say a few important aspects related to stores management in an organization.

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Already, you know the Value Engineering or Value Analysis part we have already discussed. And, now what we have mentioned that, there could be relationships between a value engineering and the stores management. As, you have already say come to know, that the substitution of the materials is an important aspect to be considered in value engineering.

So; obviously, you know say this you need to go for substitution materials. And, you prefer better quality material. And better quality material a for that matter any type of material, which you keep in your say the inventory management systems, for production purposes. Now, there must be appropriate the storing and the stores management for all these materials.

Now so, if the stores management is appropriate what will find that a say, it will have a positive impact on the average inventory investment. So, the stores management details you must know and when you study the details of the stores management immediately, you could relate many of the activities carried out as a part of stores management, with the value engineering the related activities or value engineering related factors.

So, this aspect we are going to discuss. And, we are also going to discuss during this lecture session, what is known as the inventory valuation? So, the inventory valuation is actually say one important say the objective of the storing or the stores management. And, there are a different methods you can imply, you can use, for inventory valuation.

And so, what are these methods you must know and how to use those methods, under what conditions that also you must know. So, all these details we are going to discuss during this lecture session.

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Stores Management

- Any inventory management system is closely linked with the stores management system in an organization.
- No inventory system works efficiently unless storing of the items is properly done and records of transactions are kept and maintained accurately for items over time. Transactions may be either receipt or withdrawal.
- There are two aspects to be looked into in this context:
 - i. Storing system of inventory items.
 - ii. Inventory valuation and measurement.

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Now, the stores management is one of the for the key areas of materials management, this point already we have elaborated. Like the other the key areas are say the purchasing management inventory control and many others. How, we have already pointed out. And, definitely you know the logistics and the supply chain, particularly are the logistics systems.

And so, the inbound logistics as well as the outbound logistics so, we are going to discuss the logistics and supply chain management issues, in our the next lecture session. Right now, we are referring to the stores management and what we say that? Any inventory management system is closely linked with the stores management systems in an organization.

The now here is how do establish this fact, you know that when you referred to so, the inventory management systems. So, it is closely linked with the purchasing system. And, the concept of purchasing cycle already you are aware of. Now, while you identify the many operations of say the mini interrelated activities of is purchasing cycle, you know the storing is an important activity. That means, in a purchasing cycle there is one the work element call receipt. And then, after you receive the item I this to be inspected.

So; obviously, you know this is the responsibility of the stores department or the stores management function. So, this is one part. The second part is you know the stores department or the stores the stores is playing a very important role for a for supplying the items to the using department all the time. So, like you have come to know that under certain conditions, you said stores requisition. As, a using department suppose you need some item in certain quantity.

So, and you first you verify, whether these items are available in the stores or not at that point in time. And, you send is a stores requisition for that. If you find that this item is not available in the required quantity at the stores at that point of time.

Obviously, you send another requisition it is called the purchase requisition. And, then with the imitation of the purchase requisition and you show your you just let you the stores or the purchasing department will come to know about your requirements. And, then the purchasing process starts and then the items will be supplied. And; that means, items will be received. And, again while the items are getting received the stores the playing and very important role.

So, it is receipt it is it is stored and it is to be stored, the items to be stored in such a way, that it is value is returned, you already know that what is the value of an item. So, the functional value, plus the appearance value, aesthetic values, must be must be retained; that means, that kind of the storing facilities or the storing technology you must be using. So, any inventory management system is closely linked with the stores management

systems in an organization. That means, while you try to establish his relationship, you must be able to identify specific activities, where you know the stores or the storing plays a very important role.

No inventory systems works efficiently unless storing of the items is properly done. This point we have been emphasizing and the records of transactions are kept and maintained accurately for items over time. So, this is a responsibility of the stores department. And, as you may be knowing that there are 2 main types of so, the inventory control systems; one is the perpetual review system, and the second one is the periodic review systems. And, always there could be receipts of the items and there could be issuance of the items to the using departments or so, the issue of the items or say to say the other plants to the to the users to the customers.

So, this the 2 activities you carry out. And, against these activities there will be some this; these are referred to as a transaction. So, these transactions are taking place all the time. And, while any transaction is on now it is at its impact on the inventory level; that means, is if there is any transaction. Now, a the transaction is done and then now what is say, what is its impact on the inventory level in monetary terms? So, this is this the inventory level is constantly changing.

So, you have to track, you have to know at any point in time, that what is the current inventory level in monetary terms? So, for that you need to know, what is the storing methods? And, and what are the what are the other facilities you have in the storing for what is the stores management systems.

So, the transactions may either receipt or withdrawal. So, the receipt or withdrawal means you are that the stores requisition is sent and as per the as per the requirement you sent a the items you issue the items from the stores to the using department. So, this is referred as the withdrawal of the item from the stock. So, there are 2 aspects to be looked into in this context. So, what are these 2 aspects the storing systems of the inventory items. So, you must be adopt the how do you the store which method you have a for a given item for a storing an inventory valuation and measurement is it ok. So, this 2 aspects will be dealing with.

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Stores Management

Storing systems of inventory items

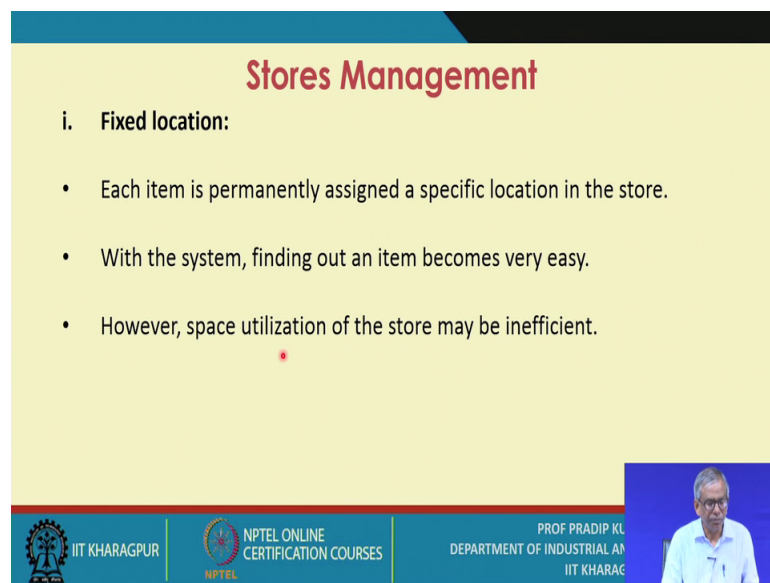
- For storing, there may three types of locations one may suggest against an inventory item:
 - i. Fixed locations
 - ii. Random locations
 - iii. Zoned locations

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Now, what are the different kinds of storing systems, you may have and we are referring to the inventory items only. Now for storing there may be 3 types of locations or one may suggest against an inventory items. So, what are these 3 types of the locations for the storing; first one is referred to as the fixed locations fix location. That means, if you get an item a for item a there is one particular the space or one particular area your marked.

So, whenever you get item a you just store it in that particular place or in that particular thus particular location. So, that is basically the fix location. The random location means you know the item is received and the item is the stored at a particular place, at any and at in place which is available at that point in time. So, this is called basically the random locations. And, third one is the zone locations; that means the group of items are to be placed in a particular area. So, that area is your marked. So, whenever for any item within this group so, you just a place or you just the store the item at a particular zone or the area.

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Stores Management

i. **Fixed location:**

- Each item is permanently assigned a specific location in the store.
- With the system, finding out an item becomes very easy.
- However, space utilization of the store may be inefficient.

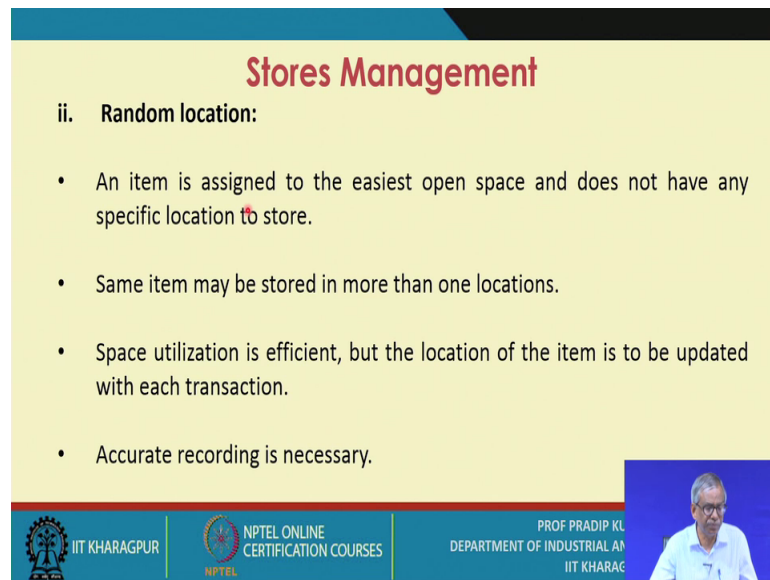
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Now, what are the characteristic features of the fixed location system? There are 3 important issues you should be aware of. First one is each item is permanently assigned to a specific location in the store.

That means, each item is permanently assigned a specific location in the store right already this point I have mentioned. And, with this system finding out an item becomes very easy, because against the items the stores location is known. And, you just make a note that there could be different ways you can store the item depending on say or the size of the item, or say you know the shape of the item, depending on say what sort of say the protection you need for that item? And, what is this the longevity or the durability. And whether the special say the say the packaging method is required or not or the special packing material is that we used or not.

So, retain it is the life. So, all these details this are the all technical issues. So, this technical issues you must consider, while you select a particular method of the location. However, the space utilizations of the store maybe inefficient, is it ok. That means, this is the point to be noted, but there are few advantages. So, that you get issue or for a fixed location system.

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Stores Management

ii. **Random location:**

- An item is assigned to the easiest open space and does not have any specific location to store.
- Same item may be stored in more than one locations.
- Space utilization is efficient, but the location of the item is to be updated with each transaction.
- Accurate recording is necessary.

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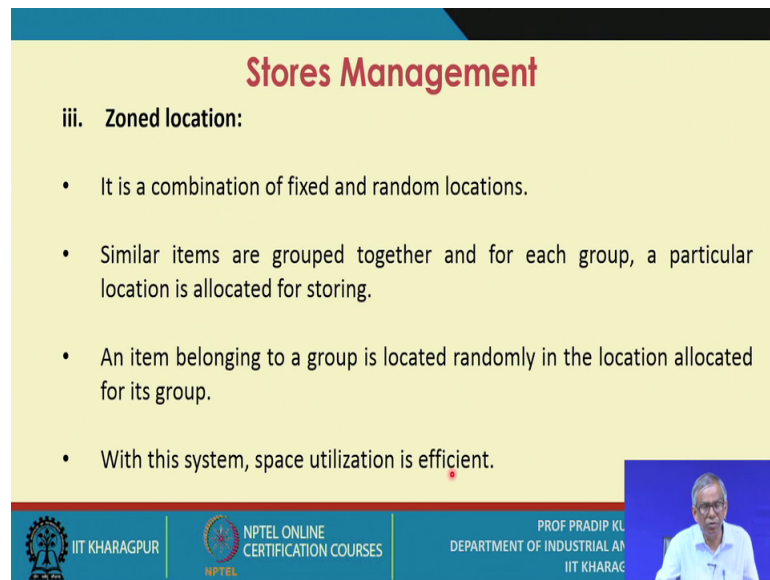
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As an alternative to the fixed location system, you can have a random location system also. So, what is random location? That means; an item is assigned to the easiest open space; that means the item has arrived. And, you find that very near; that means immediately you can identify one free space. So, why do not you just store the item in that free space.

So, as and when type of system, as and when it is available? And, item is assigned to the easiest open space and does not have any specific location to store. That means, access is guaranteed. That way you say it is if the access is very easy access user is a easiest open space. Same item may be stored in more than one locations is; obviously, there is a case and the space utilization is efficient, but the location of the item is to be updated with each transaction right. So, accurate recording is necessary.

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Stores Management

iii. **Zoned location:**

- It is a combination of fixed and random locations.
- Similar items are grouped together and for each group, a particular location is allocated for storing.
- An item belonging to a group is located randomly in the location allocated for its group.
- With this system, space utilization is efficient.

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And, many a time you need to adopt a computer based say the information system for this. So, if suppose even the second alternative is not feasible for the given item. So, you may go for the zone location system.

So, what is the zone location system? It is a combination of fixed and random locations. Similar items are grouped together has have been telling you, and for each group a particular location is allocated for storing is it ok. So, like it is like a you know the functional layout. So, for so, first what you need to do? That means, some the grouping principles you have to apply. And, based on the similar you have similarity, with respect to the materials or the similarity with respect to the shape and size all both.

So, first you have to group the items. So, that logic should be established and so, suppose you deal with some say 5000 items. So, the 5000 items may be grouped under say the 50 grouped under 50 categories and so, thus 50 groups you have created on an average, in each group there are around 100 items is it ok. And for this 100 types of items wearing quantities you create a space.

So, obviously you know. So, the similar items are group together and for each group, a particular location is allocated for storing. Now, this is essentially a location problem. And so, for there could be many other issues to be considered, just you keep in mind that this is basically a combined system. And, item belonging to a group is located randomly in the location allocated in it is group; is it ok? That means, within a particular location

within a particular say, you know the item within a particular group. So, the item is you know ha say the stored anywhere; that means, randomly is it ok. So, with this system space utilization is efficient.

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Stores Management

- The main objective of stores management is to keep the inventory of items in acceptable and good condition maintaining their quality and value till they are used or transported to other locations including users' workplace.
- The kinds of technology being used for maintenance of stores and packaging materials, packing of materials and overall physical conditions of the stores determine to what extent the quality and the value of inventory of item can be maintained and corresponding cost of carrying inventory.

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The main objective of stores management is to keep the inventory of items in acceptable and good condition maintaining their quality and value till they are used or transported to other locations including users workplace, depending on the so, the kind of item you are dealing with. So, what you need to do? That means, you are the storing method should be such that the quality of the item is retained, then the value of the item is retained. And, and as soon as you get some say you know some requisition.

So, you as quickly as possible, the items are to be sent to the using department in the required quantity or it is to be sent to the user work place. If, you deal with that the finished goods inventory in the stores. So, when the stores may have the different types of items like it could be as a raw materials and for the raw materials, you may off for open stores. Whereas for the finished goods or with the finished goods or say the purchase parts, you may definitely you may, you must go for there is as a closed as the stores.

And, so, the depending on the type of item, depending on say for type of say the work places you have, you developed the storing method. And, in today's context, you know

for retaining the quality and value of the item, you may use several sorts of you know the several types of appropriate technology for store packing and storing, is it ok.

And, you know there are say the many important functions and organizations must be dealing with, and one of the important function is the storing and the packing, packaging and storing is it ok. So, in the entire say the you know the quality loop, a starting with the market research and ending with say the disposal after use, you will find one of the key the functions is the packaging and storing. The kinds of technology been used in maintenance maintenances of the store this is an point.

So, for the maintenance of the stores and packaging materials, what kind of say the technology, you have been using an important point, packing of materials what sort of so, the method you used. And the overall physical conditions of the stores how do you were retained in good condition, to determine to what extend the quality and the value of inventory of item can be maintained and corresponding cost of carrying inventory.

You are already familiar with a particular so, the inventory related cost that is holding cost or inventory carrying cost. And, what we have mentioned that inventory carrying cost maybe substantial, and if you look at the activities to be carried out, for holding the inventory in good condition so, essentially or acceptable condition.

So, essentially it is a store related activities. So, if you have a control on the stores related activities, you will have control on the inventory carrying cost. And, as we have already pointed out that the controlling inventory carrying cost is an important issue and it should be as small as possible is it ok. So, depending on the type of technology used for storing, depending on the type of items you store. And, say what sort of you know say the improvement say the techniques you used so, the cost of carrying inventory is dependent.

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Stores Management

- For ascertaining the actual levels of quality, value, and physical inventory, a physical count and assessment is necessary. This verification is mandatory and done periodically twice or thrice a year. This is referred to as physical stock verification, through which differences, if any, between book value (as per record) and actual or physical inventory is known.
- The causes of differences need to be known and all possible preventive measures are to be taken to minimize the difference.

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So, this is one and the next important point is for ascertaining the actual levels of quality value and physical inventory. That means, one hand inventory this term your familiar with one hand inventory. A physical count an assessment is necessary. Periodically you must do, this verification is mandatory and don periodically twice or thrice a year. And, this is referred to as a physical stock verification; this is there for any origination. Through which the differences if any between the book value and say the between the book value, as for the record and actual or the physical inventory is known. That means, while you estimate the value of inventory at a particular point in time you certain the costing method is it ok.

So, through this costing or the accounting method so, you get the value. So, that is referred to as the book value. But, again the physical whens the stock which you observed, when you say check the physical stock and you just calculate it is a costing to the cost, then that value may be different. Because, there are there events that might have happened; like up likes there could be the loss of inventory, there could be the pilferage, there could be the damage to the inventory of the items. So, the many such say the events may take place, which will have a direct the a say the effect on the on the amount of say the inventory, in a physical units that you are keeping at a particular stores location.

So, always what you have to do? That means; you need to know the difference between the book value and the actual the inventory or the physical inventory valuation.

So, that is why so, the valuation of inventory at periodic intervals you do. The causes of differences need to be known, that why there is a there maybe the substantial say or the significant difference between these 2 for one item. Whereas for another item the maybe you know the difference may not be significant. So, what are the possible causes is it ok. So, is the valuation method perfect or is it that particular valuation method is suitable for the given item.

So, all these the questions you raise and you try to the solve the problems as quickly as possible. And all possible preventive measures are to be taken to minimize the difference.

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Stores Management

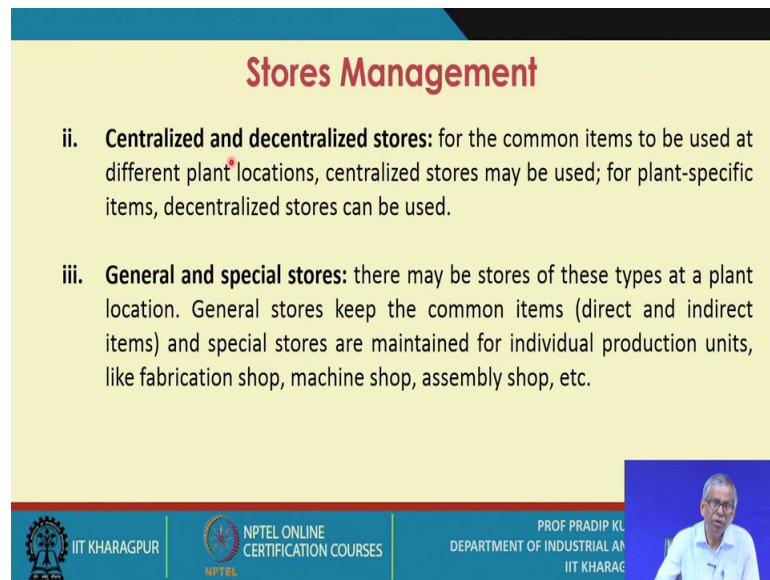
- Inventory accuracy is a fundamental requirement of any inventory system and stores management plays a vital role in it.
- The stores can be categorized under different categories:
 - i. **Open and closed stores:** usually raw materials or materials that need weather conditioning, open stores are used; otherwise, for other types of items, closed stores are used.

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So, this is obvious. So, the inventory accuracy is a fundamental requirement. So, you just so, keep a note if you note down point that is the inventory accuracy is a fundamental requirement of any inventory system and the stores management plays a vital role in it. So, without the support of the store management, you cannot ensure inventory accuracy. The stores can be categorized under different categories, the first one is open and close stores.

So, what is an open store and what is the clothes stores? Usually raw materials or the materials that need weather conditioning. There are many such the materials likes say another castings you required as a raw material open stores are used for those kinds of materials. Otherwise for other types of items close stores are usually used.

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Stores Management

- ii. **Centralized and decentralized stores:** for the common items to be used at different plant locations, centralized stores may be used; for plant-specific items, decentralized stores can be used.
- iii. **General and special stores:** there may be stores of these types at a plant location. General stores keep the common items (direct and indirect items) and special stores are maintained for individual production units, like fabrication shop, machine shop, assembly shop, etc.

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Video inset: Prof. Pradip K. Kul

Then it can be as defined as a centralized or decentralized stores. For the common items to be used at different plant locations centralized stores may be used; that means, there could be some common items and there could be special items.

So, the common items you may have a centralized stores, where as a for plant specific items, you can recommend decentralized stores. Again the stores can be of general type or the special type. There may be stores of this type set a plant location at a given plant. General stores keep the common items direct and indirect items. Direct items are those items, which are a part of the product, whereas the indirect items are those items, which are required to for a for continuing the production systems, for supporting the production system. And, the special stores are maintained for individual production units, like fabrication shop, machine shop, assembly shop etcetera.

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Stores Management

- Over and above these types of stores, there may warehouses, either owned by the organizations or leased from other agencies, located at a number of locations in the inbound and outbound logistic system being used, connected by appropriate traffic or transportation system.

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So, this way we can classify the stores over and above this types of stores, there may be warehouses either in a owned by the organizations or list from other agencies, is it ok. Like say you know like bonded warehouse, you may have located at a number of locations in the inbound and outbound logistics systems. So, later on when we referred to a inbound and outbound logistics systems, will be will come to know that how the stores management is a playing a very important role. And, what are the different types of the stores you may have you know in this the logistic logistical or say in the inbound and outbound non bound logistical systems, connected by appropriate traffic or transportation systems.

So, this very important in fact; that means, at any point in time at a given store how much say the inventory you are keeping? At any point in time it depends on say to what extent you know you are getting support with the type of traffic and the transportation system.

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Inventory Valuation

- The store is the custodian of inventory of items and hence, it is store's responsibility in many instances to assess both physical and financial characteristics of inventory.
- There must be proper control of flow of goods that is factual and objective. This represents physical characteristics of inventories.
- Along with physical characteristics, inventory has financial characteristics associated with flow of costs.

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So, the store is the custodian of inventory of items. And, hence it is the store's responsibility in many instances to assess both physical and financial characteristics of inventory. There must be proper control of flow of goods that is factual and objective; this represents physical characteristics of inventories. Along with physical characteristics, inventory has financial characteristics associated with the flow of costs. So, the first one is the flow of materials. And, the second one is the flow of costs.

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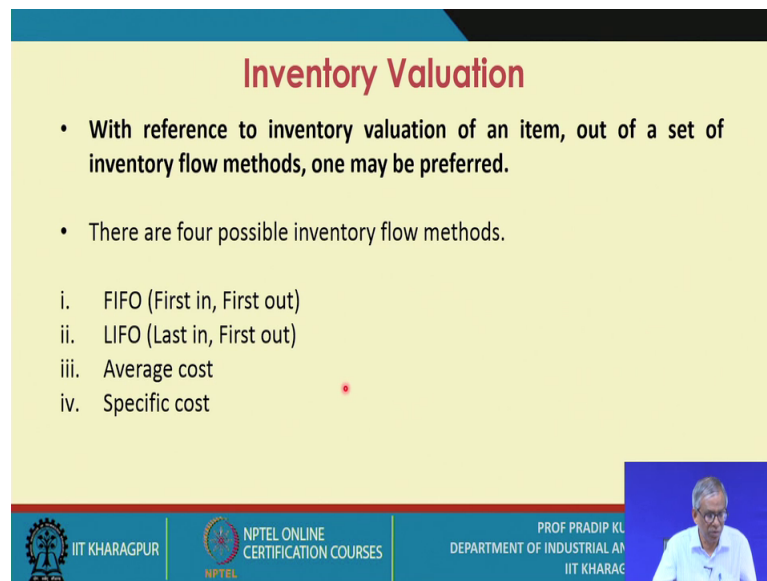
Inventory Valuation

- Inventory costs and expenses depend on the accounting procedure used.
- No single method exists for determining costs for accounting purposes.
- Inventory flow method refers to the way the items are added to and taken from inventory.
- The selection of the assumed inventory flow method determines the flow of costs.

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Say dealing with so, the inventory cost on expenses depend on the accounting procedure used. No single method exist for determining cost for accounting purposes there could be different methods. And, inventory flow method refers to the way items are added to and taken from the inventory. And, the selection of the assumed inventory flow method determines the flow of costs.

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Inventory Valuation

- With reference to inventory valuation of an item, out of a set of inventory flow methods, one may be preferred.
- There are four possible inventory flow methods.
 - i. FIFO (First in, First out)
 - ii. LIFO (Last in, First out)
 - iii. Average cost
 - iv. Specific cost

The slide is a presentation slide with a yellow background and a blue header. It contains a title 'Inventory Valuation' in red, followed by two bullet points. The first bullet point states that one method may be preferred from a set of inventory flow methods. The second bullet point states there are four possible methods, which are listed in a numbered list: FIFO (First in, First out), LIFO (Last in, First out), Average cost, and Specific cost. At the bottom of the slide, there is a blue footer bar containing logos for IIT Kharagpur, NPTEL, and the Department of Industrial and Manufacturing Engineering at IIT Kharagpur, along with a small video inset of Prof. Pradip K. L.

So, with reference to the inventory valuation of inventory out of a set of inventory flow methods one may be preferred. And, there are 4 principle methods you have and you have to select any one on them. So, the first one is the first in first out, the second one is the last in first out, the third one is the average cost method and fourth one is the you know the specific cost method.

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Inventory Valuation

- All these methods are used for inventory valuation that refer to two specific aspects:
 - i. Value of ending inventory
 - ii. Cost of goods sold

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And for all these methods for inventory valuation, we refer to 2 specific aspects one is the value of ending inventory that you must be able to estimate, and the second one is you must be able to estimate the cost of goods sold.

So, with this you know we have been say referring to the stores management issues. And, ultimately you know the related to stores management of the valuation of inventory. So, in the next lecture sessions I will be referring to the different kinds of methods which are normally used for valuation of inventory.

Thank you.