B. ARCHITECTURE
THEORY OF ARCHITECTURE – I (AR6102)
INTRODUCTION TO ARCHITECTURE – ASPECTS OF ARCHITECTURE
Lecture – 4

Architecture as an Organism:

Is architecture a static non living entity? Is architecture just an object? In fact if we have to speak as a layman, we will say that architecture is a nonliving thing. But we will have to look at architecture as a living process before we process further. Before we proceed, we will look into what is a living organism? A living organism is something which is not constant and static. It is in constant interaction with its surroundings. Also it has dynamic functions that happen within itself. An organism gets birth, it grows and it dies. Even architecture is similar in all the above aspects, except that the processes of growth, function and decay may be unnoticeably in a slow. If you see this complete growth and its interaction with its surroundings and interaction within itself, if you compare a human organism with that of a tree, the entire process is very slow in a tree or in a plant life. If you compare architecture with that of tree, it is very slow but we can't totally deny a plant is a nonliving thing. At the same time, we cannot deny that architecture is a nonliving thing. In the philosophical sense, architecture has a life to it and that is how the discussion is taken forward. A plant, an animal, a human being or an automobile, a city in a landscape or an architecture; all of the above are similar in many ways as an organism. Not just the similar entities like plant, animal and human being. Even the non-living entities such as automobile, city, landscape architecture, they are also in a way organisms. If you take for example a car, which is an automobile, it is not something that is static. It has many systems and movements within itself. It actually interacts with its surroundings like how an animal or a plant behaves. The same way, a city also grows. It was given a birth, it grows and then it dies and decays like any other organism. The same way, the entire principle is applicable to architecture also. All these cases whether living or nonliving. They all have a similar aspect to them. They have an aspect called the overall form. They have an inner structure within them. They have all

have a materiality, the material with which they are all made up of and they all have a specific function for which they are all born for. These are all the common aspects that we are going to discuss in detail in this chapter. A common aspect for both the living and nonliving things.

Form & Structure of Architecture:

The aspect of what is called Form. In each an every discussion further, we will first take the case of nature. We will study what is a form or a material means in nature, then we will compare that with that of architecture that is going to be the comparison for the discussion in this lecture. In nature, what does a form mean in nature. Form is the overall shape of a new organism. Every organism has a specific form based on its function and based on its context. Context in the sense, it may be a place or it may be a specific activity for which organism it is meant for. Based upon the function and context, the organism will have a unique shape. As an organism evolves in its life through centuries, even the form evolves. For example, we can see the image of a human skull which has gone through many changes in its form from that of its predecessors as an animal. Every organism has its unique form. It has gone through an evolution according to its function. Not just in animals but even in the case of a tree, every tree has a unique form. A tree can have a spherical foliage, a flat canopy like form, a conical form; but each and every form of a tree can have a reason because based upon the location of where a tree is, the tree has taken a different form. For example, researchers show that a conical shape of a tree in a polar region has to have a maximum sunlight intake and has to shed the snow that has fallen upon it, that's why the form of a tree in a polar region is conical in shape.

Now, we will get back to architecture. Like how it was in nature, there are various forms for specific reasons. Even in architecture, as an organism has its own unique form based upon its function and its context, the various building typologies like house, temple, school or museum or auditorium, etc and also appropriate interior space and details, so as to accommodate the assigned function. For example, if you see the image on your right, it is a museum building designed by architect Frank, the building form has a reason behind it. The building as a museum has a continuous ram which is a

unique path, it is not like any other museum that has a cuboidal space. This building form has a reason behind it.

Here, you can see certain images of linear space buildings. The first example you see on the top is a railway station space. The image you see at the bottom is a building, architecture for an air terminal. Both of them have a linear form and the linear form is due to a reason because there is a linear activity that is happening there. These buildings can't be of any other different form like circular or a squarish form. In architecture, even with the same typology of a building, say a religious building, the form can vary according to a specific context.

Now we will see the architecture of religious buildings like a temple, a mosque or a church. All the above typologies are different because they belong to different religions and have different forms accordingly. The above typology as a place of a worship have evolved to a unique form according to their functional, philosophical and cultural needs. Through the time history of more than a 1000 years, they have evolved according to the activity that happened within their religious function and that has given rise to unique typologies. We can just see the same discussion in terms of a plan, how unique is the plan of a religious temple, how unique is the plan of a religious building such as the mosque be like. If you see the sketch on the left side of the drawing board, this shows a plan of a South Indian temple where the main space inside doesn't have to be very big, it can be very small is usually a space that is very dark. It has a space in the front also, which is again not very big, meant for a smaller gathering. This is the plan of a religious building in Southern India. If you look at this, this is again a simple sketch depicting the religious space of a mosque. Where the main space for the prayer has to be very large for many people to gather and pray together. Even the front yard in the front of the mosque has to be a bigger space for a larger gathering, with only a small niche pelican towards the mecca. The basic plan itself if you see in its form is very unique under the same typology of what is called as a religious building.

Now, we will move on to the next aspect called Structure, which is the form maker of any organism, including architecture. First we will see structure in nature. In nature, what does structure mean? Structure is the skeletal framework of the organism. In the case of a human being the bones form

the structural system. Every organism for the given form will have a specific structure according to its function and context. For example, if you see this image below, it shows the skeletal structure of a tortoise which has a unique reason for it. Basically we are discussing about the form and structure for a form and structure for a unique reason. The skeletal bone, the main vertebrae of a tortoise is not like a fish, usually in the centre of the mass. It is taken outside as a protective shell. If at all a tortoise doesn't have external production, the structure won't be like this and eventually the form also won't be like this either. In nature if you see, there is a particular structure for every organism, irrespective of whether it is an animal or a plant. In architecture what does structure mean?

Structure is the skeletal framework of the building's form. In case of a modern building the columns, beams, and the foundation all together which form the support system can be called the structure, which doesn't include the surfaces and other massing elements. If you take a simple building, a simple plan of a building which has four falls, in present day, reinforced concrete building, they will have what is called as columns on all the corners. These four columns will take the entire structural load of the building and actually these walls if you see, they don't take any load. The building can still stand as a structure without these walls. What we call as a structure is excluding these walls and it has only the skeletal framework and it only needs the skeletal framework of the building. In architecture, the form is more dependant on the structure. That was until the arrival of the modern technologies. The form in architecture was limited by the structural possibilities and techniques. For example, before the arrival of materials like steel and reinforced concretes, the structural building was built only with limited technologies like brick and stone construction. If at all you want to have a big library space section, if you have a ground like this and if you need a large covering space for a library of a span more than 40 ft. You will have to have many stout space occupying columns in between. But with the arrival of a new material like steel and reinforced concrete, you don't have to have these columns in between. You can have this skeletal exterior framework which can support and take any amount of load. This is one of the very important buildings in the history of architecture which is the library building, the roof of which is made from steel. If at all the building doesn't have a steel truss, the building will have big stout columns in between, right in the centre of the reading space. Here we have an example from

architecture where the structure itself forms a unique aesthetics to the building. Here, in this specific case, the structure is not different from the form of the building, the structure is the form. Here, each and every surface is a structural element. The building doesn't have a separate skeletal as such as seen in the previous examples.

Material & Skin of Architecture:

Now we will move on to the next aspect what is called Materiality of an organism which is the basic building unit of any organism even in the case of architecture. In nature, every organism for its given function and context, will have an appropriate material which again will be interlinked to the form and function of the organism. In nature it is very difficult to see the aspects of form, structure and material working separately. They are always mutually interrelated. For example, if you see any plant material, if we can compare the plant material of the cactus with that of a plantain, the cactus is made up of a skin that is very thick so that it doesn't allow the moisture within it to escape. In comparison to the leaf of a plantain or the trunk which is made up of a very soft material that will give away water, but it can give away water because it is in a tropical climate but the cactus cannot give out water because it is in a dessert. Based upon the function of the organism, the materiality is chosen in nature. Even within the human body various parts are made up of tissues and cells of different material quality so as to support a specific function. If you take the tissue of a normal human muscle. It will be of certain quality and if you take the tissue of a cardiac muscle in a human body, it will have a lot of elasticity because it has a very unique function. In general nature, the choice of material is for a specific given function.

Now coming back to architecture. Architecture also has a different materiality based upon its function. Architecture as a constructed building is made up of building materials like brick and stone, etc. In early times and in rural settings in present days also, the materials like mud and wood are used to create spaces. Accordingly, the form of the buildings are limited with those material construction techniques. Here, we have an example from desert mud architecture. The material mud as a construction material gives a lot of thermal buffer to the interior space from the exterior harsh climate. It has a thermal function and also if you see the form of the building, the

form of the building is not something that is tall and magnificent. It can't be tall because the material is made up of mud, it has only certain limited structural possibilities. The function, the form and the materiality in architecture is all interlinked to each other. In architecture, the usage of material has a history within itself. There is an evolution we can see. Initially, men were using materials that were not very durable, like mud and wood. Later, with the advent of stone and equally strong terracotta burnt mud, people were able to make architecture which was comparably more durable. With the advantage of those physical properties of those materials like their strength, the construction techniques evolved and got better. This eventually opened up more possibilities of building form and also the scale of the building. The possibilities of larger spaces, taller structures and the durable structures happen after these materials. Here, we can see an example of a cathedral from medieval age built totally out of stone and a a few amounts of glass for the windows that stands till present due to its durability and this magnificent form is not possible with just brick or wood or mud. This form is possible only with the quality of the material stone. We can understand that the form of architecture is in a way related to the materiality of it. Also, it should be noted that these materials have their psychological and aesthetic meanings, which was utilized in history. Examples of religious architecture across the world, where stone is seen to be expressing the permanence and strength of the religious faith. Also the religious structures stood for centuries carrying forward the religious messages, through architecture. Every religious building across the world whether it is a hindu temple or a mosque or a cathedral, they are mostly built out of stone because stone is a durable material and it can take the religious message to different generations. Stone is also an expressive material which can take any decorative or sculptural form according to the philosophical need of the religion. Stone suited the aesthetic need of religious architecture across the world and across centuries.

Modern Materials - For the past few centuries with the advent of new construction materials like RCC (reinforced cement concrete), steel, glass, etc, the possibilities form have become endless. More larger, taller and durable structures and a possibility of creating more creative other-worldly forms have become possible due to the usage of modern materials like steel and concrete. Here you see an example of architecture which is a railway terminal built. The main structure of which is built totally on steel and you

have the sub structure, the main movement space built out of concrete. This expressive form in steel is not possible through other materials like stone or mud or brick with modern materials, no more the material and the structure is a limitation for the form of architecture. Form is determined only the function and aesthetics of the architecture. Form is determined only by the form and aesthetics of architecture. In early times, the form of the building was totally dependent on structure and the material capability. Presently, the structural material capabilities and possibilities are infinite, the building form is totally based on the required function and the concept or the aesthetics that the building has to express. This is one of the best examples to support the present idea or discussion. This is a museum building in a place called Bilbao in Spain which has a very unique form. The concept of this building is to express the form of fish in the water body in the front. This form is possible through modern materials like steel, titanium cladding on the skin.

Now we will move on to the final aspect, Skin of an organism, which gives a visual expression to the organism, which is applicable in architecture also. In nature, the aspect of skin or a shell is very crucial, which we can understand with the example of the human skin. In the human body, skin acts as the shell which holds all internal parts together in one form. Also skin primarily protects the innr system from the environment. Also skin as an expressive entity communicates certain visual qualities to the outer world through its properties. Not just in human bodies but even in plant life. What is referred to as skin serves all the purposes that is discussed here. In architecture, what does skin mean? In architecture, skin refers to the outer shell of the form. The outer shell that is supported by the hidden structure inside, leads to the overall form. The building shell will be made up of a material that is different from its structural core, because it serves a different purpose. Here, you see a picture of a building with a very interesting visual skin, which is not the structure of the building, it is supported by the structure of the building.

In architecture, a skin of a building has certain crucial purposes. Skin is the one that gives the massing for the building. Massing in the sense, the volume and the form of the building. The skin separates the interior space from the exterior in architecture. The skin in architecture gives a thermal control between the exterior and the interior. Moreover, the skin acts as a

visual entity, as an aesthetic entity that communicates many meanings to the outer world.

The image you see on the left side, the image you see here shows the skin of the building from the inside, the skin that acts as a thermal controller. The small perforations you see in this building are all actually movable perforations, the opening sizes of which reduce or increase according to the thermal variation or thermal condition that is needed in the interior. The skin here in this building, controls both the lighting quality inside and also the thermal quality inside. The skin can perform a functional activity like that. Here you have another example of a building where skin is performing the aesthetic function in the building, the building has a unique skin form which represents the form of a tree, the pattern of the tree branches in the front.