B. ARCHITECTURE
THEORY OF ARCHITECTURE – I (AR6102)
PRINCIPLES OF ARCHITECTURE – SCALE & PROPORTION
Lecture - 11

Introduction of Principles of Architecture:

Introduction among various principles of architecture like Balance, Symmetry, axis, rhythm, hierarchy, datum, unity, harmony, dominance, scale and proportion are of great importance. In this lecture we will see how the aspects of scale and proportion play a significant role in architectural design. Also we will understand their significance through examples from fine arts like sculptures and painting.

We need to understand the meaning and difference between the terms scale and proportion. Scale refers to the size of the object in relation to another object. Proportion refers their relative size of paths with that of the whole object. This example shows a sculpture of a human form but in different scaling in comparison with that of the actual human scale standing on the right. The art expression by manipulation of scale. Whereas, here we see, manipulation of proportion. Again it is the same human form but the size of the individual parts have changed which means the change in proportion of parts.

Scale & its Applications in Architecture:

Scale and its application in architecture. The aspect of scale is relevant in various levels of architecture. It can be applied and studied at the building level and its details, the urban design, the town planning and landscape design. You see a picture here of a building of a very large scaling when compared to the other buildings in the town scale. The scale here is enlarged in comparison with the other buildings to show its significance. This is florence cathedral in the cityscape of Florence. In the building level itself, there may be a play of scale and proportion to enhance the beauty and

harmony of a building. If you see the facade of Taj Mahal, the entrance arch form is actually repeated in many other parts of the building. It repeats itself many times without changing its proportion but it actually changes its scales which gives harmony to the building overall. Not just the arch but the rectangular frame that encloses the arch inside also repeats itself in many other parts of the building. Not only in the building level but even at a campus planning or a complex building level, there may be forms that repeat itself. Here you can see an arial view of a temple complex of gopurams that are of similar form and similar proportion but what is different is the scale of the gopuram. It gradually reduces from the outer circle in its size towards the centre. Showing the hierarchy in planning. You can see an example of scale, thereby creating a sense of magnificence in temples of Egypt. Here we see an entrance pylon of an Egyptian temple. Also, the sculptures at the entrances and many a times bigger than the actual human scale, adding to its grandeur. There are examples of modern architecture that have been inspired from traditional of proportions. What we see here is a monumental building proposed for the capital city of the Nazi Germany, designed by the architect Albert Sphere for Hitler. The form of the dome and the interior space is replicates the form of the Pantheon dome in Rome. The difference between the original Pantheon dome and this building is a scale which adds to its power and magnificence. This project was never built; it’s actually an imaginary project.

Here, we see a picture of form of pyramid, which repeats itself in the landscape but what actually changes is not the proportion, only the scale. The bigger scale implies more significance. This the main pyramid of Cheops, the Parova. The scale of the pyramid won't be felt without the comparison the human scale. The gigantism of the building can only be seen in comparison with the human scale. We have many examples of good spaces with an architectural background and architectural structures that involve the manipulation of scale to the level of city scale to show magnificence.

We shall see the aspects of scale in architectural representations. Any architectural drawing or a representation can't be easily understood in terms of dimension without actual scale. We can't imagine how big or small the building is without a scale. In this drawing of St.Peter's Rome, the actual dimension can be understood by the graphical scale given nearby the drawing, without this graphical scale the building dimension can't be

understood unless we have a comparative scale of a drawing of a human being standing in the way. The usage of the term graphical scale is different from the normal term of the scale used before. If you visually see two public spaces like what is shown in these two pictures. One is in Bologna in Italy; the other is from Jaisalmer, India. We cannot actually perceive with our naked eyes about what is the actual difference in the dimensions of the space. But if you put it in the drawing in the same scale, you can understand the dimensional difference of the two spaces. Here the details are shown in the section.

Now, we will see certain examples of scale in Art. A normal day to day life object, is made as an art installation by manipulating its scale to create interest. This similar manipulation of scale and an artistic expression created. Manipulation of scale in sculpture. Another example of sculpture from South Indian temple architecture where the supernatural scale of this demon is shown by a comparative scale of an elephant below its foot. The elephant is smaller than the snake and the snake is smaller than this gigantic human figure. Here is another example of wall murals in Egyptian architecture. A wall painting in a tall building where is again an application of scale. Here we see many pictorial representations where we see two human forms but in different scales actually, it doesn't mean we had a human form that was gigantic in history but the scale is exaggerated only to show the importance of the figure here, who is actually representing a king. Even in medieval paintings, we can see manipulation of scale to show importance, in comparison to all the figurative pictures in this group. The main picture of Mother Mary and Baby Jesus is exaggerated in terms of scale to show the importance.

Proportion & its Applications in Architecture:

Aspects of proportion and architecture. Proportion refers to the relative size of parts with reference to the whole. In architecture, proportion refers to the relative size of the architectural elements with respect to other elements or the whole architecture as a single composition. The aspect of proportion is relevant in elements of architecture and its details like doorways, windows, etc. The facade of the building, in terms of overall form and composition. The plan of the building, in terms of spatial dimensions. All the above

aspects put together forms what is called as the proportion system of a building.
Architecture of various styles of various regions have their own unique proportion systems. Which give the character to the architecture. Those proportion systems have evolved with uniqueness; style or tradition, climate, material and construction; Religion and culture. System of proportions were strictly followed in traditional and classical architecture, which give them their timeless quality and visual appeal. The proportion systems in its evolutions have reasons of both - Aesthetics and Function. Now we will certain examples of proportion systems from certain Indian examples, Western Classical proportions and Modern proportions. Applied in sculptures, painting and architecture.

Indian proportioning systems - there were strict guidelines and rules of Indian arts in terms of painting and also sculpture which set the scales and proportion for every figure of representation like what we see here. In architecture, its planning level, its campus design level, there are proportions involved in design. What you see here is the plan of the Brhadisvara temple showing the main building, the Nandi, the entrance archways, the gopurams and also the overall boundary wall of the campus. All in proper geometry and proportional arrangement where the proportion of the height in relation to the width of this campus is shown. Not only in the campus level but also in the building detailed level, the proportions were incorporated in traditional architecture. The drawing here shows the elevational detail of the Gangai Cholapuram temple. If you look closely, it has many repetitive elements gradually reducing in size towards the top. The form of the element is the same, it doesn't change in proportion, it only changes in scale.

Even within a same temple of architectural style during the same time, there may be different levels of elegance and different levels of beauty achieved. It is a comparison of the Brhadisvara temple and the Tanjore. Both the temples are of the same style but they have their own unique elegance. The difference is due to the difference in proportion as shown in this picture. The number of tyres and the spacing between the tyres is based upon a calculation which differs from each other. Inspired from the traditional architectural proportion, there are examples of modern architecture like what is shown here. It is a plan of the building in Jawahar Kala Kendra in

Jaipur, designed by architect Charles Correa. This is a picture of the same building.

Now we will see certain examples of Western proportioning systems. Called the classical proportions, they were all derived from the architecture and architects of Greek and Roman time. During which they believed the proportions of the human body that of the objects in nature and that of the entire universe, they were all in unity and architecture and sculpture follow this universal and classical proportions. Here it is a pictorial diagram of the human body with its relative proportions of height and width of the drawing by the famous artist Leonardo Da Vinci. We have many examples of architectural styles, what is called as architectural orders each involving the architectural orders or the ancient styles of classical architecture, each distinguished by its proportions and characteristic profiles and details. Three ancient orders of architecture - the Doric, Ionic and Corinthian - originated in Greece. We have examples of sculptures and paintings that have been derived from the classical proportions of Greek and Rome. Here we have a painting of a style of mannerism, where the ideal proportions of a human body have been deliberately elongated in the fingers and details of the neck to show an artistic effect.

There are specific proportion systems, one of them is the Golden proportion which is found in nature also. What is show here is the Golden rectangle. The division here denotes how the smaller part is related to the overall hole. This rectangle is an equal proportion of the entire outer rectangle. This rectangle is equal to the proportion of the inner rectangle. Like this, the smaller part relates to the entire home. The facade of the Parthenon temple in Greece. Not only the exterior form of the building but also the smaller details are based on this proportion of golden section. Here is an analytical sketch of elevation of Parthenon temple showing its geometrical axis and proportions not only in Greek and Roman architecture but also in Egyptian architecture, the proportion systems and grid systems employed in architecture and paintings and sculptures.

Application and Manipulation of Scale & Proportions:

The applications and manipulations of scale and proportions can be seen elaborately in historical examples of architecture. In modern architecture

which doesn't have a single fixed system of reference doesn't have much of the traditional way of application of scale and proportions. Another reason for that is that the modern aesthetics are no more based on an evolved tradition or any limited techniques, so every building has its own unique language of applications of scale and proportions. There is no common system of proportion. However, there are certain examples of proportion system that have evolved recently in history. This is an example of a proportion system evolved by an architect called Ligou Bousier in France, it is called the Modular which is based upon an ideal body height and proportions. He had devised this and applied it in architectural detailing. This is the plan of a unit in an apartment building which is based on a modular proportion. In modern painting and also in modern sculpture, there are examples of manipulations of scale and proportion. This is a surrealistic painting by this famous artist called Saludar Dally, which has representation of usual forms or figures, but in a very unique elongated proportion and in a comparative scale which creates a surrealistic feeling and expression. Every proportion has a functional reason behind it. Every style is unique because it has been evolved in a different way and thus has a different proportional system within itself.

A proportion may be unique because of material and construction techniques. Here is an example of comparison of columns from different style of architecture. What we see here is a stout, wide and a short column of an Egyptian temple. We have a long slender column of Gothic architecture and we have even more slender column from the architecture of Industrial age. The proportion system in style varies not just because of the aesthetic reason. but also because of the constructional and technical details. The load involved in the stability of this building is different in comparison with the other buildings. That is the reason for the stoutness of this column also climate may be the reason for the different proportion system of a style. We can see many examples of roof forms, a slope of which, a proportion of which is very unique and the reason for that may be the climate. Here you can see a very steep proportion of a sloped roof from a snowy region in Norway. In comparison with that, we have a shallow roof in Tamilnadu houses. The proportion can be applied in terms of spatial planning also. A form of space can be different based upon a function. Considering this to be a plan of activity space, all the three shapes are of same area but the proportion of area can be different according to an activity, this may be good

for an activity of centralized nature. This may be good for an activity of linear nature like an assembly line in a building. We have to understand the difference between the aspect of shape, scale and proportion. If you take a shape and change the scale of an object, it retains its character but only the dimension becomes bigger or smaller but if you change the proportion of an object, it changes its entire character but however retaining its recognizable shape. We can say a scale can have an impact and proportion can have an impact in a character of an object or architecture. A scale doesn't impact its character that much like a proportion does.

We will see a few more examples of scales and proportion and architecture. The sets of scale we are going to see are basically of pyramidical form - this one, the pyramids, the gopurams of Tamil Nadu. All of them are basically pyramids, including this. What makes them unique in their style is the proportion system involved. Here we can a row of gopurams in pyramidical form but each and every gopuram is unique because of its difference in scale and also in proportion within a building, there will be incorporation of various proportioning systems which makes it very unique from the architectural style of a similar building in a different part of the world. The plan of the buildings are of centralized nature. Both the buildings have a centralized dome with four minarets but this has a very unique language in comparison the other due to the proportion system and the scale difference not only in architecture but also in the campus planning. We have examples in history which involved proportion, scale and manipulation in the planning. This shows the plan and the aerial view of the Taj Mahal Complex where the arrangement of the main building, the entrance building and the Mughal gardens in the centre are all based upon Mughal traditional proportioning system. We have a similar arrangement of Campus in the Humayun's tomb and the Lodhi gardens around not only in traditional architecture but also in modern architecture with the manipulation of scale and proportion. What you see here mainly in this building is a single form which is repeated many times but what changes here is the scale and proportion of the building another similar example of single unit that is repeated by changing its scale and proportion by creating an overall composition.