B. ARCHITECTURE
THEORY OF ARCHITECTURE – I (AR6102)
PRINCIPLES OF ARCHITECTURE – ORDERING PRINCIPLES
Lecture - 10

Introduction of Ordering Principles:

Introduction to the ordering principles of architecture. What is called as order? We see certain examples of history in Modern architecture. We look at the building, we see some of sort of order or a perfectness or a beauty in the building. What creates this harmony, beauty or perfectness in the building? What goes into its designing that is what is called as order and that is what we are going to see in detail in this discussion. We see a quote about order now. Order must be understood as indispensable to the functioning of any organized system, neither an engine nor an orchestra nor a sports team can perform without the integrated cooperation of all its parts, so that the work of architecture cannot fulfill its function and transmit its message unless it presents an ordered pattern. It's not only for architecture, for any field, for music or for sports, every part has to have an order to work together and that's what brings perfectness and beauty to it. Order refers to not just simple geometric regularity, rather to a condition in which each part of a whole is properly disposed with reference to other parts, to produce a harmonious whole.

The building or a space has different parts to it, all the parts have to have some relation or connection to each other and also have to work functionally as a whole harmoniously, the principle behind this work is called order. We will see some principles, some basic principles of order - the axis which comes as the first primary principle, Symmetry, Hierarchy, Datum and Repetition.

What is an Axis? A line established by two points in a space, above which forms and spaces can be arranged in a symmetrical or balanced manner on either side. Symmetry - the balance distribution and arrangement of

equivalent forms and spaces on opposite sides of a dividing line or plane, or about a center or axis. You have a central line and you have forms and objects on either side arranged in a similar manner. Hierarchy is the articulation of the importance or significance of form or space by its size or shape or just the placement related to the rest of them in the organization.

Rhythm is a unifying movement characterized by a patterned repetition or alteration of formal elements or motifs in the same or modified form. Datum is a line, a plane or volume by its continuity and regularity, serves to gather measure and organize a group of forms and spaces around it.

Principles of Axis & Symmetry:

We will see about axis. Axis is a line established by two points in a space, above which forms and spaces can be arranged in a symmetrical or balanced manner. Although imaginary an axis can be powerful, dominating and regulating device. Like what you see in this picture. The axis here is the main pathway that actually connects the centre of the monument and centre of the entrance, this is a powerful device that arranges all other spaces, gardens and other buildings in the other entire complex. If the axis changes, the entire composition will change in this architecture. We will see certain attributes of an axis. Since an axis is essentially a linear condition, it has qualities of length and direction and induces movement and promotes views along its path.

Definition has qualities of length and direction and induces movement and promotes view along its path.

Definition and emphasizing an axis - For its definition, an axis must be terminated at both of its ends by a significant form or space. If we don't have these terminations in the end, the axis will be perceived infinite. It should have a space or a structure on either end to make the axis more strong. The notion of an axis can be reinforced by defining edges along its length. These edges can be simple lines on the ground plane or vertical planes. We can make the axis more strong without the termination by making the edges more strong. In this case, you can have two elevated wall planes on either side of the movement or it can be a simple floor plan which will make the axis more powerful.

The axis can also be established simply by a symmetrical arrangement of forms and spaces on either side like what you see here.

We will see certain examples of architecture where we have axis emphasized by various methods. Most of the Islamic architecture in India has a very strong central axis which connects the main structure, its centre and the entrance. This is the case of Humayun's tomb. The main axis leads to the centre of the tomb from the entrance. Everything else, the floor and the garden on either side is called as Charbagh, everything will be perfectly symmetrical on either side of the axis which makes the axis more stronger. Which makes the view towards the centre more stronger. Not only in Islamic architecture, even in Hindu traditional architecture. Most of the examples have a centralized main axis which are empowered by the structures arranged in the same line. Also, the other structures on either side will be arranged to empower the central axis because the central axis is the one which connects the entrance to the main deity of the temples. The axis not only happens in the building level but also happens in this city planning level or in the settlement level. Here, you see an example of temple settlement where you have two axis. The axis is empowered by the two structures, the way they are arranged. Another example of axis, strengthened by the pathway and by termination at the main structure.

We will see certain ways of terminating an axis. The terminating elements of an axis serve to give a visual trust. These culminating elements can be of the following - Points in space established be vertical, linear elements or centralized building forms. Another way of empowering an axis is by keeping vertical planes, perpendicular to the axis. Here you have the building facade which is perpendicular to the axis direction without a structure also, an axis can be terminated. You can have a plaza at the end of the axis. You have many examples of European architecture where you have a well defined space, generally centralized that ends in an axis. An axis can be terminated by a gateway that opens outwards towards the view that is shown here.

Now we will see certain architectural examples of how an axis is being empowered by termination and other methods. The main street of the temple of thiruvananthapuram, the axis is empowered by the main gopuram of the temple and also by the facade of the palace on the side. Not only in

this temple but most of the temple streets in Indian architecture. The gopuram acts as a main empowering element of the axis. Without the gopuram, the pathway won't be as strong and interesting.

This is an interesting example of how an axis is empowered by the presence of two columns instead of being a big archway. The axis here is empowered by the structures on either side also. By creating a vertical plane on either side, the central axis, the central movement is empowered, it is made interesting. Without this structure on either side and without these pillars, the axis won't be defined as all.

Now we will look into detail about the aspect called Symmetry. What is a symmetry? A symmetrical condition requires the balanced arrangement of equivalent patterns of form and space on opposite sides of a dividing line or plane, or above the centre or axis.

If you see actually both the aspects of axis and symmetry are related to each other, they are inseparable. There are two kinds of symmetry - Bilateral symmetry and the Radial symmetry. In Bilateral symmetry, you have the central axis and you have the two sides that are similar to each other. It can be a simple path with a single element repeating on either side or it can be a path on an axis with varieties of structures but in a similar manner on opposite sides. An axis can be radial also like what is shown here. Two perpendicular axis cross here so as to make the central load powerful. Most of the traditional religious architecture in India and abroad is an example of Radial symmetry with two perpendicular axis. Also, an axis can be more in two in number, like what you see here, Radial symmetry. Now we will some architectural examples of application of axis and symmetry.

The example of Saak institute by architect Louis Kahn, a very simple and beautiful example of how an axis is empowered by a symmetry of institutional building on either side. If the symmetry is broken in the facade of these buildings. The beauty of this axis will be broken. An example of British Council library by architect Charles Correa in New Delhi. Again you have a facade, the forms in the facade, the openings, the building forms and the garden, everything is symmetrical on either side, empowering the axis.

Bahai temple, here is an example of the radial symmetry where you don't have a single central axis. You have an axis on all the radiating sides. The building looks the same from all the directions. You have symmetry on all the directions. Example of Milan Cathedral in Italy. Most of the European cathedrals, the gothic cathedrals and even contemporary cathedrals, the facade will be perfectly symmetrical. Even the planning of the architecture will be symmetrical. The case of Taj Mahal doesn't have symmetry on one line. It has symmetry on more than two axis. If you see the facade from the front or the sides or even diagonally, it will symmetrical from all directions again this example of Humayun's tomb in Delhi, example of a radial symmetry. Example of planning of temple architecture, again an example of radial symmetry. Symmetry of a building can only be applied on buildings and campuses. The entire city or a settlement can be planned according to symmetry in axis.

The example of the Forbidden city in Beijing. There is a strong central axis along the movement path which leads to the centre of the settlement and all the buildings around are arranged in a symmetrical manner. Another example of symmetry and axis. The axis here is empowered by the Obliques like that was discussed before. The axis here is important because it leads to the main altar, to the cathedral in the front here. The axis and symmetry is more empowered by the colonnade on either side. Without this Oblixe and without this colonnade on either side, the movement here, the axis here won't be powerful or interesting.

Principles of Hierarchy, Rhythm & Datum:

Now we will see in detail about the principles. What is a hierarchy? Most of architectural compositions have varieties of forms and spaces with different functions and levels of importance and meanings. For a form or a space to be articulated as important, it must be emphasized through size or shape or its location. This articulation of importance is called hierarchy. A sketch shows a design through which hierarchy and importance is created at the centre of the Cathedral space. Most of the religious monuments which will be very large scaled has many spaces inside it. Out of all the spaces, the main central altar will be the most important space. How can it be empowered and signified? It can be empowered and signified through the hierarchy of the form. Both in the interior and also in the exterior. This is an example of

Hagia Sophia in Istanbul. You'd see many forms here, but one form is very different and is the main powerful form i.e. the central dome. Just by the positioning of it in the shape of it, the importance of the space below is emphasized i.e. an example of hierarchy.

A hierarchy or an importance can be shown in many ways. Hierarchy can be shown by size, shape or by location placement of it. Hierarchy by size, a form or space may dominate an architectural composition by being significantly different in size from all the other elements in the composition as already shown in this picture. Imagining this to be various parts of spaces of bigger architectural composition. One part seems to be important and also another part seems to be very important. This importance or field of hierarchy is created just by varying size of the part. Here it is larger, here it is smaller. Both the changes, creates importance to the arrangement. All these spaces seem to be subordinate to these two spaces. This is an example of hierarchy or manipulation to the size of the element. Now we will how the hierarchy can be created by changing the shape.

In this composition, you can see various spaces or objects out of which only two seem to be important because the shape changes or the arrangement of the shape changes. Hierarchy can be created without changing the shape and size, just by placement of it. In this case the shape is not different, the size is not different. Just by placing the shape in a different location an importance can be created. Now we will see examples of architecture which have applications of all these hierarchical methods. The plan of Jawahar Kala Kendra in Jaipur where the main administrative building is shown importance just by keeping it apart from the main composition of planning the 9 squares. The Louvre pyramid, the form is very unique and that uniqueness creates a significance of the hierarchy in the entire composition. Out of this entire facade, one part seems to be very important.

This importance gets created by the scale of it. All the arches in comparison to this main arch is smaller, that's why the importance is created. Not only in buildings, even in city scapes, certain structures and architecture can be shown importance just by manipulating the size of it. In this case, the scale of the Florence Cathedral in the Florence city is shown very important just by the scale of it and also by the shape of the dome. There is an interesting example of how a hierarchy can be created, by decrease in size also. The

series of Gopurams, receding towards the centre. The main entrance Shikhara is the smallest in the entire row. Hierarchy can be created by reducing sizes also. Here is the plan of the assembly building in Chandigarh by architect Le Corbusier. The form was rectilinear form but you have one part which is a circle and that change in the shape creates the importance, creates the hierarchy because this is the main assembly hall of the entire building. That change in shape is shown in the building view also. So if somebody perceived the building from its exterior, they will know the importance of the shape and the space below.

Now, we will discuss about the principle what is called as 'Datum'. Datum refers to a line or a plane or a volume of a reference to which other elements in the composition can relate to. It organizes a random pattern of elements through its regularity and continuity. In architecture, the aspect of Datum is very important. You have examples of architecture where you have many parts in a building. All the parts have to be combined or brought together on the same platform under a same Datum to make it as a single unified composition.

There are varieties of ways of doing it. There are different tools of creating a datum. A line can be a datum. An architectural plane or an architectural volume can be a datum, we will see it one by one. Given a random organization of dissimilar elements, a datum can organize the elements in the following ways. A line can cut through or from a common edge for the pattern, while a grid of lines can form a neutral, unifying field for the pattern. Here the main organizing elements of the composition is the central line or the central movement path, which unifies the composition without the central line, the composition may not be harmonious.

Creating a datum through a plane. A plane can gather the pattern of elements beneath it or serve as an encompassing background for the elements and frame them in its field. A volume can collect the pattern of elements within its boundaries or organize them along its perimeter like what is shown here. The different elements or spaces within an architecture is unified by a volume around it. Now we will see certain architectural examples of how organization or unification can be done by data. These structures you see here are being unified by certain elements here. One is the platform or the plinth on which the building is kept.

If you imagine this same building without the plinth which acts as a Datum, all these structures will look separate and disconnected to each other. The plinth acts as a unifying element. In this case of a Japanese temple, the bounding corridor around the building acts as a unifying element without which all the temple structures will look separate and disconnected to each other. In elevation, this corridor connects all the separate buildings into unified composition. Even a roof pane can do the same activity of connecting the disconnected spaces, like what is shown in this picture. A single roof plane which connects and unifies the activities happening below the shaded roof.

Now we will see in detail the aspect of rhythm or repetition of architecture. Again as we discuss before, all these principles are not only there in architecture. It is applicable in any form of art like sculpture also. If you have repetition in sculpture or art, it brings beauty to it. Rhythm refers to any movement characterized by a patterned recurrence of elements or motifs at regular intervals. The movement may be of our eyes or our body through a sequence of spaces. Rhythm incorporates repetition as a device to organize forms and spaces in architecture.

We will see some examples of rhythm in architecture. Architectural elements most of them are repetitive like what was discussed before. Here in this case, the columns repeat in a sequence which in this case creates a rhythm. The colonnade of St.Peter's square. Almost all building types incorporates elements that are by their nature repetitive. For example, beams and columns repeat themselves; windows and doors reoccurs in a building surface, space recur to as per similarity of need. Repetition in building need not be perfectly identical, they may just share a common trait or a common denominator.

The repetition in architecture might be created by repeating the same shape but in a different scale like what is shown in the first example. Either it is a column or a window but in a different scale. But in all cases in might not be possible. You may have different shapes but in that case you can create a repetition or a rhythm by maintaining the same size of it, irrespective of the form of shape. If neither the shape nor the size is possible as a similar one, then you can rhythm, similarity or repetition through details in the shapes

like what are shown here. Now, you can see architectural examples or applications of the repetition principles here. The Lyon station where you have rhythm and the facade by the architectural element i.e. column which is of the same shape and same size. But in the same facade you'd see, a repetition of the structural member here, the same shape but in a different size. Even windows can be a rhythmic element like what is seen in the hostel building of MIT by architect Alvar Aalto. One of the best examples of rhythm in the building form. There is only element that is repeated in this entire composition which is shell like a petal of a lotus. It changes in its size, it changes in its proportion but the main form has not changed which creates a repetition and a rhythm.