



**THE TECHNOCRACY**  
STUDENTS' TECHNICAL COMMITTEE, NIT RAIPUR

## AAVARTAN 24-25



**VIGYAAN**  
**DEPARTMENT OF ARCHITECTURE**

### PROBLEM STATEMENTS

#### **ARCH 01. Futuristic architecture bamboo construction**

Bamboo is a woody grass that is known to be the fastest-growing plant in the world. It has become a popular material choice in architecture and design projects because of its sustainable qualities and hardwearing characteristics as it has a higher compressive strength than concrete or wood, and rivals the tensility of steel. Bamboo can be cut and laminated into sheets and planks. This process involves cutting stalks into thin strips, planing them flat, and drying the strips; they are then glued, pressed and finished. bamboo is stronger than steel. This makes it an ideal material for construction projects, both big and small. Bamboo can also be processed in different ways to make it stronger. For instance, carbonization is a process that involves heating bamboo in an oxygen-free .

#### **Past methodology-**

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### **Current issue and limitations –**

One of the biggest challenges is its durability and resistance to pests, fungi, and fire. Bamboo can deteriorate quickly if not treated properly, exposing it to rot, insects, and mold. Bamboo also has a high flammability, which can pose a risk in case of fire .

### **Expection from the team-**

Design the futuristic resort with the bamboo structure . with all the required spaces and with all the required function .design as grand as you can .The site must be of your choice keeping in mind that site support bamboo structure .

## **ARCH 02. Modern solution for overcrowding in commercial space of Chandni**

### **Chowk Delhi**

Old Delhi is full of wonders, and Chandni Chowk tops this list. From housing some of the unique architecture belonging to the bygone era to being the oldest and busiest market, this place forms an integral part of Old Delhi. Besides, it is the end destination for every shopaholic and food lover. Whether it is a traditional dress or kitchen accessory, you will get almost everything here at Chandni Chowk Market Delhi.

Chandni Chowk keeps its doors open for tourists and locals alike for the entire year except on Sundays. So, you can visit this place at any time without worrying about encountering a closed market. If you are visiting Old Delhi during the summer season, try and avoid going to the market

during the daytime, as that would be quite uncomfortable, courtesy of the scorching Delhi heat. After sundown, the place gets more crowded as several shops open after 5 PM. So, be prepared to witness a humongous crowd after dusk. Also, try to avoid visiting the place during monsoons, as heavy showers create a mess in the narrow alleys.

### **Past methodology-**

Never has there been any major construction in Chandni Chowk, leave alone the Delhi Metro that has made traveling to and from the place for shoppers and shopkeepers convenient and easy. Omaxe Chowk will be one such introduction to the landscape and milieu of Chandni Chowk in these centuries.

Unchanged from the decades, The Omaxe Chowk is the renewal of a tradition of the ultimate Indian ethos, that's been here for thousands and thousands of years. Omaxe is just contributing to the beauty of this heritage of India, and tradition while opening the doors for new investment opportunities in different properties.

### **Current issue and limitations –**

Anyone who visited the much-talked-about shopping esplanade dealt with deafening traffic noise, unbearable pollution, unending crowds, roads in bad shape and dangerous power lines overhead. This was a locality on the verge of collapse. It needed immediate attention.

### **Expectation from the team-**

Give a solution for gathering of overcrowded area in chandni chowk without expanding the space and without losing the original fragrance of the space .

### **ARCH 03. Climatic responsive architecture for hot and dry area**

Architecture as a set of various climatic conditions. Architecture doesn't end within its walls - it starts in skies, goes through walls and ends in us. The invention of glass and its immaterial properties enabled the outside sensations like warmth and light to enter the building. Responsive architecture envisions the built environment to adapt to the changing needs of its occupants dynamically. Although it is increasingly feasible to move space-defining objects like room dividers by mobile robots, little is known about how or when such spatial adaptations should occur.

### **Past methodology-**

In traditional architecture of hot and dry climate, architects used deep courtyards and narrow alley with high walls to minimize hours of direct sunlight during the day. However all of the walls radiated to the cold sky during the night. Thus the walls were quite cool by the morning

### **Current issue and limitations -**

- The temperature in such areas varies between 27°C and 49°C during the day and 22°C at night.
- The humidity is low to moderate, and the skies are typically clear.
- Low humidity causes less rainfall, which reduces the number of plants in the area.
- There isn't much wind, but when there is, it's hot and dusty.
- Precipitation in this type of climate is deficient, ranging from 50mm to 150 mm annually since the air is completely hot and dry.
- In this type of climate, the sky is typically clear and blue. Even so, occasionally, dust storms fill the entire sky, producing an unbearable glare.
- Only thick leaves and thorny plants may easily survive here due to the extremely loose and sandy soil, low humidity and little rainfall.

Buildings can be designed using a lot less energy than is common today. The main objective of this research is to identify methods for reducing the building's energy usage in hot, dry areas. In this case, design strategies for energy efficiency are considered. They are mostly based on proper building shape, material selection, and orientation, as well as by implementing passive cooling methods and ventilation. The objective of this blog is to demonstrate how principles give rise to the concepts of using natural energy and passive cooling techniques.

### **Expectation from the team-**

In regions with hot and dry climates, shading is very useful for reducing heat gain. The design strategies to consider when conceptualizing are as follows: Pergolas, louvers, and screens are examples of outdoor shade structures that assist in letting just the necessary quantity of natural light into areas

Design a residential in the land of rajasthan and design atleast 2 passive cooling technique with the working model of the given solution by the team and describe them

### **ARCH 04. Construction method without the help of RCC in struction**

RCC is a popular choice for projects because it is light weight and easy to work with, making it a good choice for bridges and other large construction projects. Reinforced cement concrete (RCC) is a type of concrete that uses reinforcing fibers to improve the strength and stability of the concrete. The fibers are woven into the concrete before it's poured, and they help to distribute pressure and stress throughout the material.

This makes RCC more resistant to compressive loading and less likely to crack or shatter under stress. It is also more durable than traditional concrete, which means it can last longer without needing repairs or replacement Property of RCC

- It must have the ability to withstand adequate tensile strength, compressive strength, bending, and shear forces.
- The concrete must not show excessive deflection and spoil serviceability requirement
- The reinforcement needs to have a good covering so that corrosion does not occur •
- The hair cracks that are formed should be within the permissible limit • It should be good fire and weather-resistant
- The concrete can be molded into any desired shape and size while it is still fresh
- It should be a high-durability material
- Any load can be constructed to be supported by an RCC structure .

The earliest recordings of concrete structures date back to 6500BC by the Nabataea traders in regions of Syria and Jordan. They created concrete floors, housing structures, and underground cisterns. 3000 BC – Egypt and China: Egyptians used mud mixed with straw to bind dried bricks. François Coignet used iron-reinforced concrete as a technique for constructing building structures. In 1853, Coignet built the first iron reinforced concrete structure, a four-story house at 72 rue Charles Michels in the suburbs of Paris.

### **Current issue and limitations –**

RCC structures demonstrate two types of failures: 1. Structural Failure: This failure is basically due to design deficiency, that is, when the applied load exceeds the design If serviceability aspect is not considered then the structure fails due to cracking, deflection or corrosion, deterioration.construction errors, disintegration, scaling, cracking, efflorescence, erosion, spalling, and popouts.

### **Expectation from the team-**

Design G+2 building without any structural support of RCC in the construction Find any replacement of the RCC which can support the structure Without and deflection Make details of the material that are use ,how durable are the , what type of soil or environment they need for the steady structure .

### **ARCH 05. Plan to built houses on the mood by 2040**

Rather than searching for real estate listings in another state or even country, you may eventually be looking for homes in an area much farther away: the moon. NASA has announced that it plans to build residences on the moon by 2040, which you may be eligible to live in during your lifetime.

### **Past methodology-**

The moon is a magnet, and it is pulling us back.

Half a century ago, the astronauts of Apollo 17 spent three days on that pockmarked orb, whose gravitational pull tugs not just on our oceans but our imaginations. For 75 hours, the astronauts moonwalked in their spacesuits and rode in a lunar rover, with humanity watching on television sets 240,000 miles away. The Apollo program was shuttered after they splashed back down to the Pacific Ocean in December 1972, and since then, the moon has hung, uncharted and empty, a siren in the sky

### **Current issue and limitation-**

Unlike Earth, the moon lacks erosion processes caused by wind and water, resulting in the presence of sharp-edged particles in lunar dust. This abrasive characteristic poses a significant hazard to space exploration.

### **Expectation from the team-**

NASA's endeavour extends beyond national borders and incorporates partnerships with universities, private enterprises, and construction firms. These collaborations signify a paradigm shift in the architectural realm, where interdisciplinary teamwork and shared expertise are essential in crafting innovative solutions for extraterrestrial living.

You are one of the architect in the project so according to the given challenges design a lunar house .

Make sure of the atmosphere , material, sustainability of the house ,how the moon soil can help for construction and durability ,etc.

## **ARCH 06. How to Improve Internal and External Environments with Glass Ceilings**

As a highly transparent material that stands up to all but the most extreme of weather conditions, is easily formed into any size or shape, and, once formed, will last for thousands of years, glass is still one of the most innovative and crucial materials used in architecture. Although contemporary building practices allow us to form huge, glittering skyscrapers of glass that rise hundreds of meters into the air, the ancient material's original purpose – to welcome light into weathertight and secure interiors – remains its most important more than a thousand years on. As important as glass is to almost every typology of architecture in the form of windows, when it comes to the roof of a building, the use of glass is not so simple. We've understood the power and danger of combining light and glass ever since we saw a magnifying glass used to concentrate the heat of sunlight into incredibly high temperatures in children's cartoons. Under a glass roof, the solar gain can make for uncomfortable internal environments without the correct protective precautions.

### **Past methodology-**

Glass has come a long way since the ancient Egyptians first started using it for decoration and protection from external elements. Over the centuries, glass has been used for windows, mirrors, skylights, and even as a structural material in buildings. The evolution of glass in building design is a fascinating story of innovation, creativity, and a quest for beauty and functionality.

### **Current issue and limitations –**

- Overheating
- Thermal Insulation
- Noise Levels
- Condensation on Glass
- Airtightness

### **Expectation from the team-**

Design a part of Indira Gandhi Airport in ,New Delhi which is not used since 15 years .You are there to desing a area with glass ceiling and have to create a waterfall structure from that ceiling. The ceiling style can be of your choice ,for example, Singapore's Jewel Changi Airport

## **ARCH 07. Temple Complex of the Future (Religious Architecture)**

Temples have always held central importance around the world and can be active sites of cultural confluence. Possible areas to explore in your architecture dissertation for this topic are the uses of sustainability in creating religious structures, materials used, analysing the cultural significance of the architectural elements in structures, and classifying their types and historical context.

### **Past methodology-**

Inter-faith traditions are spreading across the world, and this can and has given rise to new ideas. The Lotus Temple in Delhi is an excellent case study on the same - with a marvellous, nine-sided circular shape that embodies the central tenets of the Baha'i' faith. It receives 20 percent of its electricity from solar panels. While the structure may look delicate, it can withstand an earthquake of up to 8 on the Richter scale. This is because each of its nine petals has been individually constructed and fortified. It is also one of the foremost examples of biomimetic architecture in the modern world.

### **Current issue and limitations –**

Some temples face encroachment on their land, leading to disputes over property ownership. In some cases, valuable temple land has been illegally occupied or acquired, making it difficult for the temple authorities to manage and expand their premises. 19 May 2023

### **Expectation from the team-**

Design a future Hindu temple for of your choice of architecture style .The temple must consist all the important element of Hindu architecture that a traditional temple have . the structure must show the future near by of 2080 -2090. Explain how the future temple is different from the traditional one from the structure and other element