



## VIGYAAN PROBLEM STATEMENTS

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### 1. Structural Health Monitoring

Due to the engineering costs and lack of resource availability associated with incorporating a SHM system into a structure, many organizations opt to forego deploying one. Reduction in maintenance costs by only conducting maintenance when it is needed and increasing the lifetime of structures by detecting damage early for a proactive response is a main challenge now a days.

**Aim:**

- Performance enhancement of an existing structure.
- Monitoring of structures affected by external factors.
- Feedback loop to improve future design based on experience.
- Decline in construction and growth in maintenance needs. The move towards performance-based design philosophy.

### 2. Artificial Recharge Techniques for Augmentation of Ground Water

Most water for recharge becomes available during short periods. These periods usually coincide with floods, when recharge infrastructure – such as canals, pipelines and recharge basins – is already working at full capacity. As demand for ground water has gone up, rapid urbanization and land use changes have decreased drastically the already low infiltration rates of rainfall into the soil and have diminished the natural recharging of aquifers. **You have to come up with a qualitative approach to face this challenge.**

### 3. Effective Water Distribution System

Providing sufficient water of appropriate quality and quantity has been one of the most important issues in human history. As populations grew, the challenge to meet user demands also increased. People began to transport water from other locations to their communities, the best serving example of which is the Chennai water crisis. Many efforts on the development of a water supply system have been made through for sustainable water supply. However, the complexity of system limited the site specific application at the first era. **Develop an effective water supply system to assist decision makers to design more reliable systems for a long range operation period.**

#### **4. Monitoring Of Water Bodies In Terms Of Their Quality**

Monitoring water quality is an important part of helping us determine whether or not we are making progress in cleaning up our waterways. It reveals the health and composition of streams, rivers, and lakes at a snapshot in time, as well as over weeks, months, and years.

The importance of tracking changes in water quality can't be overstated: human health and livelihoods depend on clean, reliable water supplies. In addition to furthering scientific discovery, monitoring is crucial for ensuring the sustained health of the water bodies we enjoy. So suggest a few simple techniques that can be easily implemented and can attain a acceptable tolerances in terms of quality.

#### **5. Feasibility of Transferring Water from Surplus to Deficit Water Bodies**

Utilization of available water of a region for use of a community has perhaps been practiced from the dawn of civilization. In India, since civilization flourished early, evidences of water utilization has also been found from ancient times.

Although many such developments had taken place in the field of water resources in earlier days they were mostly for satisfying drinking water and irrigation requirements. Modern day projects require a scientific planning strategy due to:

1. Gradual decrease of per capita available water on this planet and especially in our country
2. Water being used for many purposes and the demands vary in time and space
3. Water availability in a region – like county or state or watershed is not equally distributed.
4. The supply of water may be from rain, surface water bodies and ground water.

So suggest some measures available for planning, development and management of water resources of a region systematically.

#### **6. Durability of Concrete**

Concrete is a global material that underwrites commercial wellbeing and social development. There is no substitute that can be used and can rely on structural integrity. The major issue we face now a days is durability. A major concern of a concrete structure is how to get a robust and reliable structure in terms of costs, maintenance and repairs. The next question is how to specify requirements for these points? Can we rely on the existing codes or should we prescribe more details? Therefore, an update of the design method and durability related challenges are required.

**Aim:** To enhance the durability of concrete using various mineral and chemical admixtures.

## 7. NSC Design

Undesirable seismic performance or failure of non-structural components (NSCs) during earthquakes is reported as a major portion of seismic economic loss. To prevent or reduce earthquake induced damage in NCSs sufficient resistance must be provided. In a performance based design framework, the required seismic design force is determined according to the predefined performance criteria. Depending on the type of NSC, the performance criteria could be either an acceleration or displacement limit. Hence, a floor horizontal acceleration or displacement response spectra is needed to determine the forces generated in the NSCs. This problem describes a novel analytical approach to derive earthquake induced floor spectra in a regular building. The general approach is based on representing the structure as equivalent single degree of freedom (SDOF) systems considering a first non-linear mode and the other predominantly elastic higher modes.

## 8. Earthquake Resistant Design

Due to earthquake, major losses can occurred it may give damages to structure and in worst case it may collapse. For avoiding this damage of structure steel braces provided to high rise building to provide strength and also for resist lateral load imposed by earthquake and wind.

There are 'n' numbers of possibilities to arrange steel bracings such as X, V, Inverted V. A building is situated at seismic zone V. There are various steel bracing systems used to resist the lateral forces. For strengthening of RCC and Steel building against seismic forces steel bracing system applied on structure for avoiding displacement of building. The aim of project is by using this bracing for varying height of building analysis can be obtained for seismic zone V. In this project main thing is comparing building with and without bracing displacement, drift and storey shear results at zone V. The objective of this problem is to evaluate the response of braced and un-braced structure subjected to seismic loads and to identify the suitable bracing system for resisting the seismic load efficiently.

## 9. Non Ductile Concrete Buildings

Poor seismic performance of concrete building has been demonstrated dramatically in recent earthquakes in the world. The scenario based on these incidents confirms that the large proportion of deaths and serious injuries will be attributable to the collapse of **non-ductile concrete buildings**. The exposure to life and property loss in an earthquake is immense. Many non-ductile concrete buildings have high occupancy. Severe damage can lead to critical loss of building contents.