



## **AAVARTAN'23-24**



### **VIGYAAN DEPARTMENT OF CIVIL ENGINEERING**

#### **PROBLEM STATEMENTS**

**CIV01.      Improved Levelling Survey Techniques**

Surveying errors can have a significant impact on the accuracy of measurements, leading to inaccurate results. Investigate and quantify the sources of error in leveling surveys, such as instrumental inaccuracies, atmospheric conditions, and human errors, to develop improved techniques for more accurate elevation measurements.

**CIV02.      Durability of Construction Paints**

The durability of construction paints can vary based on factors such as the type of paint, environmental conditions, nature of surface, evaluate the durability and weather resistance of paints commonly used in civil construction, including exterior paints and coatings, to recommend suitable products for specific environmental conditions.

CIV03. Sustainable Concrete Mix for Dams

Develop a sustainable concrete mix design with reduced shrinkage properties to minimize cracking in large concrete dam construction and incorporating recycled aggregates and supplementary cementitious materials (SCM) to reduce the environmental impact of construction.

CIV04. Temperature Effects on Concrete Strength

Temperature can have a significant impact on the strength development of concrete. It can accelerate the rate at which concrete gains strength, while lower temperature can slow down the strength development process. Evaluate the influence of temperature variations during curing on the strength development of concrete and propose suitable curing methods for different climatic conditions.

CIV05. Innovative Sustainable Bridge Design

Develop a sustainable bridge design using innovative materials and construction techniques to minimize environmental impact during the construction phase and evaluate the feasibility of building a floating bridge across a wide river or bay, considering the effects of water currents, wave action, and potential environmental concerns.

CIV06. Urban Green Roof and Truss Design

How can we design a green roof system or robust roof truss design for an urban building, considering the added weight of vegetation, agriculture storage facility and water retention, while ensuring the overall roof strength.

CIV07. Foundation Effects on Soil Permeability

Investigate the effects of foundation on soil permeability & the seepage patterns and uplift pressures under a concrete dam structure. And evaluate the permeability reduction in compacted clay due to hydration and propose measures to minimize permeability.

CIV08. Fire Escape Plan for Public Buildings

Develop a fire escape plan for a public building, illustrating the locations of emergency exits and evacuation routes in different sections of the building.

CIV09. Landslide Risk Assessment in Himalayan Areas

Develop a systematic landslide risk assessment framework for key transportation routes in hilly and Himalayan areas, identifying high-risk zones and recommending risk mitigation measures to enhance the safety of army convoys.

CIV10. High-speed Rail Track Design

Develop optimized track designs (using low-cost materials) and alignments for high-speed rail systems, considering factors like track curvature, super elevation to ensure safe and smooth travel at high speeds. Showcase your ideas and prepare a model.

CIV11. Railway bridge inspection and maintenance

Develop comprehensive inspection and maintenance protocols for railway bridges, including assessment of structural integrity, fatigue analysis, corrosion protection to ensure the safety and reliability of rail transportation.

CIV12. Corrosion Protection in Railways

Develop innovative corrosion protection solutions for various railway infrastructure components, including signaling systems, communication networks to ensure reliable railway operations.

CIV13. Early Warning System for Earthquakes

Prepare models for early warning systems for earthquake - prone regions to minimize the impact on buildings. And what are the ideas and strategies for construction approaches for earthquake -resistant buildings using sensor-based health monitoring of structures.

CIV14. Modeling Smart Road Systems

Prepare a model of smart road systems with integrated sensors and data analytics to enhance traffic management, safety and maintenance efficiency.