



(PROBLEM STATEMENT FOR CIVIL ENGINEERING)

1) Smart villages - integration of ict to existing rural Infrastructure.

- Information and communications technologies (ICTs) have proved its vast potential for the benefit of mankind in various fields. Information and communications technologies (ICTs) are often used to assure the right to an education and learning, and have a potential to serve developing needs . The various researchers have recognized the potential of ICTs for rural development and it may play key role for the fast and sustainable development of rural India in coming years. Information Technology (IT) can make a difference in a developing country only, if it is designed in close collaboration with its users .

2) MMCs (Modern method of construction/modern material of construction) to build LIG homes under PMAY (Pradhanmantri Awas Yojna)

- Owing a house for low income and middle income is becoming a difficult. Hence, it has become a necessity to adopt cost effective, innovative and environment-friendly housing technologies for the construction of houses and buildings for enabling the common people to construct houses at affordable cost. It covers the use of local materials in the different components of building to make the building low cost and it makes affordable houses for low income people.

3) Solar powered irrigation system

- The main goal of this project is to develop an irrigation system in the field of agriculture by using solar energy and it has many advantages. The system is an automatic irrigation system where the irrigation pump is operated from solar energy. It becomes tedious to manually operate the irrigation system and keep monitoring the water level of the soil. Hence the system uses solar power by using photo-voltaic cells instead of commercial electricity.

4) Risk analysis of a Infrastructure/construction project.

- Software is a unique tool that can be used for project planning , control, monitoring and reporting. It is useful for all engineers who are in the field of project management. It is backed by Oracle, which in turn provides unlimited data storage and fast access to the data. The combination of the two makes it a brilliant software that can be recommended to all project managers and planners. Also its multidisciplinary functionality makes it perfect for all trades.

5) Earthquake treatment design & advanced control devices

- How to reduce vibrations in the structure
- How to increase serviceability of structure by minimum use of materials like steel etc.
- Use of prestressing in earthquake resisting structures
- Use of rubber in earthquake resisting structures
- Use of precast members in earthquake

6) Green buildings & zero energy buildings

- Green Building refers to a structure and using a process that is environmentally responsible and resource efficient throughout a building's lifecycle. Since buildings consume nearly 50% of World's Total Energy, Green Buildings, on the other hand, consume minimum amount of energy with the use of energy efficient materials. Hence, location of green buildings in the close proximity would create a green zone and providing much healthier environment with minimum heat island effect.

Requirements: Start with Smart Design, Use Energy Modeling, Super-Seal the Building Envelope, Super-Insulate the Building Envelope, Heat Water Wisely, Use Highly Insulated Windows and Doors, Use the Sun for Solar Tempering, Create an energy Efficient, Fresh Air Supply, Select an Energy-Efficient Heating and Cooling System, Install Energy Efficient Lighting.

7) Passive solar energy buildings

- Passive solar design is a green concept which is aimed to utilize the maximum solar energy in the form of heat to maintain interior thermal comfort throughout the sun's daily and annual cycles, thereby the reducing the dependence of energy consuming mechanical and electrical systems of heating and cooling. The windows, walls and floors of the homes are designed to collect the solar heat from the sun in winter and reject it in the summer.

8) Computer application in civil engineering-ANN using GIS and GPS

- The use of electronic computers for the solution of problems related to Civil Engineering. Programming languages with particular emphasis on FORTRAN 90. Geometric and algebraic test problems. Integration, least-squares, Fourier series. Solution of linear algebraic systems and eigenvalue problems. Applications to different Civil Engineering disciplines. The MATLAB program and its uses, MATLAB toolboxes and mathematical libraries, the MATLAB programming language, graphics in MATLAB and interaction with other programming languages. Various MATLAB commands, such as commands for: simple calculations, complex numbers, matrices, solution of linear systems, polynomials, polynomial roots, graphics in 2D or 3D, histograms, symbolic mathematics, derivatives, integrals, interpolation polynomials, differential equations, functions, solution of non-linear equations, solution of non-linear systems, Taylor polynomials.
- **Requirements:** Various softwares for Civil like staad pro, epanet, ansys, auto-cad, MATLAB, FORTRAN, revit, sap.
- For a construction project to be successful, many factors including environmental impact, scheduling conflicts, site safety, budgeting etc; should be considered. GIS software greatly enhances the optimum use of land, the functional efficiency of a proposed design, its marketability etc ; GIS is a powerful tool in management of spatial information and also provides its potential in forest fire management. There are different applications of GIS in forest fire management out of which the most important ones are Hazard mapping, forest fire simulation and resource management. It is very helpful in tracking vehicles and finding easier routes for traveling. There are various hazards such as nuclear disaster, chemical disaster, etc., for which a web based application tool, provides a web-based evacuation preparedness for citizens living close to nuclear power plant, within mile radius.

10) Pollutant removal from ground water by coagulation process

- High concentrations of arsenic in groundwater have caused extraordinary medical issues the whole way across the world. In this, diverse strategies of arsenic evacuation have been considered by utilizing some cross breed materials, for example, Activated (charcoal) furthermore with Ferric Chloride, Coarse Calcite alongside Ferric Sulphate(hydrous) and Portland Cement. These cross breed materials were set up by sol-gel and co-precipitation strategy.

11) Health monitoring using sensors.

- Smart sensing technologies including the applications of fibre optic sensors, piezoelectric sensors, magnetostrictive sensors and self-diagnosing fibre reinforced composites, possess very important capabilities of monitoring various physical or chemical parameters related to the health and therefore, durable service life of structures. In particular, piezoelectric sensors and magnetostrictive sensors can serve as both sensors and actuators, which make SHM to be an active monitoring system. Thus, smart sensing technologies are now currently available, and can be utilized to the SHM of Civil Engineering structures.

12) Best out of waste using civil engineering.

- Waste material has been defined as any type of material by product of human and industrial activity that has no lasting value. The re-use of waste materials is an essential step in creating a sustainable future, and research into the re-use of different byproducts has often led to new materials that provide superior service or greater economy than those traditionally used. Marginal soils, including loose sands, soft clays, and organics are not adequate materials for construction projects. These marginal soils do not possess valuable physical properties for construction applications. The current methods for remediation of these weak soils such as stone columns, vibro-compaction, etc. are typically expensive. Stabilization of soil with adding these waste materials are new & cheaper method of utilization. There are many method of waste management but recycling of them is one of the best methods of utilizing the waste material.