DON BOSCO COLLEGE OF ENGINEERING

Fatorda, Goa - 403 602

DEPARTMENT OF CIVIL ENGINEERING

2022-2023

"EcoVille – 2k23"

.....way towards Sustainable Development

From the HOD's Desk:

It is a great pleasure to bring out the project idea book "EcoVille – 2k23" that we launched so enthusiastically in the year 2020 which projects the implementation of innovative ideas considering their impact on the environment.

Civil Engineering is one of the oldest engineering disciplines and aims at facilitating the life for the society and in general making the world a better and more civilized place to live. It is the most versatile and core branch of Engineering comprising of structural Analysis & Design, Geotechnical, Irrigation and water resources, Transportation, Construction and Environmental Engineering etc. In our department students are encouraged to participate and present their project work in National and International conferences. Students are also motivated to participate in project competitions organized at National level to enhance their presentation and communication skills along with technical knowledge. Our graduates are exceptionally well prepared for challenging careers, handling major projects and being on the fast track towards new heights in their careers.

Release of "EcoVille – 2k23", a project idea book of Civil Engineering department is an attempt to improve industry institute interaction.

Dr. Shwetha P.
Associate Professor and Head,
Dept. of Civil Engineering
Don Bosco College of Engineering, Fatorda-Goa

CONTENT

Domain of project : Green Technology and Sustainable Development

STUDY OF COASTAL ZONE MANAGEMENT AND THEIR REQUIREMENTS IN THE STATE OF GOA

Domain/Area of Interest:

Project Members:
Anand Alias Shubham P.Kamat
Sanat Prabhudessai
Aditya Tendulkar
Saishree Shirodkar
Shruti S Lotlikar
Luella Sequeira

Project Guides:
Prof. Satyesh Kakodkar
Prof. Shruti Jhambhale

Brief Idea of project: This study is to investigate the demarcation of Coastal Regulation Zones, with a particular emphasis on comprehending the processes, obstacles, and consequences associated with the implementation of CRZ demarcation measures. The purpose and scope of mangrove growth in the coastal regulation zone (CRZ) are primarily focused on environmental protection and the sustainable development of coastal areas. Promoting the growth of mangroves in the CRZ is intended to guarantee their conservation and restoration, considering their ecological significance and their crucial role in maintaining coastal resilience. This project aims in reviewing the roles of mangrove as coastal protection as well as a natural barrier to storm surges, tsunami, wind, waves, and erosion, and the benefits of protecting mangroves. The demarcation of the CRZ serves multiple purposes, including environmental conservation, the management of coastal erosion and flooding, the promotion of sustainable development, and the preservation of coastal communities. It helps identify and protect ecologically sensitive areas, regulates development to prevent environmental degradation, and guarantees the sustainability of coastal ecosystems.

Applications

The Coastal Regulation Zone is the zone near the coastline which includes the coastal area up to 500 meters from the High Tide Line (HTL) and a stage of 100 meters along the banks of streams, estuaries, backwaters, and rivers vulnerable to tidal variations (CRZ). These zones are governed by CRZ rules.

EXPERIMENTAL STUDY ON PLASTER BY PARTIALREPLACEMENT OF CEMENT WITH GGBS

Domain/Area of Interest:

Project Members:
Kenny B. Ferrao
Abhishek Jaiswal
Suraj Dharwadkar
Ganesh Masekar
Nandraj Naik

Project Guide:
Mrs. Shruti Jambhale

Brief Idea of project: *Our aim of this project is to produce a plaster that is less dependent on cement and sand, so as to reduce the environmental impactwhile still being practical.*

Our project has 3 objectives.

1. To analyse the physical and chemical properties of soil and GGBS
2. To work out the best combination of plaster using soil, GGBS and cement
3. To study the strength behavior of plaster made with GGBS and soil.

Applications: Construction Industry for saving natural resource, decreasing the use of cement and impact on environment by using byproduct in construction.

Awards and Participation: ---

Working Model: ---

SIESMIC ANALYSIS & REDESIGN OF EXISTING STRUCTURES

Domain/Area of Interest: Earthquake Engineering/Seismic Engineering

Project Members:
Mr. Aturaj Pradeep Arolkar
Mr. Harsh Jayant Shenvi Navelkar
Mr. Raj Manoj Mardolkar
Mr. Sankalp Chandrashekhar Tuenkar
Mr. Varad Vishwajit Shirodkar
Mr. Siddharth Ratnakar Phadte

Project Guide:
Prof. B.R. Anirudha

***Brief Idea of project*:** The seismic resilience of existing structures is of paramount importance in regions prone to earthquakes. The project focuses on enhancing the seismic performance and resilience of buildings and infrastructure while ensuring safety and minimizing damage. The study employs ETABS software for rigorous seismic analysis, simulating various scenarios to evaluate the structure's behaviour during earthquakes.

The project begins with comprehensive data collection, including structural drawings, plans, and material specifications. The project models and analyses both Model 1 and Model 2 under seismic loads. Bracing is provided for the structures to resist the seismic loads and improve their seismic behaviour. By sharing the findings and recommendations the project aims to foster a culture of continuous improvement in creating safer and more resilient structures.

***Applications*:**

1. **Seismic Retrofitting-** Project's findings can be directly applied to retrofit existing buildings and infrastructure in earthquake-prone regions.
2. **Building Code and Standards improvement**- The project's results can contribute to the improvement of building codes and standards related to seismic design.
3. **Risk Assessment and Insurance-** Insurance companies and risk assessment firms can utilize the project's results to evaluate the seismic risk of buildings and infrastructure.
4. **Future Infrastructure Design-** The project's knowledge can be applied to the design of new buildings and infrastructure in earthquake-prone regions.

DEVELOPMENT OF GEOPOLYMER CONCRETE AND IT'S UTILIZATION IN CONSTRUCTION

Domain/Area of Interest: Geotechnical engineering and Construction

Project Members:
Pawanraj S. Sawant Dessai
Siddhanth L. Kamulkar
Sairaj C. Akarkar
Mayuri M. Naik
Vaishnavi B. Kalangutkar

Project Guide:
Prof. Satyesh Kakodkar

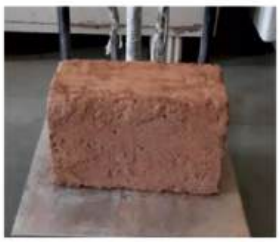
Brief Idea of project: Our study aims at development of Geopolymer concrete and it's utilization in construction. By re-using Iron Ore Tailing waste, we intend to reduce the negative impact on the environment caused due to mine waste. Preliminary tests like specific gravity, moisture content were conducted on iron ore tailings to evaluate its properties. In our project, M30 grade concrete was produced by conducting 4 trial mixes, first trial with a mix proportion of 100% for 10mm aggregate, 100% IOT, 65% GGBS, 10% fly ash, 15% cement, and 10% lime. In Trials 2, 3, and 4, 10mm aggregate was replaced with 10%. 20%, and 30% ceramic waste, respectively. A control mix was prepared to compare the compressive strength with the trial mixes. Results showed that when we opted for a 40% increase in ceramic waste, the strength decreased. But as the ceramic waste content increased, the workability decreased, so we opted for a standard Geopolymer Mix without ceramic. Additionally, it is observed that in none of the tests did the compressive strength fall below the value specified by the IS code. Using the control mix. Casting of blocks and panel was done and tests were performed on them.

***Applications*:** We can use geoploymer blocks as partition walls and geoploymer panel as cladding for exterior wall.

Awards and Participation: Smart India Hackathon 2022

Working Model:

Geopolymer Concrete Panel



Geopolymer Concrete Block

QUALITY MAPPING AND PREPARATION OF CHECKLIST FOR PILE CONSTRUCTION AND PILE INTEGRITY TEST

Green Technology And Sustainable Development

Project Members:
Pushkar Patkar (2021030)
Vysakh Nair (2021026)
Ronson Rodrigues (2021031)
Ninad Chodankar (2021008)
Aniket Kumar (2021020)
Damodar Arondekar (2021004)

Project Guide:
Jeffrey Valadares

Brief Idea of project: Basically the idea of the project is to create a checklist of different types of failure that occurs in pile foundation

***Applications*:** The project is the need of the hour as the far has increased the structures will go taller and foundations will go deeper. We will need to check all the criteria as the bad practices need to be taken care off

Awards and Participation: -

Working Model: -

EVALUATION OF PRODUCTS MADE FROM ACTIVATED GGBS

Green Technology and Sustainable Development

Project Members:
Hanumantray Nirdi(2021027)
Avinash Harijan(2021014)
Niraj Hoble(2021015)
Akash Gawas(2021011)
Alwaz Shah(2021002)
Omkar Gawas(2021012)

Project Guide:
Prof. Jeffrey Valadares

Brief Idea of project: Basically the idea of the project is to make construction products without the use of cement as for the production of cement lots of Carbon Dioxide (CO_2) is released which harms the environment.

Applications: The project focuses on providing green and sustainable construction products like pavers, cover blocks, etc. without the use of cement in manufacturing. Need of cement in construction industry is increasing rapidly and along with that production is also increasing resulting in emission of greenhouse gases affecting the environment. Our aim is to replace construction products made of cement with GGBS products which is a green material and production does not involve much emission of CO_2.

EXPERIMENTAL INVESTIGATION OF CONCRETE BY PARTIAL REPLACEMENT OF CEMENT AND SAND WITH SUSTAINABLE

Domain/Area of Interest: Green Technology and Sustainable Development

Project Members:
Siddharth Bagkar
Atharv Bandekar
Sanket Bhat
Sahil Korgaonkar
Dhanraj Shetkar
Dharmesh Surlakar

Project Guide:
Prof. Kaushik Pai Fondekar

Brief Idea of project: An experimental study was conducted by partial replacement of cement with fly ash and ground granulated blast furnace slag and sand with quarry dust. Several set of combinations was carried out by partially replacing cement with 10%, 20% and 30% fly ash and sand with quarry dust by 40%, 50% and 60%. Furthermore, several combinations of GGBS partially replacing cement by 30%, 40%, 50% and sand with quarry dust by 40%, 50% and 60% were conducted. The optimum percentage from the above set was taken into the consideration for the ternary mix. The results of ternary mix were compared with results of conventional concrete which are relatively satisfactory.

Applications: It can be used for concrete structure and also for non-structural purpose.

Working Model:

STRUCTURAL AUDIT AND REPAIR METHODOLOGIES OF DISTRESSED BUILDING

Domain/Area of Interest: **Structural audit**

Project Members:
Mr. Dayanand Naidu
Miss. Shivangi Komarpant
Miss. Sonali Naik
Miss. Sonam Bhagat

Project Guide:
Ms. Nadya Baracho

Brief Idea of Project: To carry out the structural audit of the distressedbuilding to study its current condition.

***Applications*:** To carry out the further study on structural audit and varioustypes of instruments that can be used for the same.

Awards and Participation: ---

USE OF WASTE PLASTIC IN GREEN MASONRY BRICKS

Domain/Area of Interest: Green technology and sustainable development

Project Members:
Miss. Anisha Naik (2021003)
Mr. Muzammil Shaikh (2021023)
Mr. Prajwal Dabolkar (2021029)
Mr. Chinmay Sawant Talaulikar (2021034)
Mr. Sumedh Shetgaonkar (2021038)
Mr. Tanesh Narvekar (2021043)

Project Guide:
Prof. Swaroopa Sail

Brief Idea of project: The aim was to address plastic pollution and the high cost of construction materials. The results showed promising findings, with the bricks demonstrating suitable compressive strength values for structural applications. The use of Scrap Plastic Waste and river sand as composite materials for masonry bricks offers an eco-friendly and cost-effective solution to environmental concerns and resource depletion, making them a viable alternative in the construction industry.

Applications:

1) Non-load bearing walls: Plastic bricks are suitable for constructing non-load bearing walls, partitions, and interior structures.
2) Pavements and walkways: Plastic bricks can be used for paving footpaths, walkways, and other non-load bearing ground surfaces.
3) Insulation panels: The thermal insulation properties of plastic bricks make them useful for creating insulation panels used in walls and roofs.
4) Temporary structures: Plastic bricks can be used to build temporary structures like booths, kiosks, and shelters.

Working Model

EARTHQUAKE RESPONSE CONTROL OF A STRUCTURE USING SHEARWALL

Domain/Area of Interest: Structural Engineering

Project Members:
Mr. Pranath Gauns Dessai
Mr. Joel Vasanth
Mr. Mohammed Gaus Kanyal
Mr. Flinton Milroy Silveira
Mr. Kishorekumar C.S.
Mr. John Joseph Reji

Project Guide:
B. R. Anirudha

Brief Idea of project:

Earthquake occurs because of disturbance that is triggered underneath the ground surfacethe resulting ground motion from an earthquake induces large force onto the structure ofa short period of time. Using a shear wall is a great and efficient way to control the effectsof earthquake caused by seismic loads acting on the building. In the present study two 10Storey structures will be considered. One structure is regular and other one is irregular, and analysis is conducted on both structures with and without shear walls. Performance of both buildings will be evaluated using ETABS and a detailed comparative study is performed to enhance the performance of both the regular and irregular building.

***Applications*:**

- To mitigate the effects of earthquake on a regular and irregular structureusing shear walls.
- To identify the optimum location of shear walls in both regular andirregular structure in order to get best results.

Awards and Participation: ---

Working Model: (If any): ---

EXPERIMENTAL STUDY ON PROPERTIES OF LIGHT WEIGHTBLOCKS USING FLY ASH AND RUBBER

Domain/Area of Interest: Using waste material

Project Members:
Krish Naik
Anagha A. Prabhukhadpe
Gulahmed Sahikh
Shruti Sawant
Siddhi Surlakar
Viraj Tandel

Project Guide:
Prof. Swaroopa Sail

Brief Idea of project:

An experimental study was conducted by partial replacement of tyre rubber with fly ash. 3 set of combinations was carried out by partially replacing fly ash with 0%, 5% ,10% and 15% tyre rubber were conducted. The optimum percentage from the above set was taken into consideration for the ternary mix. The results of the ternary mix were compared with the results of conventional AAC block which are relatively not satisfactory.

Applications:

It can be used for partition walls in cold storage

Working Model:

APPLICATION OF WATER QUALITY INDEX FOR SURFACEWATER IN GOA

Domain/Area of Interest: Environmental Engineering

Project Members:
Miss. Owena De Souza
Miss. Sisera De Souza
Miss. Dikshita Nevli
Mr. Fredrick Dias
Mr. Vighanesh Pednekar
Mr. Dinesh Lopes Pereira

Project Guide:
Miss. Prachi Dessai

Brief Idea of project: Clean freshwater is crucial for human survival and the ecosystem. Water quality issues need urgent global attention due to their potential to disrupt the hydrological cycle. In the past decade, water resources, especially surface water, have degraded due to population growth, urbanization, and intensified agriculture. Water quality depends on chemical, physical, and biological factors, evaluated against standards for drinking, agriculture, and industry. Assessing water quality is crucial for public health and aquatic life preservation. Goa thrives on 11 rivers and 42 tributaries, like Terekhol, Mandovi, Baga, and Zuari, nurturing the region since ancient times, as seen in Stone Age carvings. They offer clean water and sustain diverse ecosystems. Goa's main rivers and tributaries face threats from mining, barge pollution, and industrial discharges. Urgent action is needed to prevent their potential extinction. The study assesses river water quality using IS Code, CCME WQI, and WAWQI methods to measure pollution levels.

***Applications*:** Water Quality Index is applicable for Classification of water into

1. Drinking water
2. Water for irrigation
3. Livestock watering use

Awards and Participation: NIL

Working Model: NIL

RUNOFF PREDICTION FOR MANDOVI RIVER BASIN USING INTEGRATEDSCS-CN MODEL AND GIS TECHNOLOGY

Domain/Area of Interest: Hydrology.

Project Members:
Rowena Rodrigues
Sanket Gaonkar
Shaurya Parsekar
Sonia Karra
Sudesh Shelar
Tejas Devidas

Project Guide:
Dr. Shwetha Prasanna

Brief Idea of project:

1. To calculate direct runoff based on rainfall, soil type, soil moisture,drainage, density etc.
2. To estimate the total average volume of runoff using total average annualrainfall by SCS-CN model.
3. To compare the runoff results of SCS-CN model and GIS technology.

***Applications*:**

- This project gives insight with regards to how to perform and use the SCS-CN model for a beginner. As the accuracy of data increases, better models will be created and hence mapping out the runoff affected areas.
- GIS technology can be used for scientific investigation, resource management and development planning.
- The model can also be used as reference by any NGO, or stakeholders to see and check if the land is under any risk.

Department of Civil Engineering
Don Bosco College of Engineering, Fatorda, Goa

Vision

To be the Center of Excellence in Civil Engineering Education and Consultancy by providing holistic, innovative and research centric environment and keeping pace with rapidly changing technologies.

Mission

- To impart quality education in civil engineering, through effectiveness and innovation in teaching and learning.
- To promote positive interactions among faculty and students and foster networking with alumni, industry and other stakeholders.
- To train young minds in soft skills, intellectual and ethical strengths, conducive to globally competitive environment.
- To motivate students for research and entrepreneurship in relevant sectors of society with focus on excellence and creativity.
- To undertake sponsored research and provide consultancy services in all the areas of civil engineering beneficial to the community.