

6th Sem/Mini Project-III/Session 2024-25

Group No	Uni R No	Name	Title
G-1	22024112	Gudesh kumar	Design and Analysis of single Storey Public Building
	21024144	Churamani sahu	
G-2	22024136	Samir Kumar	Evaluation of Ground Improvement using Stone Column
	23024149	Harsh Vardhan Banjare	
	22024104	Antara Deb	
G-3	22024135	Riya Dewangan	Exploring Recurrence of Violations at Mid-Block Median Openings: An Ordered Probit Analysis
	22024103	Anshuman	
	22024123	Neetika Singh	
	22024116	Karan Gangwani	
G-4	22024125	NIKHIL PANDEY	Design and Analysis of a Residential Building
	22024110	Dasari Himabindhu	
G-5	22024133	Rishabh Kumar	Experimental Investigation of Concrete with Limestone and Calcined Clay (LC2) Based Binder
	22024134	Rishi Kesh Harsh	
	22024115	Jay prakash kumar	
G-6	22024121	MD SAHIL HAQUE	Hydraulic analysis of Mahanadi River Using Google Earth Pro and River Analysis systems
	22024106	Arkeet Roy	
	22024109	Bandaru Sravanthi	
G-7	22024145	SUNDARAM	Cost Prediction of construction Project using Artificial Neural Network
	22024105	Anukriti Bala	
	22024131	Rajesh Kumar	
	21024101	Aditya Yadav	
G-8	22024143	Sumit Kumar	AQUASYNC: Technical and AI Approach Towards Water Quality Managements Management
	22024126	PINKI KUMARI	
	22024142	Sidharth Kumar	
	22024149	Vishal Kumar	
G-9	22024137	SATYAJEET AADIL	Planning and Estimate of Residential Building
	21024138	Sourav singh	
	21024128	Robin Kumar	
	21024130	Samyak Tamgadge	
G-10	22024147	TARUN KUMAR	Development of CNN-Based Pavement Crack Detection Model and PCI Estimation
	22024127	Piyush Keshri	
	22024120	Manish kumar ratre	
G-11	22024117	Anitha Kongalla	Dynamic analysis of Embankment built on Soft Soil Improved with Encased Stone Column
	22024129	PURUSHOTTAM DAS MAHANT	
	22024146	Supriya kumari	
	22024101	Agidi Koushik	

G-12	22024108	Ayushi Sharaff	Compressive Strength Prediction of Geopolymer concrete using Artificial Neural Network and K-Nearest Neighbors
	22024128	Prakash tiwari	
	22024138	Shinde Chirag Krishna	
G-13	22024144	Sumit Ratre	An Experimental Study of Effect of Partial Replacement of Cement with GGBS in M-30 Grade Concrete
	22024119	Manish Kumar	
	22024130	Rahul Kumar Singh	
G-14	22024139	Shivam Kumar Singh	
	22024148	Udit kumar nishad	
	22024150	Vivek Kumar Meena	
G-15	22024113	Himanshu Mishra	Comparative Design of Slab Using Excel, Python and STAAD Pro
	22024122	Md Sohail Akram	
	22024141	Shubham Kumar	
G-16	22024102	Annu Kumari	Treatment of Greywater by UV-H ₂ O ₂ advanced Oxidation Process
	22024132	Rintu Kumar	
	22024107	Ashish Nagesh	



Report on Mini Project III

**DESIGN AND ANALYSIS OF SINGLE STOREY PUBLIC
BUILDING**

Submitted by Group No 1

GUDESH KUMAR(22024112)

CHURAMANI SAHU(21024144)

B .Tech VI Semester



**Under the Guidance of
MISS AYUSHI NAYAK
Assistant Professor**

**DEPARTMENT OF CIVIL ENGINEERING
INSTITUTE OF ENGINEERING AND TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University established by the Central Universities Act
No. 25 of 2009)
Session 2024-25**

DEPARTMENT OF CIVIL ENGINEERING
INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A CENTRAL UNIVERSITY)



CERTIFICATE

We here by submit the mini project report entitled "**DESIGN AND ANALYSIS OF SINGLE STOREY PUBLIC BUILDING**" in the Department of Civil Engineering of Guru Ghasidas Vishwavidyalaya, under the supervision of **MISS AYUSHI NAYAK** (Assistant Professor), Department of Civil Engineering, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

Signature _____

Miss Ayushi Nayak
Assistant Professor
(Project Guide)

Signature _____

(External Examiner)

Signature _____

(External Examiner)

Signature _____

Prof. M. C. RAO
Head of department
Department of Civil Engineering
Guru Ghasidas Vishwa

ABSTRACT

The 2D and 3D plan drawn in AutoCAD and the design and analysis of single storey public building is done by following the codal provisions and guidelines given in IS 456:2000 and SP16. The main focuses in this project are to calculate the loads on different members of the building, analyze all the members of the building, design different members of the building and also show the typical detailing of the following members.

In this project we enhanced our knowledge and learned more about load calculations, design and analysis of the different members of the building. Also, we studied how to analyze and design with practical imagination. By studying the methods in structural analysis in theory we have known how analysis is done of any given building in practical life, and also how to design the different members of any particular building by confirming all the codal provisions given in IS 456:2000 and SP16.

The outcome of this project is to draw 2D and 3D plan using AutoCAD application and to design and analyze all the different members of the building by using IS 456:2000 and SP16 also detailing by using SP34.

Report on Mini Project III

Evaluation of Ground Improvement Using Stone Column

Submitted by

Group No 2

1. Samir Kumar (22024136)
2. Harsh Vardhan Banjare (23024149)
3. Antara Deb (22024104)

B. Tech VIth Semester



Under the Guidance

Mr. Vinod Kumar (Assistant Professor)

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CERTIFICATE

This is to certify that the mini project work entitled **"Evaluation of Ground Improvement Using Encased Stone Column in PLAXIS"** presented by Samir Kumar (22024136), Harshvardhan Banjare (23024149), Antara Deb (22024104) students of B.Tech IV semester, Department of Civil Engineering and Technology, Guru Ghasidas Vishwavidyalaya, has been successfully and satisfactorily completed.

This Project Report is Submitted in partial fulfilment of the requirement for the award of the degree of Bachelor of Technology, School of Studies of Engineering and technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

We wish in all future endeavors to graduating students.

Signature _____

Mr. Vinod Kumar

(Project Guide)

Assistant Professor

Department of Civil Engineering

Signature _____

(EXTERNAL EXAMINER-1)

Signature _____

(EXTERNAL EXAMINER-3)

Signature _____

Prof. M. C. RAO

Head of department

Department of Civil Engineering

SOS (E & T), Guru Ghasidas Vishwavidyalaya

(A Central University), Bilaspur

Signature _____

(EXTERNAL EXAMINER -2)

Signature _____

(EXTERNAL EXAMINER-4)

ABSTRACT

Ground Improvement Technique (GIT) refers to a set of engineering methods used to enhance the physical properties of weak or problematic soils to make them suitable for construction. These techniques aim to improve soil strength, reduce compressibility, control settlement, and increase load-bearing capacity. GIT is applied when natural ground conditions cannot support structures safely. Common methods include mechanical compaction, soil stabilization with additives (like lime or cement), grouting, drainage systems, vibro-compaction, and the use of geosynthetics. The choice of technique depends on soil type, project requirements, and environmental conditions, ensuring safe and economical foundation design and construction.

Stone columns are used to improve the load-bearing capacity and reduce settlement in soft, compressible soils such as clay or silty soils. They are formed by drilling holes into the ground and filling them with compacted crushed stone or gravel in layers.

PLAXIS 3D is a powerful finite element software used for 3D analysis of deformation and stability in geotechnical engineering projects. It is widely used by engineers to simulate soil-structure interaction and complex ground behavior.

MINI PROJECT-III REPORT

ON

**Exploring Recurrence of Violations at Mid-Block Median Openings:
An Ordered Probit Analysis**

Submitted to

Department of Civil Engineering

By

Riya Dewangan 22024135

Anshuman 22024103

Neetika Singh 22024123

Karan Gangwani 22024116

B. Tech (VI Semester)

Under the supervision of

Dr. Adheesh Kumar Vivek

(Assistant Professor)

**DEPARTMENT OF CIVIL ENGINEERING****SCHOOL OF STUDIES IN ENGINEERING AND TECHNOLOGY****GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)**

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(SESSION 2024-25)

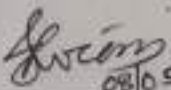
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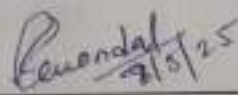
This is to certify that the mini project- II work entitled "**EXPLORING RECURRENCE OF VIOLATIONS AT MID-BLOCK MEDIAN OPENINGS: AN ORDERED PROBIT ANALYSIS**" presented by Ms. Riya Dewangan (22024135), Mr. Anshuman (22024103), Ms. Neetika Singh (22024123), Mr. Karan Gangwani (22024116), students of B. Tech, VI semester, Civil Engineering Department, Guru Ghasidas Vishwavidyalaya, has been completed successfully and satisfactorily.

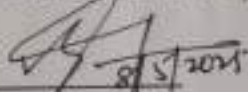
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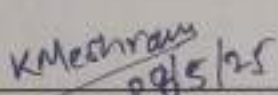
Dr. Adheesh Kumar Vivek

Assistant professor

Guide

Signature  08/05/25
(EXTERNAL EXAMINER-1)

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(EXTERNAL EXAMINER-3)

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(EXTERNAL EXAMINER-4)

Signature _____

Prof. M. C. RAO

Head of department

Department of Civil Engineering

SOS (E & T), Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur

Abstract

The study considers the traffic violations committed by road users at mid-block median opening while taking U turns. The current research aims to investigate various factors leading to traffic violations at MBMOs particularly because most of them are unsignalized and is still unexplored for heterogeneous traffic conditions prevailing in India. In this regard, a questionnaire was framed considering sociodemographic background and other inevitable conditions prevailing at mid-block median opening. To identify the most significant independent variables affecting the dependent variable, Spearman's correlation analysis was first employed. This helped us in filtering out insignificant variables such as gender, marital status, education, use of speed limit sign, wrong side driving, streamlined merging, etc and selecting only those independent variables that demonstrated a meaningful relationship with the outcome of interest some of them are age, land use, lack of concentration, inadequate length of median opening, use of mirror, etc. The selected variables were then subjected to an ordered probit model analysis, an appropriate method for modelling ordered data. Following model estimation, a marginal effect analysis was performed to quantify the impact of unit changes in each significant independent variable. The analysis revealed that the type of vehicle and improper traffic signs have most significant impact on the dependent variable, implying that policy measures should be implemented targeting these independent variables, as they have a significant impact on the recurrence of violations. The fundamental equation derived from the ordered probit model was subsequently employed for validating the model's predictive performance. Through this validation process, it was observed that the developed model demonstrated a high level of statistical significance, indicating its robustness and reliability in capturing the underlying relationships within the data. The analysed data assisted to rank the variables seeking immediate attentions by planners and policy makers.

Keywords: Mid-block median openings; Violation; Spearman's correlation; Ordered probit model; Marginal effect

MINI PROJECT-III REPORT

on

DESIGN AND ANALYSIS OF A RESIDENTIAL BUILDING

Submitted to the
Department of Civil Engineering
by

Nikhil Pandey

(Roll No. -22024125)

Dasari Himabindhu

(Roll No.-22024110)

Under the Supervision of
Dr. VVS Surya Kumar Dadi
Associate professor



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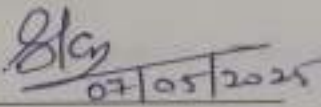


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CERTIFICATE

This is to certify that the mini project work entitled "**DESIGN AND ANALYSIS OF A RESIDENTIAL BUILDING**", submitted by **Mr. Nikhil Pandey** (Roll no. - 22024125), and **Ms. Dasari Himabindhu** (Roll no.-22024110), students of B. Tech VI Semester, Civil Engineering Department, Guru Ghasidas Vishwavidyalaya, has been completed successfully and satisfactorily.

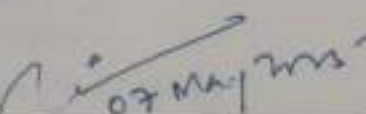
This project report is submitted in partial fulfilment of the requirements for the award of the Degree of Bachelor of Technology in Civil Engineering, SoS, Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

Signature 
07/05/2025

Dr. VVS Surya Kumar Dadi

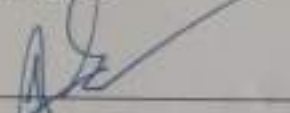
Associate Professor

Department of Civil Engineering

Signature 
07/05/2025
External Examiner -1

Signature 
External Examiner -2

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External Examiner -3

Signature 
External Examiner -4

Signature 
Prof. M. C. RAO
Head of Department

Dept. of Civil Engineering

ABSTRACT

This project details the design and structural analysis of a residential building, integrating AutoCAD for architectural planning and STAAD Pro for computational analysis, validated by manual calculations adhering to the Indian Standard Code IS 456:2000 and SP 16. The architectural layout and structural model were developed, followed by load application and analysis in STAAD Pro to determine critical structural responses.

Manual calculations for key elements provided a comparative assessment against the software results. A significant aspect of the project involved generating detailed reinforcement drawings for beams, columns, and footings based on IS 456, SP 16 and SP 34 provisions, ensuring standards in constructability.

Keywords: Residential Building Design, Structural Analysis, AutoCAD, STAAD Pro, IS 456:2000, SP 16, SP 34 Manual Calculation, Reinforcement Detailing.

Report on Mini Project

**EXPERIMENTAL INVESTIGATION ON CONCRETE WITH
LIMESTONE AND CALCINED CLAY(LC²) BASED BINDER**

Submitted by

Jay Prakash Kumar(22024115)

Rishabh Kumar(22024133)

Rishi Kesh Harsh(22024134)

B.Tech VIth Semester



Under the Guidance

Dr Nikhil Kumar Verma

(ASSOCIATE PROFESSOR)

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(A CENTRAL UNIVERSITY)



CERTIFICATE

It is certified that the mini project entitled "Experimental Investigation on Concrete with Limestone and Calcined Clay (LC²) Based Binder" submitted by Jay prakash Kumar, Rishabh Kumar and Rishi kesh harsh in partial fulfillment of the requirements of the award of the degree of Bachelor of Technology in Civil Engineering, School of studies of Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur, is carried out by them in the Department of Civil Engineering during session 2023-24 under supervision and guidance of Dr. Nikhil Kumar Verma, Associate Professor, Department of Civil Engineering, School of Studies of Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur CG.

Signature _____

Name Dr. Nikhil Kumar Verma

Associate Professor
Guide

Signature _____

(EXTERNAL EXAMINER-1)

Signature _____

(EXTERNAL EXAMINER-2)

Signature _____

(EXTERNAL EXAMINER-3)

Signature _____

(EXTERNAL EXAMINER-4)

Signature _____

Dr. M. C. RAO

Professor & Head of department
Department of Civil Engineering

SOS(E & T), Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur

ABSTRACT

The increasing demand for sustainable construction materials has led to the development of alternative cementitious systems that can reduce the environmental impact of ordinary Portland cement (OPC). This project investigates the mechanical performance of Limestone Calcined Clay Cement (LC²) as a partial replacement for OPC in M25 grade concrete. An initial set of three mix designs was developed using water-cement ratios of 0.45, 0.40, and 0.40 with 15% fly ash replacement. The mix with a W/C ratio of 0.40 exhibited the highest 28-day compressive strength of 33.2 N/mm², which exceeds the target mean strength which is 31.6 N/mm² that's why W/C ratio of 0.40 selected as the base mix for developing LC² concrete.

Two LC² variants were prepared by replacing 10% and 15% of cement with a combination of calcined clay and ground limestone (LC² V1: 5%+5%, LC² V2: 5%+10%). A total of nine cubes were cast for each variation and tested for compressive strength at 3, 7, and 28 days. The results revealed that LC² V2 achieved a 3-day strength of 17 N/mm², 7-day strength of 32.0 N/mm² and a 28-day strength of 30.34 N/mm², closely matching the control mix. LC² V1 also showed early strength gain with 21.67 N/mm² at 3 days, 21.67 at 7 days and 29.17 N/mm² at 28 days. These findings indicate that LC², especially with up to 10% calcined clay replacement, can serve as a viable and eco-friendly alternative to conventional OPC concrete without compromising strength requirements. Further testing of higher replacement levels is recommended for enhanced sustainability.

KEYWORDS LC² (Limestone-Calcined Clay) Concrete, Sustainable Construction, CO₂ Emissions Reduction, Portland Cement Substitution, Green Building Material

6

Report on Mini Project III
Hydraulic Analysis of Mahanadi River Using Google Earth
Pro and River Analysis Systems

Submitted by

MD Sahil Haque (22024121)

Arkeet Roy (22024106)

Bandaru Sravanthi (22024109)

B. Tech VIth Semester



Under the Guidance

Dr. Ashish Kumar Parashar

Associate Professor

DEPARTMENT OF CIVIL ENGINEERING

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2024 - 2025



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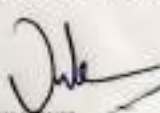
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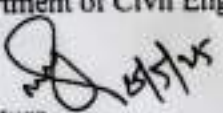
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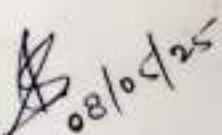
This is to certify that the mini project work entitled Hydraulic Analysis of Mahanadi River Using Google Earth Pro and River Analysis Systems, presented by Mr. MD. Sahil Haque (Roll No 22024121) and Mr. Arkeet Roy (Roll No: 22024106) and Ms. Bandaru Sravanthi (Roll No: 22024109) students of B.Tech. VIth Semester, Civil Engineering Department, Guru Ghasidas Vishwavidyalaya, has been completed successfully and satisfactorily.

This project report is submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in Civil Engineering, SOS, Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.).

Signature 
Dr. Ashish Kumar Parashar
Associate Professor
Guide
Department of Civil Engineering

Signature 
Dr. Umank Mishra
Associate Professor
Department of Civil Engineering

Signature 
Dr. Prakhar Modi
Assistant Professor
Department of Civil Engineering

Signature 
Dr. Sonal Banchhor
Associate Professor
Department of Civil Engineering

Signature 
Dr. M. C. Rao
Head of the department
Department of civil engineering

ABSTRACT

This project presents a hydraulic simulation of the Mahanadi River using HEC-RAS and Google Earth Pro, focusing on steady flow conditions. The simulation involved generating water surface profiles, velocity distributions, and floodplain mapping across selected cross-sections. Significant changes were observed in flow depths and velocity magnitudes at critical sections, indicating variable river behavior across the reach. Areas of potential backwater effect, flow concentration, and irregular cross-sectional geometry were identified. The results aid in understanding the river's flow response under defined conditions and demonstrate the river's hydraulic behavior in varied terrain and geometry.

7

COST PREDICTION OF CONSTRUCTION PROJECT USING ARTIFICIAL NEURAL NETWORK

**A Mini Project report submitted to Civil Engineering Department for the
partial fulfilment of the requirement for award degree of Bachelor of
Technology in Civil Engineering**

Submitted by

Anukriti Bala (Roll No: 22024105)

Sundaram (Roll No: 22024145)

Rajesh Kumar (Roll No: 22024131)

B. Tech VI Semester



Under the Guidance

Mr. Rochak Pandey

Assistant professor

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CERTIFICATE

This is to certify that the Mini Project work entitled "**COST PREDICTION IN CONSTRUCTION PROJECT USING ARTIFICIAL NEURAL NETWORK**" presented by Ms. Anukriti Bala (Roll No.: 22024144), Mr. Sundaram (Roll No.: 22024118) and Mr. Rajesh Kumar (Roll No.: 22024130) students of B. Tech vith Semester, Civil Engineering Department Guru Ghasidas Vishwavidyalaya, has been completed successfully and satisfactorily.

Signature _____

Name: Mr. Rochak Pandey

Assistant

Professor

(Guide & Internal

Examiner)

Signature _____

(EXTERNAL EXAMINER-1)

Signature _____

(EXTERNAL EXAMINER-2)

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(EXTERNAL EXAMINER-3)

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(EXTERNAL EXAMINER-4)

Signature _____

Prof. M. C. RAO

Head of department

Department of Civil Engineering

SOS (E & T), Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur

ABSTRACT

Cost prediction is the process of estimating the future cost of a project, product, or service. It involves analyzing historical data, industry trends, and other factors to forecast the likely cost of a particular endeavor.

Cost prediction provides a clear understanding of costs, enabling organizations to communicate more effectively with stakeholders, including investors, customers, and employees.

Cost prediction using ANN: Cost prediction using Artificial Neural Networks (ANNs) involves training ANNs on historical data to forecast future costs. ANNs can learn complex patterns and relationships in data, making them suitable for cost prediction tasks.

Here we have prepared dataset of 374 construction projects with 14,000 data sample and thereby predicted the value of cost using respective algorithm and comparing the accuracy from all the algorithms stated.

This study demonstrates the effectiveness of Artificial Neural Networks (ANNs) in cost prediction, offering a robust and accurate approach to estimating costs in various industries. By leveraging historical data and optimizing ANN architectures, our model achieves high prediction accuracy, outperforming traditional methods. The results highlight the potential of ANNs to improve cost estimation, enabling better decision-making and resource allocation.

8

Report on Mini Project

AQUASYNC:- TECHNICAL AND AI APPROACH TOWARDS WATER QUALITY MANAGEMENT

Bachelor of Technology
VIth Semester

Submitted By-

Group No – 08

Sumit Kumar
Pink Kumari
Sidharth Kumar
Vishal Kumar

Under the Guidance

Dr. Prakhar Modi



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CERTIFICATE

Certified that the Mini project report entitled "AQUASYNC:- Technical and AI approach towards water quality management" submitted by Sumit Kumar, Pinki Kumari, Sidharth Kumar and Vishal Kumar of B. Tech 4th Semester, in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies in Engineering and Technology Guru Ghasidas Vishwavidyalaya, Bilaspur is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under my supervision and guidance.

Signature _____

Name- Dr. Prakhar Modi

Guide

Signature _____

(EXTERNAL EXAMINER-1)

Signature _____

(EXTERNAL EXAMINER-2)

Signature _____

Dr. M. C. RAO

Head of department

Department of Civil Engineering

SOS(E & T), Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur

ABSTRACT

This report investigates the transformative impact of integrating machine learning (ML) and software development in the realm of water quality management. Water quality is essential for public health, environmental sustainability, and adherence to regulatory standards. This project explores how machine learning algorithms can enhance water quality management by offering predictive analytics and automated decision-making capabilities.

Our project developed a Python-based software application that leverages ML principles to assess and predict water quality parameters, providing real-time evaluations and comprehensive insights into water suitability for various uses. By combining software development with ML, the project aims to address existing challenges in water quality monitoring and offer a scalable solution that enhances the efficiency and effectiveness of water management practices.

Report On Mini Project-III
**PLANNING AND ESTIMATE OF RESIDENTIAL
BUILDING.**

Submitted by

Group no-09

Samyak Tamgadge (21024130)

Satyajeet Aadil (22024137)

Robin Kumar (21024128)

Sourav Singh (21024138)

B.Tech VIth Semester



Under the Guidance

PROF. SHAILENDRA KUMAR

DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central university established by the central universities act no. 25 of 2009)

Session 2024-2025

DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A CENTRAL UNIVERSITY)



CERTIFICATE

Certified that the mini project report entitled "Planning and Estimate of Residential Building" submitted by Samyak Tamgadge, Satyajee Aadi, Robin Kumar and Sourav Singh of B. Tech 6th Semester, in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies of Engineering and Technology Guru Ghasidas Vishwavidyalaya, Bilaspur is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25.

Signature.....

Name – **Prof. SHAILENDRA KUMAR**

Professor

Guide

Department of Civil Engineering

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External 1

Department of Civil Engineering

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External 3

Department of Civil Engineering

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Prof. M. C. RAO

Head of Department

Department of Civil Engineering

SOS (E & T), Guru Ghasidas

Vishwavidyalaya

(A Central University), Bilaspur.

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Department of Civil Engineering

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Department of Civil Engineering

ABSTRACT

AutoCAD is an essential tool in the engineering, design, and architecture industries, as it allows users to create precise and accurate designs quickly and efficiently. It includes various tools and features, such as drafting tools, annotation tools, and collaboration tools, that enable users to create complex designs and collaborate seamlessly.

The purpose of mini project is to develop a good learning in AutoCAD for designing any structural building's plan, elevation, and section. As a civil Engineer we are able to draw a complete a building plan of any residential building.

After the completion of this whole project, we will able to draw a complete plan, detailing, estimation and costing of any structural building which will gives a major impact in our civil engineering career.

A
MINI PROJECT REPORT ON
**Development of CNN-Based Pavement Crack Detection
model and PCI Estimation**

Submitted by

Group no-10

Tarun Kumar (22024147)

Piyush Keshri (22024127)

Manish Kumar Ratre (22024120)

B.Tech VIth Semester



Under the Guidance

Dr. Kundan Meshram (Assistant Professor)

DEPARTMENT OF CIVIL ENGINEERING

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Session 2024-25

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GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR(C.G.)
(A CENTRAL UNIVERSITY)



CERTIFICATE

It is certified that the Mini project report entitled "**Development of CNN-Based Pavement Crack Detection model and PCI Estimation**" submitted by Tarun Kumar, Piyush Keshri and Manish Kumar Ratre of B. Tech 6th Semester, in partial fulfilment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies of Engineering and Technology Guru Ghasidas Vishwavidyalaya, Bilaspur is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-25 under my supervision and guidance.

Signature *K. Meshram*
Name – **Dr. Kundan Meshram**
Assistant Professor
Supervisor

Signature.....*[Signature]*
(EXTERNAL EXAMINER-1)

Signature.....*[Signature]*
(EXTERNAL EXAMINER-2)

Signature.....*[Signature]*
(EXTERNAL EXAMINER-3)

Signature.....*[Signature]*
Dr. M. C. RAO
Head of department
Department of Civil Engineering
SOS(E & T), Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur

ABSTRACT

Timely and accurate detection of pavement cracks is essential for ensuring road safety and effective infrastructure maintenance. Traditional inspection methods are manual, time-consuming, and prone to human error. This project presents an automated pavement crack detection system using Convolutional Neural Networks (CNNs), aiming to improve the efficiency and reliability of pavement assessments. The system involves collecting pavement images under various conditions using smartphones, followed by preprocessing to enhance image quality. A CNN model is then trained to detect and classify common crack types such as longitudinal, transverse, and alligator cracks. The model also estimates the Pavement Condition Index (PCI) and repair cost through regression analysis, offering a more complete evaluation of road surface conditions.

To make the system accessible and scalable, a user-friendly web interface has been developed, allowing users to upload images and receive real-time crack analysis, PCI estimation, and cost prediction. The model demonstrates high accuracy and reliability across diverse scenarios.

This project addresses key limitations in existing methods, such as poor generalization and lack of severity quantification. Future improvements will focus on real-time video analysis and enhanced model accuracy using transfer learning. Overall, the system represents a significant advancement in road maintenance technology using AI-driven solutions.

Report On Mini Project

DYNAMIC ANALYSIS OF EMBANKMENT BUILT ON SOFT SOIL IMPROVED WITH ENCASED STONE COLUMN

Submitted by

Group no-11

Agidi Koushik (22024101)

Kongalla Anitha (22024117)

Purushotham das mahant (22024129)

Supriya kumari (22024146)

B. Tech VIth Semester



Under the Guidance

Dr. Balbir Kumar Pandey

DEPARTMENT OF CIVIL ENGINEERING, SCHOOL OF STUDIES OF
ENGINEERING AND TECHNOLOGY, GURU GHASIDAS
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Session 2024-2025



DEPARTMENT OF CIVIL ENGINEERING

**SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,
GURU GHASIDAS VISWAVIDYALAYA, BILASPUR (C.G.)**

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

CERTIFICATE

Certified that the Mini project report entitled "Dynamic analysis of embankment built on soft soil improved with encased stone column" submitted by Agidi Koushik, Kongalla Anitha, Purushottam Das Mahant, and Supriya Kumari of B. Tech 5th Semester, in partial fulfillment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies in Engineering and Technology Guru Ghasidas Vishwavidyalaya, Bilaspur is accorded to the student's work, carried out by them in the Department of Civil Engineering during session 2023-24 under my supervision and guidance.

Signature

Name – Dr. Balbir Kumar Pandey

Assistant Professor

Guide

Signature

(External Examiner - 1)

Signature

(External Examiner - 3)

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(External Examiner - 2)

Signature

Prof. M.C. RAO

Head of the department

Department of Civil Engineering

SOS (E & T), Guru Ghasidas Vishwavidyalaya (A Central
University), Bilaspur

COMPRESSIVE STRENGTH PREDICTION OF GEOPOLYMER CONCRETE USING ARTIFICIAL NEURAL NETWORK AND K-NEAREST NEIGHBORS

Project Report Submitted in Partial Fulfillment of Academic
Requirement for the Award of Degree of

BACHELOR OF TECHNOLOGY
in
CIVIL ENGINEERING

Submitted By
AYUSHI SHARAFF
(22024108)
PRAKASH TIWARI
(22024128)
SHINDE CHIRAG K.
(22024138)

Under The Guidance of
Dr. M.CHAKRADHARA RAO
Professor



DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY
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2024 - 2025



DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,

GURU GHASIDAS VISWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Act 2009 No. 25 of 2009)

CERTIFICATE

Certified that the project report entitled "**COMPRESSIVE STRENGTH PREDICTION OF GEOPOLYMER CONCRETE USING ARTIFICIAL NEURAL NETWORK AND K-NEAREST NEIGHBORS**" submitted by AYUSHI SHARAFF, PRAKASH TIWARI and K. CHIRAG SHINDE in partial fulfillment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, Department of Civil Engineering, School of Studies of Engineering and Technology Guru Ghasidas Vishwavidyalaya Bilaspur is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-2025 under my supervision and guidance.

Sign.....

Prof.M. Chakradhara Rao

Signature.....
(External examiner - 1)

Signature.....
(External examiner - 2)

Signature.....
(External examiner - 3)

Signature.....
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Prof.M.Chakradhara Rao

Head of Department

Civil Engineering Department,

School of Studies of Engineering and Technology

Guru Ghasidas Vishwavidyalaya

ABSTRACT

Geopolymer concrete is a sustainable alternative to traditional concrete, offering improved durability and environmental benefits. However, predicting its compressive strength remains a challenge due to the complex interactions between various factors. This study explores the application of Artificial Neural Networks (ANN) and K-Nearest Neighbors (K-NN) to predict the 28 days compressive strength of geopolymer concrete. A dataset of 300 samples was collected, which were published by different researchers in the open literature. Total 12 input parameters were used, namely binder content, amount of slag, rest period, curing temperature, curing period, the ratio of NaOH/Na₂SiO₃, amount of superplasticizer, extra water added, the molarity of NaOH, alkaline activator to binder ratio, amount of coarse and fine aggregates. From the results it may be concluded that the performance of the K-NN model was better than the ANN Models to estimate the compressive strength. The comparison reveals that K-NN is the most reliable model, giving an accuracy of 99%. The ANN Model demonstrates the highest coefficient of determination (R^2) of 0.84 and the lowest RMSE value of 0.83 MPa and MAE of 0.64 MPa.

Keywords: Geopolymer concrete, ANN, K-NN, Regression analysis, Compressive Strength, Classification Learner

**AN EXPERIMENTAL STUDY ON EFFECT OF PARTIAL
REPLACEMENT OF CEMENT WITH GGBS IN M-30 GRADE
CONCRETE**

Project Report Submitted in Partial Fulfilment of Academic Requirement for the
Award of Degree of

BACHELOR OF TECHNOLOGY

in

CIVIL ENGINEERING

Submitted By

Sumit Ratre

(Roll No. 22024144)

Manish Kumar

(Roll No. - 22024119)

Rahul Kumar Singh

(Roll No. - 22024130)

Students of B. Tech.-VI Semester

Under the Guidance of

Dr. R. K Choubey

Professor, Civil Engineering



DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

Session 2024-25

DEPARTMENT OF CIVIL ENGINEERING
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CERTIFICATE



This is to certify that, the Mini Project work entitled "**An experimental study on effect of partial replacement of cement with GGBS in M-30 grade concrete**" presented by Mr. Sumit Ratre (Roll No.- 22024144), Mr. Manish Kumar (Roll No.-22024119) and Mr. Rahul Kumar Singh (Roll No.- 22024130), students of B.Tech, 3rd Year, VI Semester, Civil Engineering, Guru Ghasidas Vishwavidyalaya, SoS Engineering & Technology, Bilaspur (C.G.) is satisfactory and accepted by the Department of Civil Engineering.

Signature.....

Dr. R.K Choubey

Guide

Signature.....

(External examiner – 1)

Signature.....

(External examiner – 2)

Signature.....

Prof. M. C. RAO

Head of department

Department of Civil Engineering

ABSTRACT

With rapid urban growth, there is a need for eco-friendly alternatives to traditional building materials. Cement, a major part of concrete, harms the environment by using up natural resources like limestone and producing high carbon emissions during manufacturing. To reduce this impact, this investigation looks at partially replacing cement with Ground Granulated Blast Furnace Slag (GGBS), a steel industry by-product that has cement-like properties.

This experimental investigation focuses on the mechanical characteristics (compressive strength) of M 30 grade nominal mix concrete and concrete when cement is partially replaced by GGBS in proportions of **10%, 20%, 30%, and 40%** by weight. Concrete mixes were designed using the guidelines provided by IS 10262:2019, with a water-to-cement ratio of **0.45 and 0.425**.

The experimental investigation indicates that the workability of fresh concrete decreases with increases in the percentage replacement of cement with GGBS in M 30 grade concrete. Further it is also revealed that the compressive strength of concrete with partial replacement of cement by GGBS shows a gradual increase up to 30%, possibly due to densification, and decreases beyond 30%, which may be attributed to the lower reactivity in C-S-H gel formation.

**COMPARATIVE DESIGN OF SLAB USING EXCEL,
PYTHON AND STAAD PRO.**

**Project Report Submitted in Partial Fulfillment of Academic
Requirement for the Award of Degree of**

BACHELOR OF TECHNOLOGY

In

CIVIL ENGINEERING

Submitted By

HIMANSHU MISHRA

(22024113)

MD. SOHAIL AKRAM

(22024122)

SHUBHAM KUMAR

(22024141)

Under The Guidance of

Ms. PREETI SINGH

ASSISTANT PROFESSOR



DEPARTMENT OF CIVIL ENGINEERING

**SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,
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(A Central University Established by the Central University Act 2009 No. 23 of 2009)

2024 - 2025



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SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY,

GURU GHASIDAS VISWAVIDYALAYA, BILASPUR (C.G.)

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CERTIFICATE

Certified that the project report entitled "**DESIGN OF SLAB USING PYTHON, EXCEL AND STAAD PRO**" submitted by HIMANSHU MISHRA, MD. SOHAIL AKRAM and SHUBHAM KUMAR in partial fulfillment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, Department of Civil Engineering, School of Studies of Engineering and Technology Guru Ghasidas Vishwavidyalaya Bilaspur is accorded to the student's own work, carried out by them in the Department of Civil Engineering during session 2024-2025 under my supervision and guidance.

Sign
Ms. Preeti Singh
Assistant Professor
(supervisor)

Sign
Examiner(s)

Sign
Prof. M. Chakradhara Rao
Head of Department
Civil Engineering Department,
School of Studies in Engineering and Technology
Guru Ghasidas Vishwavidyalaya

ABSTRACT

The design of reinforced concrete slabs is a critical component in structural engineering, ensuring safety, functionality, and cost-effectiveness in building construction. This project presents an integrated approach to slab design by leveraging the computational capabilities of Python, the data handling and tabulation strengths of Microsoft Excel, and the structural analysis power of STAAD Pro. The primary objective is to automate and optimize the slab design process to minimize manual errors, enhance efficiency, and ensure compliance with design codes (such as IS 456:2000).

In the first phase, manual calculation is made, , Excel is used as a dynamic tool to validate results, visualize data trends, and gives accurate result as manually calculated.. In the second phase, Python scripts are developed to perform calculations related to slab dimensions, loads, bending moments, shear forces, and reinforcement detailing. These scripts incorporate essential design checks and generate outputs based on user-defined parameters and gives visual representation of slab designed. Finally, STAAD Pro is employed for advanced modelling and structural analysis to simulate real-time loading conditions and validate the design under various boundary constraints.

The integration of these three tools demonstrates a comprehensive, semi-automated workflow for slab design, reducing design cycle time and increasing accuracy. This project not only reinforces core structural engineering concepts but also highlights the benefits of software integration in modern design practices.

Report On Mini Project-III
**Treatment of Greywater by UV- H₂O₂ Advanced
Oxidation Process**

Submitted by

Group no-16

Annu Kumari (22024102)

Ashish Nagesh (22024107)

Rintu Kumar (22024132)



Under the Guidance

Dr. Bijoli Mondal

DEPARTMENT OF CIVIL ENGINEERING, SCHOOL OF STUDIES OF ENGINEERING
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Session 2024-2025

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Certified that the Mini project report entitled "Treatment of Greywater by UV - H₂O₂ Advanced Oxidation Process" submitted by Annu kumari , Ashish Nagesh and Rintu kumar of B. Tech 6th Semester, in partial fulfillment of the requirements of the award of degree of Bachelor of Technology in Civil Engineering, School of Studies in Engineering and Technology Guru Ghasidas Vishwavidyalaya, Bilaspur is accorded to the student's work, carried out by them in the Department of Civil Engineering during session 2024-25 under my supervision and guidance.

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Associate Professor
Guide

Signature.....
Mr. Vinod Kumar
Assistant Professor
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Signature *K. Meshram* 08/05/25
Dr. Kundan Meshram
Assistant Professor
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Signature *P. M. C. Rao* 08/05/25
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