



VELAGAPUDI RAMAKRISHNA SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS) (Sponsored by Siddhartha Academy of General & Technical Education)

Approved by AICTE | Affiliated to JNTUK Kakinada | An ISO 9001:2015 Certified Institution



**CIVIL
ENGINEERING**

TECHNICAL MAGAZINE

July-December 2018

VOLUME - 1

ISSUE NO. -1



About the College:

Velagapudi Ramakrishna Siddhartha Engineering College was established in the year 1977, as the first self-financing Engineering College in the composite state of Andhra Pradesh. The college is in Autonomous Status from 2006 onwards granted by UGC, permanently affiliated to JNTUK and approved by AICTE. The institute is accredited by NAAC with A+ grade in 2021. All the UG programs are accredited by NBA under OBE Tier-I format and 5 PG in Engineering programs are also accredited once. The institute was ranked at 178 in NIRF-2021, 156 in NIRF-2020 and 171 in NIRF-2019 by MHRD and also stood at good rankings given in various surveys by national magazines. The institute was ranked in band A' (6-25 Rank) in 'ATAL Ranking of Institutions on Innovation Achievements (ARIA) in 2020 and was ranked 'Excellent' band by MHRD, GOI in 2021. The college received AICTE - CII Indpact award from MHRD for best I-I-I in civil engineering and was rated platinum for four consecutive years 2017-2020. The institute is recognized as 'SIRO' by DSIR, MST, GOI. This is the only private college granted with "Margadarshan Scheme " project by AICTE in the state of AP. The institute was rated PLATINUM by AICTE-CII survey for the last four years. The college has 20+ collaborative labs & COE's supported by Siemens, Dassault, IBM, DST, NI, Oracle, Apple, CISCO etc., The college is offering consultancy services in A.P. and earned more than Rs.12 crores during the last 5 years. The institute received R&D projects worth more than Rs.5.0 crores for the last 6 years funded by UGC, AICTE, DST, DRDO etc. The college has a worthy placement record, competent faculty with more than 135 PhDs. The strong presence of Alumni was felt across the Globe as Entrepreneurs, CEOs, Academic leaders etc. Six departments of the institute were recognized as Research centres by JNTUK, Kakinada. The institute has more than 60 MOUs with industry partners and more than 1000 publications by faculty for the last 3 years in National, International Journals and Conferences. Industry relevant curriculum is offered involving MOOCs Industry based courses, Internship Skill development, and Personality Development & Student practice courses. The college has NSS & NCC units in the campus recognized by State and Central Governments. There are quite a good number of visiting and adjunct faculties from foreign universities and industry. The

Laboratories in the Civil Engineering department are also accredited by NABL which is rare in academic institutions.

About the Department :

The Department of Civil engineering of Velagapudi Ramakrishna Siddhartha Engineering College was established in 1977 at the inception of the college. The under graduation program was started with an intake of 60 later increased to 120 in 2007 and further increased to 180 in 2011. The Department started offering Postgraduate courses Structural Engineering from 1999 and Geotechnical Engineering from 2016 with an annual intake of 18 each. The department has state of the art advanced laboratories to cater the needs of students, research and consultancy. The department has total faculty of over forty-five, with fifteen doctorates and seventeen more pursuing PhD. The department takes pride in its highly experienced faculty specialized in all major specializations of Civil Engineering.

Department Vision :

To impart teaching, research and develop consultancy that serves the society and to strive continuously for excellence in education.

Department Mission :

To provide quality education for successful career and higher studies in Civil Engineering that emphasizes academic and technical competence in profession and research, effective communication, team work and leadership to meet the challenges of the society.

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1. PAPER PUBLICATIONS OF THE FACULTY

i) Control of phosphoric acid induced volume changes in clays using fly ash

Volume changes of soils induced by inorganic acids cause severe foundation and superstructure failures in industrial buildings. This study aimed to assess the potential of fly ash to control volume changes in soils under acidic environment. Two soils such as black cotton soil predominant with montmorillonite and kaolin clay predominant with kaolinite were used for the present investigation. Both soils exhibited an increase in swelling subjected to phosphoric acid contamination. Ion exchange reactions and mineralogical transformations lead to an increase in swelling and a decrease in compressibility in black cotton soil, whereas phosphate adsorption and mineral dissolution lead to an increase in swelling and compressibility in case of kaolin clay. Different percentages of Class F fly ash obtained from Ramagundam national thermal power station were used for soil treatment. Fly ash treatment leads to significant reduction in swelling and compressibility, which is attributed to the formation of aluminum phosphate cements in the presence of phosphoric acid.

ii) Prediction of compressive strength of GGBS based concrete using RVM

Ground granulated blast furnace slag (GGBS) is a by product obtained from iron and steel industries, useful in the design and development of high quality cement paste/mortar and concrete. This paper investigates the applicability of relevance vector machine (RVM) based regression model to predict the compressive strength of various GGBS based concrete mixes. Compressive strength data for various GGBS based concrete mixes has been obtained by considering the effect of water binder ratio and steel fibres. RVM is a machine learning technique which employs Bayesian inference to obtain parsimonious solutions for regression and classification. The RVM is an extension of support vector machine which couples probabilistic classification and regression. RVM is established based on a Bayesian formulation of a linear model with an appropriate prior that results in a sparse representation.

Compressive strength model has been developed by using MATLAB software for training and prediction. About 70% of the data has been used for development of RVM model and 30% of the data is used for validation. The predicted compressive strength for GGBS based concrete mixes is found to be in very good agreement with those of the corresponding experimental observations.

iii) Experimental Investigation of Vertical and batter pile groups subjected to dynamic loads.

In the present work, the dynamic responses of cast in-situ reinforced concrete vertical and batter pile groups constructed in the silty sand have been investigated. An experimental study was carried out on four pile groups: a group of three vertical piles and a group of three batter piles arranged in triangular pattern, and a group of four vertical piles and a group of four batter piles arranged in square pattern. All batter piles were inclined at 20° to the vertical. Each pile group had a rigid pile cap supporting the oscillator-motor assembly for generating the dynamic loads. The pile groups were tested by varying the exciting force level in different loading direction, and their responses were compared in terms of resonant frequency and peak displacement. The peak displacement of the batter pile group shows a significant reduction (about 25% and 50% in vertical and lateral directions, respectively) compared to their respective vertical pile groups.

iv) Effect of state of compaction on the electrical resistivity of sand-bentonite materials.

Sand-bentonite mixtures are often used as lining materials in various containment systems. Leachate leakage can affect the electrical resistivity of sand-bentonite liners, and consequently, resistivity measurements can be used as an effective tool to detect contamination. This paper presents the results of an investigation into the effect of the state of compaction on the resistivity of sand-bentonite mixtures, with the bentonite content varying

from 0 to 100%. The resistivity of mixtures at their different states of compaction are investigated. The resistivity of the lining mixture decreases as the water content increases, but the rate of decrease is reduced significantly above a specific water content for each mixture. Furthermore, this specific water content was noted to be on the wet-side of the optimum for sand-bentonite mixtures and on the dry-side of the optimum for pure sand and pure bentonite. Increasing bentonite over 20% demonstrates insignificant impact on resistivity. It is observed that at higher water contents, bentonite addition has negligible effect on resistivity. Correlations applicable to the sand, bentonite and pore fluid used in this study have also been presented. The results from this study may be useful for soil contamination detection, liner leak detection, development of sensors, soil and corrosion studies, etc. in Australia as well as worldwide for similar sands.

v) Studies on Hexagonal Wire Mesh-Reinforced Crushed Stone Dust

Crushed Stone Dust (CSD), which is a waste product from an aggregate crusher, could be used as a pavement layer. To improve the tensile strength of CSD, it is worthwhile reinforcing it. In the present study an attempt has been made to reinforce a loosely and densely compacted CSD layer with Hexagonal Wire Mesh (HWM) placed in various positions. The results indicate that the California Bearing Ratio (CBR) value is improved by the placement of HWM in CSD. Field Rutting studies were also conducted on test tracks made of unreinforced and reinforced CSD layers. The rut depths were significantly reduced due to the inclusion of the reinforcement in the CSD layer.

vi) Performance based congestion control using video graphic volume count for an uncontrolled intersections in vijayawada city- a case study

The rapid changing in environment of traffic has impacted and led to the problem of traffic congestion. Vijayawada has been mentioned as a city that is developing rapidly which has caused changes in social structure extensively. The expansion area of the city has been expanded fragmentally based on basic infrastructure, the transportation

infrastructure can't support the growth of economy and rapid increase in population. Due to traffic congestion many huge problems are occurring like wastage of time, accidents, wastage of money, pollution etc. To overcome all these problems congestion control measures should be adopted and we selected a corridor in Vijayawada city having uncontrolled intersections are evaluated using video graphic technique.

vii) Generalized Analysis of Under-Reamed Pile Subjected to Anisotropic Swelling Pressure

Many pioneering foundation techniques have been suggested for plummeting the unfavorable heave of foundations placed in expansive clays. This paper presents another innovative technique of the determination of load creating a specified amount of settlement and load which maintains no uplift/no settlement. In the present study a slip layer of varying thickness is introduced along the pile periphery and depth of swelling zone, intensity of anisotropic swelling pressure are varied and stress based analysis is conducted and load creating a known amount of settlement and load which maintains no uplift/no settlement are found out. It is accomplished that (a) Increase in expansive zone increases, load required for known amounts of settlement increases for a given slip element thickness, bulb diameter and swelling pressure (b) The soil heave and pile uplift are immensely affected by the intensity of anisotropic swelling pressure intensity. (c) Provision of slip element below the pile tip reduces the pile upheaval.

viii) Seismic Liquefaction Analysis of Capital Region of Andhra Pradesh State, India

Liquefaction is a phenomenon happens in a loose, fully saturated cohesionless soil in undrained condition subjected to cyclic loading. During liquefaction of the soil lost its shear strength when the mean effective stress is made equal to zero due to the progressively increasing excess pore water pressure. Liquefaction may cause failure of foundations, resulting

in collapse of structure, even if the structure is designed as an earthquake-resistant. Liquefaction depends on characteristics of subsurface soil. Amaravathi is a new capital of Andhra Pradesh State, India. The construction activities in the capital region are swiftly increasing. It is essential that the new structures constructing in capital should be assessed for liquefaction susceptibility. In the present investigation an attempt has been made to assess the liquefaction susceptibility of various sites in the capital of Andhra Pradesh State, India. The liquefaction analysis is carried out by using simplified method which mainly relies on Standard Penetration Test (SPT) value.

2. CONFERENCES ATTENDED BY FACULTY

i) Response surface methodology for optimal stabilization of expansive soil using ggbs and fibers

Expansive soils being troublesome due to their cyclic volumetric change behaviour upon moisture fluctuation have occupied large tracks of land in many countries including India. Several remedial techniques were promulgated in order to mitigate the damages. Admixture stabilization to modify their behaviour has been popularly used across the world. This paper presents the study of the influence of Ground Granulated Blast furnace Slag (GGBS) and glass fibers (GF) of different aspect ratios on the swelling and strength properties of expansive soil. The optimum contents of admixtures are found by a recently developed optimization technique called Response Surface Methodology (RSM) wherein an experimental program is generated by utilizing central composite design. The generated model is validated by laboratory tests and using analysis of variance (ANOVA). The optimum values are found to be 24% GGBS, 0.78% glass fibers with aspect ratio of 512.

ii) pedestrian gap acceptance behavior at uncontrolled intersection for an urban corridor vijayawada city

The substantial increase in number of vehicles leads to tremendous rise of traffic volume and also the traffic congestion on roads. Almost every city in India is facing the traffic problems. These traffic problems leads to the loss of manpower and also increase of fuel consumption. Critical gap and lag are less the developed countries which confirms the ore risky behaviour of drivers in developing countries like India critical gap is the most important parameter associated with gap acceptance study especially in case of delay and capacity estimation. Uncontrolled intersections in the developed countries are controlled by traffic signals like vehicle signals , pedestrian signal etc, but in vijayawada no one traffic signals and yield signs. It creates more problems and also leads to delay of traffic. This paper systematically analyse the behaviour of pedestrian at uncontrolled intersections.

iii) Design concept of prestressed balanced cantilever segmental bridge

Bridges are constructed by cantilever method to cross geological critical areas such as valleys, rivers, and in heavy traffic areas for the easy flow of vehicles where shoring may become costly or even may not be able to be adopted. The construction is carried out segment by segment on either side of the pier above the ground level and so it can also be called as segmental balanced cantilever bridges. Spans of 80 to 150m are favored for bridges with prestressed concrete box girder decks built by the cantilever method. However, this method can be used for spans up to 200m in common widths without major problems. This paper is going to explain a design procedure for segmental prestressing along with an example which was solved using IRC6-2014 and IRC112-2011. The concept of simplified frame analysis is adopted for transverse analysis, and a line beam modeling is adopted for longitudinal analysis. For the calculation of prestressing forces, Magnels graphical method is used.

iv) An experimental investigation on fracture parameters and brittleness of self-compacting lightweight concrete containing magnetic field treated water

In this study, an experimental research on the fracture parameters of self-compacting lightweight concrete (SCLC) using tap and magnetic water (MW) is presented. For all SCLC mixtures, common fracture parameters were specified by means of both work of fracture method (WFM) and the size effect method (SEM). Three-point bending tests were carried out on 90 notched beams with six mix compositions. The beams were made from mixes with three different water to cement (w/c) ratios of 0.37, 0.47 and 0.52; also, both tap and magnetic water were consumed in the concrete mixes, separately. The results of this research showed that by using MW in SCLC and decreasing w/c ratio from 0.52 to 0.37: (a) both initial fracture energy G_f and total fracture energy G_F increased; (b) the fracture toughness and the mechanical properties of SCLC improved. Additionally, the achieved data exhibited that there

was a reasonable relation between the total fracture energy obtained by WFM and the initial fracture energy achieved through SEM. The average of GF to Gf ratio in SCLC was 2.70. Furthermore, by using MW in SCLC mixtures, compressive strength, splitting tensile strength and modulus of elasticity increased up to 18%, 9% and 10%, respectively.

3. BOOK CHAPTERS BY FACULTY

- i) Sediment distribution pattern studies for Thandava and Konam reservoirs in Vishakapatnam District”, a book on Water Resources and Environmental Engineering-I, ISBN 978-981-13-2043-9.

The life of any reservoir gets reduced due to deposition of sediment over a period. It is necessary in all reservoir operation plans to know the exact volume of water left after the sediment settles. Keeping this in view, two reservoirs in the Visakhapatnam district of state of Andhra Pradesh, viz; Thandava and Konam reservoirs have been selected. The main object of the present study is to identify the particular suitable theoretical method to predict sediment distribution pattern for selected catchments by comparing with the hydrographic survey results. Literature review has enabled the identification of two methods for determining the sediment distribution pattern. These methods are (a) Area-Increment Method (b) Empirical Area-Reduction Method. This exercise enables the identification of a suitable method for obtaining the sediment distribution in these reservoirs. Finally with the help of the method suitable for each of the selected reservoirs the current capacity (corresponding to year 2017) of the reservoirs is obtained.