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

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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 wad 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.

Table of Contents

1. PAPER PUBLICATIONS OF THE FACULTY

i) Constitutive Behaviour of Fine Grained Soils of Vijayawada Region

A comprehensive study was carried out to examine the suitability of hyperbolic model to establish undrained stress-strain (σ-ε) response of cohesive soils of Vijayawada region, India. The majority of locations in this region covered with cohesive soils. Standard penetration test (SPT) is the most commonly used in-situ test conducted as a part of geotechnical investigation in this region. In this paper a simplified hyperbolic model was proposed to evaluate the σ-ε curve in terms of SPT value (N value). The present study aims on predicting undrained shear strength/undrained cohesive strength (Cu) and elastic modulus (E) from N value. Empirical correlations would permit consulting engineers to rapidly estimate Cu and E using N value.

ii) Mobile health services for smart cities

Smart city utilizes information and communication technologies to provide comfortable living to its residents. Smart cities aim to improve the quality of healthcare services rendered to the patients, either through remote consultation or continuous monitoring of physiological data. Patient consultation or monitoring involves both communication and transmission of medical data between the doctor and the patient. Transfer of medical data is especially challenging since it is highly dynamic and contains valuable diagnostic information. Any alterations caused to the data, due to network operating conditions will produce potentially disastrous consequences in terms of patient diagnosis. So, medical data must always be transmitted on a network that provides good Quality of Service (QoS). In this context, a Patient Data Transfer (PDT) algorithm is proposed to identify the best network for medical data transfer in smart cities. The performance of the algorithm is tested for various medical traffic classes

iii) Influence of contacting material on calibration response of diaphragm earth pressure cells

Earth pressure cells (EPCs) are widely being used for the measurement of pressure acting on structures or within the soil. Output from an EPC varies with properties of contacting media (fluid or soil), density of media, etc. As geofoam is used in many geotechnical applications, especially to control earth pressures, it is prudent to calibrate earth pressure sensors, with geofoam as a contacting material with EPCs (geofoam calibration of EPC). In the present study, two diaphragm-based EPCs of different make are used to perform in-soil and geofoam calibration studies. A deadweight calibration set-up is developed to perform both soil and geofoam calibration tests. Effect of soil thickness, geofoam thickness, combined geofoam and sand thickness, geofoam density and displacement/loading rate on the EPC output under external loading is studied. From soil calibration results, it is observed that optimum sand thickness is 4.17d for both types of EPC. The response of EPC in geofoam calibration resembles the stress–strain response of geofoam, and it varies with the density of geofoam. At any applied pressure, output from an EPC is much higher in the case of geofoam calibration compared to that of soil calibration.

iv) Comparitive Study on Effect of Diverse Geosynthetics and Their Spacing on Soft Clayey Soil

Presence of soft clayey soil poses a problem for the construction of high load structures due to its low bearing capacity and high settlement. The soil should hence be stabilized to enhance its bearing capacity and decrease the settlement to make it suitable for construction. This study focuses on the behavior of geosynthetic reinforced-clayey soil and also the effect of different parameters contributing to their performance using laboratory model tests. The parameters investigated in this study are the type of geosynthetic reinforcement andthe number of reinforcement layers / vertical spacing between geosynthetic layers. Laboratory Tests were performed to examine the efficiency of geosynthetics and the effect of their spacing on the peak load bearing stress of soil. A series of model tests were conducted to

investigate the behavior of the geosynthetic- reinforced clay under circular type of loading.Tests were conducted by preparing soil specimens reinforced with geotextiles, geogrids and geocomposites at various spacing and were tested for their load bearing capacity. The test results show an enhancement in load carrying capacity and depletion in settlement of soil when reinforced with the geosynthetics. Based on the results of the experimental program, the effect of spacing in increasing the load carrying capacity of clayey soil is established. The results of this study may be helpful in improving the bearing capacity of highly compressible soft soils and also in reduction of layer thickness in pavement design on soft clayey soil

v) Durability of Robust self-compacting hybrid fiber reinforced concrete

In the current study we analyze the behavior of Robust Self Compacting Concrete in addition of Hybrid Fibers with fine aggregate of quartz sand as 100% replacement of river sand. Apart from achieving high strength it is necessary for the structures to be more durable. In this regard laboratory tests were conducted on with the addition of hooked end steel fibers and glass fibers to check for abrasion resistance, permeability and durability studies were conducted. Experimental findings revealed that addition of hybrid fibers to specimen will result in additional loss of material when compared to specimen cast without fibers, permeability results show in the favor of specimen with fiber and durability tests indicate that percentage loss is compressive strength when immersed in 5% and 10% HCL concentration is 9.8% for without fibers and 8.5% for with fibers, and when placed in 5% and 10% H2SO4 concentration is 28.7% without fibers and 25.7% with fibers, the average loss of material for abrasion resistance test is observed to be high when fibers are added, permeability is 18ml for with fibers & 20ml for without fibers.

vi) Modelling and analysis of rotor Braking system

A brake is a mechanical device which simulated frictional safety is connected to moving machine part, to stop the movement of a machine. At present performing this function, the brakes take in either kinetic energy of the moving part or the potential energy surrendered

by items being brought down by lifts and so forth. The energy absorbed by the brakes is scattered as heat. Disc brake is a recognizable automobile application where they are utilized broadly for car and bike wheels. The disc is sandwiched between two pads activated by cylinders backed in a calipers mounted on the stud shaft. At the point when the brake lever is pressed using pressurized hydraulic pressurized fluid is constrained into the chambers pushing the contradicting cylinders and brake pads into frictional contact with the disc. The frictional heat produced amid braking application can result in various negative impacts on the brake assembly, for example, brake blur, untimely wear, thermal splits and disc thickness variation (DTV). The main purpose of this project is Optimization of Automotive Brake Disc and analysis the unsteady state thermal behaviour of the dry contact between the brake disc and pads during the braking phase. The thermal-structural analysis to determine the deformation and the Von Misses stresses established in the disc. The objective of the project is the design, analysis and optimization of disc brake using Ansys. The brake disc is designed by a 3Dmodelling software CATIA V5R20 and we analyse structural and thermal conditions on disc brake using ANSYS 15.

vii) Determination of fracture parameters in binary blended self-compaction concrete

Among all the construction materials, concrete is most widely used due to its unique advantages compared to other materials, its application areas increases and become common place each day. Self Compacting Concrete is special type of concrete which places itself in densely-equipped narrow and deep sections with its own weight, tightens without any vibrations, has high resistance or durability characteristics and performances, and has a very fluid- consistency. A Substantial increase in the demand of crack resistance has been noted recently, a structural finite element analysis model has stimulated the failure criteria of rationality and rational constitutive relation. In this study, SCC was investigated via the two-parameter fracture model which needs two fracture parameters namely: the critical stress intensity factor KI and the critical crack tip opening displacement CTODc to characterize failure of concrete structures. In SCC mix, fly ash and ground granulated blast furnace

slag(GGBS) were used as powder materials. Based on maximum loads of SCC specimens produced with different powder materials critical stress intensity factor KI and critical crack mouth tip opening displacement CTODc, fracture parameters were determined. Consequently, it was observed that concrete compressive strength and powder admixture type are effective on fracture parameters of concrete.

viii) Study on Pervious Concrete

Most cities today are covered with impermeable areas. During heavy rains or floods, water flowing to the surface causes inconvenience to users. In areas with a poor drainage system, this leads to severe flooding in low areas. In this situation, it is important that the surface is permeable. This is just the surface of the permeable concrete. Permeable concrete should have more voids compared to conventional concrete, which is achieved by the small amount or absence of fine aggregates. The important feature of permeable concrete is its permeability. This property allows water to enter the concrete. However, there are very limited standards for measuring this property. In particular, there is still no clear laboratory test for measuring the permeability of permeable concrete. We measure the unique property of permeable concrete, i.e. its permeability, and also try to increase the strength of permeable concrete without affecting the percolation properties. Experiments were performed on blends of zero fine granules and water / cement ratios of 0.3 to 0.35. We also tested the properties for small amounts of sand, namely 5%, 10% and 15% of the total aggregates, to obtain the optimum water / cement ratio obtained in our tests. To test the permeability used, the soil is replaced with a concrete sample of suitable dimensions. For a fine zero aggregate it was observed that the percolation coefficient increases with decreasing water / cement ratio of 0.32, at which the resistance is also comparatively maximal. We therefore found that the optimum water / cement ratio for the permeable concrete mix was 0.32.

2. CONFERENCES ATTENDED BY FACULTY

i) An analytical optimization study on the core-outrigger system for efficient design of tall buildings under static lateral loads

The location and number of outriggers in a core-outrigger lateral resisting system have a major influence on the tall buildings' performance and the design's cost efficiency. In this study, an analytical procedure was performed to produce a general equation of the top lateral displacement of a core-outrigger system (up to four outriggers) due to various static lateral loading distribution forms (uniform, triangular and parabolic). Moreover, the optimal positions of outriggers that produce the maximum top displacement reduction are determined in this research. On the other hand, this work proposes the maximum height of a tall building corresponding to displacement limit criteria, number of the outrigger and outrigger positions. For practical use, this study offers curves for use at the preliminary design stage to allocate the top displacement and the number of the required outriggers in terms of the building height and a proposed rigidity factor which shows to have a great influence on a core-outrigger system in a tall building.

ii) Influence of dolomite on mechanical, physical and erosive wear properties of natural-synthetic fiber reinforced epoxy composites

The study was intended to investigate the influence of dolomite content on the physical, mechanical and erosive wear properties of hybrid natural—synthetic fiber reinforced polymer composites. Therefore, epoxy composites, having fixed amount of Grewia optiva and glass fiber with varying proportion of dolomite particles (0, 5, 10 and 15 wt%) were developed with hand-layout technique. The results show that the density, void content, impact energy and hardness increases, while flexural and tensile strength decreases with the increase of dolomite content. For erosive wear analysis, Taguchi method with L16 orthogonal array was used. The experiments were performed on an air jet machine with different impingement angles (30, 45, 60 and 90°), erodent sizes (100, 150, 200 and 250 μm) and impact velocities (10, 20, 30 and 40

m s−1). The lowest wear rate was achieved under optimal condition of 10 wt% dolomite content, 30° impingement angle, 10 m s−1 impact velocity and 150 μm erodent size. Moreover, scanning electron microscopy was implemented in order to analyze the eroded composite surfaces for possible wear mechanism.

iii) Durability of High Volume Fly ash Concrete Exposed to H2SO4 Environment

The effects of ASTM Class C fly ash incorporation on mechanical properties and sulfuric acid resistance of concrete has been investigated within the scope of this study. Cement was replaced with fly ash up to 70%. Test results indicate that sulfuric acid resistance of steam-cured concrete could be improved significantly by incorporation of fly ash. Under standard curing conditions, the strength values of high-volume fly ash concretes were satisfactory except 1-day strength. Curing by steam helped to increase the 1-day strength values. However, long-term strength values decreased significantly for concrete mixtures over 30% of fly ash replacement levels

3. BOOK CHAPTERS BY FACULTY

Recent developments in earth pressure reduction techniques", In Edited book entitled 'Frontiers in Geotechnical Engineeing, Developments in Geotechnical Engineering, by M.Latha G. (eds.), Springer Nature Singapore Pte Ltd, Chapter 16, DOI: 10.1007/978-981-13-5871-5_16.

Rigid earth retaining structures are common civil engineering structures and they are constructed to retain the backfill soil. The evaluation of lateral earth pressure on retaining walls under due to retaining soil and external loads during the service life is vital as it significantly influences the cost of the project. Lateral earth thrust on rigid retaining walls from the backfill can be minimized by a suitable technique, notably using lightweight backfill, placing a compressible inclusion between the backfill and the retaining wall, or by providing one or more relief shelves along the height of the wall. This paper discusses recent studies carried out at IIT Bombay to reduce long-term lateral thrust on rigid retaining walls retaining cohesionless backfill using compressible geo-inclusion. The laboratory studies on geofoam samples reveal that Young's modulus, yield stress, and compressible strength of the geofoam reduces with time. Also, the estimated creep strains obtained from Time–Temperature–Stress Superposition (TTSS) accelerated creep testing method at the end of 100 years was in the range of 2.1–2.4%. The isolation efficiency of the geofoam, which is defined as the ratio of reduction of lateral thrust due to the provision of geofoam at the soil–wall interface and the lateral thrust without geofoam, obtained from pseudo-long-term studies was more compared to that of short-term studies by 2.4–8.1%. The studies, for the first time, reveal that geofoam inclusion considerably reduces the lateral thrust on the wall not only in short-term but in long-term as well.