



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 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) Influence of Graded Glass Fibers on Strain Hardening and Strain Softening behavior of GFRC under Uniaxial stress

In this investigation, four different lengths of glass fibres were blended together in a graded glass fibre form – that is, short graded glass fibre (SGGF: 3 + 6 mm), long graded glass fibre (LGGF: 12 + 20 mm) and combined graded glass fibre (CGGF: 3 + 6 + 12 + 20 mm) – and added to the concrete. The uniaxial tension and compression behaviour of M50 grade concrete with graded glass fibres at three different volume fractions – that is, 0.3, 0.4 and 0.5% – for five different fibre volume combinations were studied. It was observed that adding SGGF to the concrete results in higher peak strength and adding LGGF to the concrete resulted in higher post-peak deformation. The best performance was exhibited by the combination of SGGF and LGGF (CGGF) for the same volume fraction of fibres, and this was attributed to the grading of the different fibre lengths, which can control the different scales of cracking and thus contribute to the increase in pre-peak strength and post-peak deformations. Finally, from this study it was concluded that the strain softening behaviour in compression was influenced by the strain hardening behaviour in the tension of graded glass fibre reinforced concrete (GGFRC).

ii) Hydrophilic and hydrophobic chemicals as self-curing agents in self-compacting concrete

In recent years, there has been an increase in the study of providing internal curing in concrete to enable high water retention capacity. Curing is an important parameter that directly affects the strength and durability of concrete. The present experimental program evaluates the effect of hydrophilic and hydrophobic chemicals as self curing compounds in Self Compacting Concrete (SCC). The parameters in this study include type of curing chemical (Polyethylene Glycol - 4000, Liquid Paraffin Wax), dosage of curing chemical (0%, 0.1%, 0.5% and 1.0%) and curing temperature (Room temperature -27 ± 2 °C, elevated temperature-

60 °C). The performance of curing chemicals was determined by conducting tests viz: compressive strength, split tensile strength, flexural strength and rapid chloride permeability test (RCPT). It was concluded that both curing chemicals performed better at both curing temperature conditions compared to no cured specimen. The study concluded that the optimum dosage of Polyethylene Glycol and Liquid Paraffin Wax is 1.0% and 0.1% by weight of cement.

iii) A two-sided lateral gap continuum model and its numerical simulation for non-lane based heterogeneous traffic movement

The objective of this study is to model the complex behavior of non-lane based heterogeneous traffic which is predominantly occupied by vehicles with varying physical and dynamical characteristics and their staggered car following behavior. This study proposes a new continuum model by considering the properties of two-sided lateral gap in a non-lane based heterogeneous traffic stream. The model is built on a strong empirical background and modified car following theory. In particular, the model consists of density dependent disturbance propagation speed, viscosity term and a frictional clearance term to describe the complex vehicular interactions in a traffic stream. Viscosity term in the model represents the driver's reaction to a sudden change in density and further, it helps in smoothening out the shock fronts. Frictional clearance term in the model considers the effect of slow moving vehicles on the dynamics of fast moving vehicles. The results of mathematical and numerical analysis show that the proposed model satisfies all the qualitative and physical properties of the real world system. Moreover, two sided lateral gap in the model improves the stability region of traffic flow and increases the capacity and density of traffic stream. In addition, it is able to dissipate the traffic perturbation rapidly when compared to one-sided lateral gap model. It is anticipated that the new model provides the basis for evaluating alternative transport policy measures and helps in analyzing the system performance in the future.

iv) Experimental Study on Seismic performance of bed joint reinforced solid brick masonry walls

The paper reports on a comprehensive review of state of art on the performance of bed joint reinforced masonry walls for structural applications under lateral loadings. In severe seismic zone regions still need to improve performance of masonry buildings. In current scenario lack of design and construction on reinforced masonry walls and experimental investigations on bed joint reinforced shear walls to study the effect of reinforcement on deformation, stiffness and strength. In past international and national literature reviewers shown that bed-joint reinforcement provides only marginal improvement of in-plane shear capacity, but satisfactory improvement in ductility capacity. In the unreinforced masonry walls crack distribution with large energy dissipation to prevent this one should go with horizontal reinforcement. However almost no research on bed joint reinforced, shear wall is available. The current study includes the analysis & experimental study on full-scale solid burnt brick masonry walls of different aspect ratio, with and without bed-joint reinforcement, through displacement-controlled in-plane cyclic loading to understand the difference in performance of unreinforced masonry walls, walls with IS 4326 (1993) detailing and reinforced masonry walls in terms of strength, stiffness, ductility and energy dissipation.

v) Seismic liquefaction potential assessment of Andhra Pradesh Capital Region

Seismic liquefaction hazard is an actuated ground failure which is responsible for significant damage to life and property. Andhra Pradesh state authorities are aiming to develop major infrastructural projects in the capital region. Liquefaction Potential Index (LPI) can predict the severity of liquefaction at a place. The present work aims at assessing liquefaction severity using LPI for different locations in the new capital region of Indian state, Andhra Pradesh. Further, current study presents a preliminary liquefaction severity map of the Andhra Pradesh state Capital region. This study reveals that the majority of the locations in this region may not be prone to liquefaction in the event of light earthquakes.

vi) Design and Sustainability of an Earthquake Resistant G+3 Residential Building

In structural building it is fundamental that the vision belief system of the designer in his plan stage meets in its execution. Its additionally essential to guarantee that so as to meet this necessity the measurement, materials and so on... , don't surpass according to the need, along these lines increasing the cost and request to be a finished designer. Tall structure, modern and business building which have a perplexing geometry are hard to examine and plan physically. In this manner it is very to utilize STAAD.PRO programming for the examination and structure. The standard goal of this venture is to investigation and plan of a multistoried G+3 building utilizing staad.pro. the structure has an all out developed zone of sq meter . Plan of the structure is created utilizing auto CAD. The plan includes load counts physically and examining the entire structure by STAAD.pro. The structure strategies utilized in STAAD-PRO investigation are limit state configuration fitting in with Indian standard code of training for configuration shafts, segments, and footings. The structure of part is completed utilizing sp16 configuration helps for strengthened cement and IS 456-2000 plain and fortified solid code of training. Nitty gritty basic drawing of the shafts, sections and balance are set up after all checks. The whole structure is an encircled structure with segments and pillars assembled solidly, framing a system. The investigation of the confined structure is done utilizing STAAD.pro .The casing comprises of pillars and segments .A model is created of the encircled structure and loads are applied on the individuals. The loadings are received according to IS 875-1987 Design of burdens for structures and structures.

vii) Mechanical Properties of Fly Ash Based Geopolymer Concrete and Conventional Concrete

Creation of concrete includes devouring of common non-sustainable assets. The concrete ventures have been ordered as profoundly dirtying enterprises. It is relevant to utilize eco-accommodating strategies in a manner to supplant, lessen or reuse the customary materials to be utilized in cements (Portland Cement Concrete). Solid utilization is underdog to water

right now. Normal Portland concrete is ordinarily utilized as basically fastener to create concrete because of its accessibility of the crude materials everywhere throughout the world. The use of cement has extraordinarily affected the cutting edge world in framework, home and transportation, advancing the improvement of monetary advancement, human advancement and personal satisfaction. The natural issues related with the creation of OPC is notable, the measure of carbon dioxide discharged during the production of OPC because of calcinations of limestone and ignition of non-renewable energy sources is high. It is well known truth that creation of 1 kg of concretes delivers almost 1 kg of carbon dioxide. The degree of vitality required to deliver OPC is just beside steel and Aluminum so there is a need to conserve concrete. One of the solid answers for conserve concrete is to supplant with other strengthening establishing materials like fly debris, slag, meta kaolin, and so on then again the bottomless accessibility of fly debris, which being a side-effect of coal-based force plants the world over making a chance to enhance to OPC with fly debris. The all out creation of fly debris is almost as same as concrete, however our use of fly debris is just 5% of the creation, subsequently the utilization of fly debris ought to be improved.

viii) Bottom Ash based steel fiber reinforced concrete

Concrete is the most significant material for construction and by incorporation of various industrial by products may improve its properties. Normally fine aggregates have been obtained from natural sources like river beds, now days there is a lot of scarcity for getting natural aggregates. So to overcome this problem, aggregates are partially replaced with alternative materials like bottom ash, recycled aggregates and some natural aggregates .In present study, fine aggregate was replaced with bottom ash and steel fibres are used to improve strength characteristics of concrete. M25 grade concrete was prepared for control specimens, and also bottom ash based fiber reinforced concrete specimens were prepared in different proportions 0%, 10%, 20%, 30% and 40% with bottom ash by weight of fine aggregate and a 1.0% and 1.5% of steel fibers were added by weight of cement. To examine bottom ash based steel fiber reinforced concrete specimens were tested under flexural, split tensile, and compression. The mechanical property of bottom ash based steel fiber reinforced concrete was

compared with control mix to examine optimal combination of bottom ash and fibers. It was noticed that 10% replacement of bottom ash has shown the maximum improvement in Compressive, split tensile and flexural strength. Hence, bottom ash based steel fiber reinforced concrete can be used as construction material.

ix) Urban Water Quality Scenario by using Geospatial Engineering

In the world scenario the contamination of water due to the various reasons is one of the major problems in the urban and semi-urban areas which have both positive and negative impact on the existed environment and also on the quality of human life. The developing activities taking place in and around the urban areas covers soil with concrete which leads to reduced soil recharge capacity at one side and the other side releasing of untreated urban sewage in to nearby open water bodies without any concern became most practicing method in most of the urban areas. The new capital region of Andhra Pradesh is selected as study area which is rapidly developing with commercial and residential built-up area. Due to which the pressure on groundwater is increased rapidly with respect to its quality and the quantity to meet the requirement of the living as well as migrating people from all the corners to the newly developing capital region. If the similar situation continues there will be a severe and irreparable damage to the availability of groundwater for the future generation and also there will be a notable reduction in the living standards of urban people. The present study examines groundwater and surface water quality and compared with water quality standards to determine the status of water quality at study area. A total three samples were collected for three times in three consecutive months of study period and analyzed by using standard analytical procedures. Geo spatial technology was adopted to represent the statistical data of water quality in the form of GIS maps for more accuracy to identify the periodical changes in water quality at study area.

x) Statistical Modelling of Groundwater for Environmental Sustainability

In the worldwide calculations groundwater of urban areas has been depleting very rapidly by leaving its huge scarcity for the upcoming future generation due to uncontrolled and unpredictable census year by year along with migrations from rural to urban areas, at the other face the available groundwater is becoming polluted due to the unscientific handling like over lifting of water years together from one particular point which caused intrusion of pollutants in to the underground aquifers along with releasing of chemicals and other pollutant substances on the open ground as well as in to the nearby water bodies are the prime reasons for groundwater contamination. Modeling of groundwater with respect to its quality along with the quantity is an immediate need to be taken why because groundwater plays vital role and very important component to meet the total requirement of water lifting from the underground aquifers for both domestic and agricultural needs. By lifting water from the same point there is a possibility for deteriorating of water content in that aquifer and it may leads to permanent destruction of water quality in that respective aquifer, to overcome these consequences the modeling technique where withdraw of water will be regulated along with injection of water into the aquifer can be adopted. In the present study we have identified ten sampling localities from Guntur municipal corporation, Andhra Pradesh, India by considering severe problems associated with groundwater in both quality and quantity point of view, in all the locations five sub locations were identified for water sampling. Samples were collected for three times from the bore wells and hand pumps, average of three times analysis was considered as final values. Analysis was done by using standard analytical methods. The results were compared with IS 10500 -2012 drinking water quality standards to get the scenario of water quality.

xi) Geospatial Engineering on Hydrological Behaviour of Catchments at River Basin

Water is the most important parameter to be considered for improving living standards of the people at any area, which is being supplied to the public with various distribution systems from the sources of water supply. Generally water is available and being

supplied to the public from two different sources such as surface water and groundwater. Surface water is available in the form of catchments, ponds, rivers etc. catchment is a hydrological body which has the source of water through precipitation and the runoff from the nearby areas. Every drop of catchment normally enters either into the river or it may evaporate if the water is not being used, at most of the areas catchments are serving as potential water resource for drinking, agriculture and for various daily day to day activities. The hydrological behavior of Catchments near to the rivers is greatly influenced by the quality of river water as the contaminants enter in to the catchments either directly or through infiltration. In the present study catchments at every village near to the river basin of Krishna River were selected to assess the quality of water and its level of suitability for consumption. Total eight water samples were collected in sterilized glass bottle by covering all the corners of the catchment and all the tests were conducted by adopting standard analytical procedures, the results were correlated with Surface water quality criteria for different uses (specified by CPCB, 1979 and the Bureau of Indian Standards, 1982.) and then results were projected in GIS maps.

xii) Hydrological Modelling of Catchments at Industrial Sector

In any nation industries are the major sources for the country economy and also the major source of employment for the people of any nation. Industries are also considered as prime reason for the developmental activities with huge employment potential at the other side the environmental conditions in and around the industries are degrading very rapidly due to the lack of proper supervision on disposal of industrial wastes along with the emissions releasing into the open atmosphere by few of the industries [9] without any concern of human health eventually over a period of time all the effluents and the emissions released into the open atmosphere without treatment shows dangerous consequences on the environment in the society. The major requirements of any industries starts with water only, as the water is prime element for the survival any living organism on the earth and also the water is the prime component for the development of any area but at certain areas the water both surface and ground water [11] sources have been contaminating due to the unethical and unscientific disposal of wastes into the open lands as well as into the nearby water bodies. when we

emphasize the reason behind this specific activity we came to understand that improper maintenance of effluent treatment plants and the effluents releasing from them shows its severe impacts on nearby aquatic organisms [3], if the same water is used for domestic activities there will be a damage for human health and sometimes it may leads to the death of the individuals also. In the present study three locations were indentified around the boundaries [8] of catchment based on the entry of flow into the catchments and the samples were collected for three times in the study period of three months, all the samples were marked with labels and analysis [2] was carried out by using prescribed analytical procedures, the results were compared with surface water quality standards [1] specified by Central Pollution Control Board,1979 and the Bureau of Indian standards, 1982 to find out the hydrology of the catchmen.

xiii) Impact of Lime Stone on Groundwater and Soil

Unpredictable rapid increased growth of population with increased lifting of water from the deeper crusts of earth leads severe groundwater contamination and also unreparable damage to soil structure and its stability. The extent and severalty of damage to the groundwater and the soil depends on the nature and the toxicity of the pollutants. It is very difficult to identify exact sources of groundwater contamination as the sources are hidden from the sight even the sources are predicted it is difficult to measure the extent of damage to the groundwater and soil. Taken to consider it, the present study was carried out at Piduguralla municipal region, Guntur district Andhra Pradesh which is surrounded by limestone beds. Due to the availability and the abundance of natural lime stone the area is very much familiar with other name as 'Lime city' which is surrounded by number of lime stone and white cement industries. It was observed that chemicals from lime stone quarries damaging quality of both groundwater and the soil. Twenty five sampling locations were identified to collect groundwater samples along with ten soil sampling locations. Samples were collected for three times during the study period of three months and the average values were noted as final values, water quality results were correlated with IS5000 – 2012 standards to find out the

suitability of water consumption, all the tests for both groundwater and the soil were carried out by adopting standard analytical procedures.

xiv) Exploration of Groundwater Quality to Promote Sustainable Environment

Groundwater is the combination of different minerals and salts which is available to the human kind for the survival primarily and also for all the developmental activities of the society. Around the world the quality of the groundwater at majority of the fresh water aquifers is good and recommendable for consumption with basic treatment where as the accessibility of groundwater[6] depends on the practices taking place for lifting of water, rate of consumption along with the climatic conditions. Groundwater is the most important and the essential need for all the living beings irrespective of age and the species they belongs to, because almost more than ninety percent of metabolic activities of the human beings and the other living organisms depends on the water itself, even though water is available in the other notable form as surface water [5] it is not at all recommendable for consumption without proper required treatment [7]. In the present scenario accessing of quality groundwater is the most difficult and complex issue to meet the daily demand of the public especially in the developing cities [9] and the towns it is very big complicated issue due to the continues addition of unpredictable population year by year which makes the situation more worse. Apart from the above man made activities quality and the quantity of groundwater also depends on the existed soil conditions and its function with respect to the water holding capacity and rate of infiltration. The present study was carried out at downstream area of Krishna River in mangalagiri mandal of Guntur district, Andhra Pradesh. The study area had been divided into eight locations based on the possible interference of groundwater by human activities to find out the complete and detail composition of various cationic, anionic and heavy metals of water to estimate the suitability of water for consumption.

xv) Efficient method on Energy Regeneration through Speed Breakers

From the last century speed breaker is been the sedulous thing in controlling the speed on roads. But as the technology and requirements in vehicular design increased over

time, the design of vehicles having the ability to move at high speeds had ameliorated. Speed breakers with the intent of controlling speed had been doing great damage to the vehicular functioning and been gist in fuel wastage if the vehicle crosses the limits. To utilize the present exhausting resources efficiently, every black point has to be covered and recovery of lost energy has to be the main aim. So the energy lost by a vehicle in negotiating a speed breaker has to be recuperated. This can be brought to fruition by utilizing an energy regenerating speed breaker. Many attempts had carried out in creating an efficient energy regenerating speed breaker, every method proposed had involved in outlasting the energy generation and carried a hitch. This paper deals with a newfangled method in the renewal of energy involving the principles of negative suction.

xvi) Road Accident Scenario in Vijayawada – A Case Study

Road traffic continues to be a major developmental issue, a public health concern and is aleading cause of death and injury across the World killing more than 1.35 million globally in2016 as reported in the Global Status report on Road Safety 2018 with 90% of these casualtiestaking place in the developing countries. The study collect the previous accident data such as, state, area, location, type of accident, road condition, weather condition, injuries of the victim, gender of the victim, vehicle damage, type of vehicle. Those data are collected from the Autonagar, Penamaluru, kankipadu, police stations. This section highlights the methods that have been used to identify and rank the block spots. The accident data collected and analysed those locations having accident cases more than 14 (i.e. 2 or more accident cases per year on an average) have been considered for the identification of the black spots using statistical methods viz. Weighted Severity Index Method, Priority Score Method, Accident Severity Index and Fatality Rate and then ranked with the help of these methods.

2. CONFERENCES ATTENDED BY FACULTY

i) Design and development of high performance based engineered cementitious composite eco-friendly beams preparation: an integrated approach

Now a days focusing on cost-effective and performance-based composite has increases in the construction field to improve structural safety and avoiding the environmental and economical problems. Engineered Cementitious Composite (ECC) is a light weight composite, adaptable due to strain hardening behaviour and self-healing properties that are significant parameters of structural performance and safety. In the preparation of ECC, scarcity of synthetic fibers namely Poly Vinyl Alcohol (PVA) fibers that increase the necessity of alternatives like natural fibers which are eco-friendly and widely available. In this connection integrated the sustainable approach for the preparation of ECC. Processing of materials, mix design and procedure in preparation of base mix of ECC and adjustments based on properties are analyzed and designed for high performance of natural fiber reinforced ECC beams based on integrated sustainable approach.

ii) Impact of materials on characteristics of engineered cementitious composite at elevated temperatures: An integrated approach

In recent years focus on Temperature resistive high performance-based composite has increased in the construction field. Engineered cementitious composite (ECC) is one of the composites that is adaptable by properties such as strain hardening behaviour, self-consolidation, and resistance to elevated temperatures. ECC is designable based on Micromechanics principles. This composite has materials such as Cement, Silica sand, Flyash, Poly Vinyl Alcohol (PVA) fibers, and Superplasticizers namely polycarboxylate ether, etc. The constituents using in this composite preparation are responsible for the performance of ECC, and it also reduces the loss of strength at high temperatures compared to Normal concrete. Apart from the impact of materials, type of cooling Regime such as water cooling, open-air

cooling also influences the resistance of ECC at high temperatures. In this paper, various materials and properties on how to influence the performance of ECC in elevated temperatures and the impact of cooling Regimes are analyzed.

iii) Analytical study on seismic performance of bed joint reinforced solid brick masonry walls

It is notable that brick work structures endure a lot of harm during seismic tremors, prompting huge loss of lives. Practically 75% of the disaster, credited to seismic tremor in a century ago, is because of breakdown of workmanship structures [1]. A greater part of the apartments in India are Unreinforced Masonry (URM) structures that are powerless and helpless much under moderate quakes and due to high wind forces out-of-plane action is acting on the wall which makes a severe damage at high wind loads and it is well known that Reinforced masonry construction has got a significant number of advantages than the masonry without reinforcement, whose application is very less in Indian construction practices and still there are no specified codes prescribed and in most constructions there been used shear walls instead of reinforced masonry walls even at the moderate earthquakes [2]. On the other hand, a great need to focus on understanding masonry buildings that are subjected to both axial loaded and seismic loads [3]. The main objective of this paper is to study the methods available in the literature to obtain the seismic vulnerability of un-reinforced masonry walls using linear static analysis [4]. To achieve this, analysis (Staad.Pro software) have been carried out as a part of this research. Two walls with same dimensions with an unreinforced and bed type reinforced masonry were analysed under uniaxial loading. A constant axial compressive load was maintained for each specimen during the analysis [5]. Idealized Load vs Deflection plots are used to describe the wall deflections and maximum stresses evolved by using STAAD.Pro. The final outcome of this performance analysis declares the efficiency of Reinforced masonry walls over the masonry walls without reinforcement under both axial and seismic loads (Load vs Maximum shear stress).

iv) An integrated methodology for structural performance of high-volume fly ash concrete beams using hybrid fibers

Concrete is worldwide using construction material. That consists of materials such as cement, sand, coarse aggregates, etc. Cement is one of the materials that responsible for binding properties but it responsible for co2 emissions. High-Volume Fly ash (HVFA) substitution to cement is a well-recognized approach to reduce CO2 emissions. The utilization of HVFA is used in construction of many Buildings, Roads and Dams. By the usage of fly ash, it will improve the Quality of concrete and also increased the life of concrete buildings and Structures. The addition of hybrid fibers will improve tensile performance along with high-volume flyash. By adding the fibers like steel fibers, polypropylene fibers etc., can improves the higher compressive strength and tensile behavior of concrete and to reduce the cracks due to Plastic and Drying shrinkage. By the usage of hybrid fibers which changes the mechanical properties and to prevent the shrinkage cracks. In these materials which helps to reduce the emission of Carbon dioxide released in the atmosphere and to observe the strengthening of concrete and to enhance the cracking resistance and these durability and mechanical properties. In this connection, investigated the influence by combination of high-volume fly ash concrete beams using Hybrid fibers and also the evaluated the environmental impacts and resistance in elevated temperatures. Based on this, a suitable methodology proposed for investigate performance of HVFA beams with hybrid fibers.

v) BOOK CHAPTERS BY FACULTY

vi) Effect of Acid and Alkali Contamination on Swelling Behavior of Kaolin Clay

This paper aims at studying the influence of acid and alkali solutions on the swell behavior of a non-expansive soil. Sulphuric acid (acidic medium); sodium hydroxide (alkaline medium) of 1 N and 4 N concentrations were used as pore fluids to understand the influence of acid and alkali pore fluids on the swell behavior of kaolin clay relying on one-dimensional free swell tests. Results showed that kaolin clay exhibits maximum equilibrium swelling of about 41% in acidic medium and 22% when interacted with alkaline medium. It is further observed that the magnitude of induced swell in clays is dependent on dispersion of clay particles leading to the formation of new minerals under both acidic and alkaline media. In order to better understand the mechanism responsible, the contaminated soil was investigated for changes in mineralogy and microstructure relying on x-ray diffraction (XRD) analysis, scanning electron microscopy (SEM) at the end of interaction. The formation of zeolite minerals viz. sodalite in alkaline media and aluminum sulphate hydrate hydroxide in acidic media were noted from XRD results. Furthermore, SEM studies revealed rosette-type morphological structure(s) in case of 4N NaOH and needle-like structures in H₂SO₄.