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About the Institute

Vel Tech is well-known for its renowned educational practices, which has been recognized and endowed with several awards. The founders of the Institution Col. Prof. Vel. Dr. R. Rangarajan, Founder Chancellor & President and Dr. Sagunthala Rangarajan Foundress President believe that education is for all, despite their financial means, which will promote and uplift the society.

Global Alliances of Vel Tech are working on International Relations with more than 390 Institution across 30 countries and have entered in the Memorandum of Understanding (MoU) with 120 Institutions for various Academic and Research exchange activities. Students, Faculty members and Researchers get the collaborative platform for Academic projects to explore best leading practices and Research work with International Universities. Vel Tech believes that there are no boundaries in the pursuit of knowledge. Through these strategic alliances with International Universities, the standard of education at Vel Tech is on par with the standards of best universities in the world.

About the Department

The Department of Civil Engineering was started in the year 2009 and it offers B.Tech. Programme, M.Tech Programme (Structural Engineering and Environmental Engineering), and Ph.D Programme. The Department has 28 faculty members (most of them with Ph.D. qualifications).The department has been accredited by NBA (Tier I).

Most of the faculty members are fellow and member of professional bodies in various fields of Civil Engineering covering the areas of concrete, soil mechanics, water resources and remote sensing. Faculty members continuously update their knowledge by attending training programmes at IITs, IISc and other premier Institutions. Active participation of the faculty members in research, consultancy services & sponsored research activities help them to interact with industries and demonstrate the application of concepts in field and improve the teaching learning activities of the department.

About the Conference

Two Day International Conference on Novel Innovations and Sustainable development in Civil Engineering aims to confer the endurance of structures and innovative ideas for the sustainable development of construction industry to satisfy the needs of today and tomorrow. Eminent professors of various Universities from India and abroad will discuss their ideas about the theme. The conference will discuss about the innovative, economic, environmental and social measures that can be applicable in the construction industry.

Call for papers

The conference provides a platform for professionals, scientists, academicians, research scholars, students, industrialists and builders to disseminate the information on various aspects related to the themes mentioned below.

Conference Themes

Papers from the following themes are invited

- Structural Health Monitoring
- Composite Structures
- Lightweight Structures
- 3-D Printing
- Modular Construction
- Low Carbon Construction Materials
- Reclaimed Building Materials
- Advancements in Construction Techniques and Materials
- Construction Management
- Asset Mapping
- Application of Remote Sensing and GIS
- Hybrid Transportation
- Pavement Geotechnics
- Ground Improvement Techniques
- Soil Reclamation
- Assessment and Control of Air Pollution
- Prevention of Ground Water Contamination
- Solid and Hazardous Waste Management
- Water Resource and Water Quality Management
- Advanced Water and Wastewater Treatment

Any other original research articles and case studies in the field of Civil Engineering are also invited.

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International Speakers

Dr. Fauziah Ahmad
Professor
School of Civil Engineering
Universiti Sains Malaysia
Engineering Campus, Malaysia

Dr. Sudip Kumar Pal
Professor
School of Civil Engineering
Chittagong University of Engineering
& Technology (CUET), Bangladesh

National Speakers

Dr. V. Jothiprakash
Professor
School of Civil Engineering
Indian Institute of Technology Bombay

Dr. B. Krishna Prapoorna
Associate Professor
School of Civil Engineering
Indian Institute of Technology Tirupati

Dr. R. Siva Chidambaram
Scientist / Asst. Prof. (AcSIR)
Advanced Structural Composites &
Durability (ASCD) Division
CSIR - Central Building
Research Institute, Roorkee

Dr. Resmi Sebastian
Assistant Professor
School of Civil Engineering
Indian Institute of Technology Ropar

Keynote Lecture Title

Technical Session – I
"8RMAT for sustainable slope stabilization technique and erosion control protection"

Dr. Fauziah Ahmad
Professor
School of Civil Engineering
Universiti Sains Malaysia
Engineering Campus, Malaysia

Technical Session – II
"Soft computing techniques in hydrological time series modeling "

Dr. V. Jothiprakash
Professor
School of Civil Engineering
Indian Institute of Technology Bombay

Technical Session – III
"Seismic waves propagation in jointed rocks"

Dr. Resmi Sebastian
Assistant Professor
School of Civil Engineering
Indian Institute of Technology Ropar

Technical Session – IV
"Evaluating the urban road environment in relation to human and aquatic health impacts induced by urban road dust"

Dr. Sudip Kumar Pal
Professor
School of Civil Engineering
Chittagong University of Engineering & Technology (CUET), Bangladesh

Technical Session – V
"Influence of coupler on the structural behaviour of RC elements"

Dr. R. Siva Chidambaram
Scientist / Asst. Prof. (AcSIR)
Advanced Structural Composites & Durability (ASCD) Division
CSIR - Central Building Research Institute, Roorkee

Technical Session – VI
"Low - Impact development advanced pavement systems"

Dr. B. Krishna Prapoorna
Associate Professor
School of Civil Engineering
Indian Institute of Technology Tirupati

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A S D F

Experimental Study on Effects of Steel Fiber on Hardened Concrete

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ABSTRACT

Innovative Research on concrete technology has become an important study in present world as the use of concrete has increased enormously in recent decades and hence causing a negative impact on our environment. So, as to shift our innovation towards sustainable environment, new studies are being carried-out on a day-to-day practice, to enhance concrete's philosophical characteristics, making them cost effective, economical and safe for environment. But significant research has not been done with use of steel fibre, and hence very less is investigated about the mixture on concrete qualities. Critical study conducted to look into the effects by addition of hook end steel fibres with dosage of 0%, 1%, 2% and 3% by weight of concrete and having aspect ratio 50, 60 and 75. The mechanical properties i.e. compressive strength, flexural strength and split tensile strength was computed for steel fiber reinforced concrete (SFRC). The experimental outcomes were procured and the outcome data were analysed with each other. A correlation between Compressive strength, Flexural strength and Split tensile strength represented as charts was compared. Experimental outcomes revealed the increase in percentage of various strengths for concrete grade M40 in 28 days period after curing.

Keywords: *Steel fibers, aspect ratio, Compressive strength, Flexural and Split Tensile Strength of Concrete.*

Experimental Study on Hardened Properties of Concrete using Magnetized Water

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ABSTRACT

In this research paper, the experimental study on mechanical properties concrete of M25 using magnetized water and also compare with blended concrete using normal water. The magnetized water was prepared using the magnetic treatment system This paper presents a detailed experimental study on compressive strength, split tensile strength and flexural strength at the age of 7,14 and 28 days. Test results indicate the use of magnetized water in concrete has improved the mechanical properties of concrete using magnetized water is enhances Compressive strength (11.8%), Split tensile strength (8%) and flexural strength (6.7%). Using magnetized water not only increases the mechanical properties of concrete and also reduces the usage of cement content up to 25 % in concrete.

Keywords: *Compressive Strength, Magnetized Water, Mechanical Properties Split Tensile Strength.*

Evaluation of Seismic Performance of Existing RC Frame with Steel Haunch Retrofit

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ABSTRACT

In framed structures, beam-column connections are exposed to lateral and uplift forces under seismic excitation, which create a weak link and cause bond failure. Proper reinforcement detailing in the joint region should be made to prevent this weak link. IS 13920-2016 suggests, ductile detailing should be provided in RC structures to enhance their seismic capabilities. Where in the joint region a high percentage of transverse reinforcement is needed in order to meet the required strength, toughness, stiffness, and ductility which leads to congestion of steel leading to construction difficulties. The recent structural failures in recent earthquakes indicate that the current design procedures are weak, causing the Performance-Based Earthquake Engineering design (PBEE) process to be implemented. PBEE is a method of nonlinear analysis used to determine how the structure will respond to lateral loads. Seismic performance can be greatly enhanced through the proper initial retrofitting method. Providing steel haunches at the joints will be an effective method for the repair and restoration of existing structures. Also, the addition of fibres to seismic joints partially eliminates the necessity of providing transverse reinforcement and its associated construction problems in beam-column joints subjected to earthquakes. Literature review indicates that few studies have been conducted on steel haunch retrofitting. ABAQUS, a Finite Element Software is used to conduct a comparative analysis between a bare frame and that of a retrofitted one. Where it resulted in improved load carrying capacity of retrofitted frame up to 2.25times that of the bare frame.

Keywords*: Pushover analysis, Steel Haunch retrofit, Shake table test, Abaqus simulation, Seismic capacity*

Experimental Investigation on Concrete – Filled Steel Tubular Beam

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ABSTRACT

This research focuses on behavior of concrete – filled tubular beams. This approach is based on unified theory, confinement factor also used to describe the composite action of concrete filled steel tubular beam. In this analysis four numbers of simply supported concrete – filled square beams of size 92 × 92 mm, thickness 3 mm beam specimen of 1100 mm long steel hollow sections filled with various grade of concrete with same sizes of hollow sections were investigated. The detailed measurement on this material properties, displacement and strain were performed. Academic study was carried out for ultimate moment carrying capacity of the beam. The final results from experimental investigation shows that filling material having more moment carrying capacity of tubular beams. This research is also extending the detail of, if the grade of concrete is more in tubular beams gives more flexural strength in the given specimen.

Keywords: *concrete filled beams, two-point load, grade of concrete, peak moment capacity.*

Stabilization of Clay Soil Using Coire Fibre, Cement and Flyash Mixture

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ABSTRACT

Expansive soils are found in many parts of the world such kind of soil generally consists of active clay minerals. Geotechnical engineers face various problems while designing foundation because of poor bearing capacity of clay soil and excessive settlement. To overcome these problems researches are concentrated on soil improvement techniques by adding fibres, cement and fly ash.to improve the properties of clay soil. The fibres are added at percentages (0.5% and 1%) and cement are added at percentages (2% and 4%) to enhance the ground improvement by giving them in four proportions. It can be used as a replacement for deep foundation or raft foundation and aids in embankment and slope stability.

Keywords: Stabilization: Clay soil; Cement; Flyash; Coir fibre.

Assessment of Ground water Quality in Guntur District, Andhra Pradesh by Remote Sensing

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ABSTRACT

By filtering through various soil layers groundwater is clean and free from bacteria, Due to rapid changes like urbanization, industrialization and improper disposal of waste that polluting the groundwater. Objective of this study is to assess and map the spatial distribution of groundwater quality in Guntur District Andhra Pradesh, using Remote Sensing and Geographical Information System. As the capital region is laid in Guntur district, Groundwater is the main source for industrialization and urbanization. Here the physical and chemical properties analytical data of groundwater sample data of well points from various regions in Guntur district are being collected from the ground water department of Andhra Pradesh. These data is predefined into attribute database and prepared the thematic map. The Inverse Distance Weighted (IDW) spatial interpolation technique was used to estimate the spatial distribution of groundwater parameters like pH, hardness, chlorides, sulphates, sodium, magnesium, potassium, carbonates, bicarbonates and specific conductivity. However, this analysis helps us to compare between different parameters and with different years. The present work is available for future planning and management of groundwater resources in the Guntur district. Suitable remedial measures are also suggested for the improvement of the quality of groundwater uniformly throughout the district**.**

Keywords*: Remote sensing, GIS, ground water, spatial distribution, thematic maps, quality*

Effluent Therapy of Electroplating Industry using Hybrid Up Flow Anaerobic Sludge Blanket Coupled with Dual Chambered Microbial Fuel Cell

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ABSTRACT

In the present study, the treatment of electroplating industry wastewater is done by coupled approach of hybrid upflow anaerobic sludge blanket (HUASB) with dual chambered microbial fuel cell (DMFC). A laboratory scale anaerobic treatment was conducted in HUASB at an organic loading rates (OLR) was found to be 0.28 to 11.38 kg COD/m ^{3}/d over a period of 290 days. The optimum OLR of the anaerobic reactor was found to be 6.83 kg COD/m^3/d, and the corresponding chemical and biochemical oxygen demand (COD and BOD) removal efficiency obtained were 88% and 90%, respectively. A maximum biogas production of 12.5 L/d was achieved. The effluent from the HUASB was further treated through DMFC technology. At the optimized conditions, DMFC treatment was achieved COD and BOD removal efficiency of 85% and 89%, respectively. The maximum voltage of 590 mV and corresponding power density of 98mW/m^2 was achieved while treating the electroplating industry wastewater. The maximum values of COD and BOD removal efficiency achieved was 98% and 99% respectively, for the coupled treatment system.

Keywords: *Electroplating industry wastewater, HUASB, DMFC, COD, BOD*

Assessment on Seismic Response of RC Framed Buildings with Scrap Tyre as the Base Isolator Using Nonlinear Static Push Over Analysis

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ABSTRACT

The investigation evaluates the seismic performance of scrap tyre rubber pad (STRP) bearings manufactured from used hazardous automobile tyres using Nonlinear static procedures. In this study, the four-story regular building and irregular-shaped buildings such as plan irregularity (H shape, square core type, and plus type) and vertical geometry irregularity (two types) of fixed and STRP base were analyzed using the SAP 2000 software package. The concept of Nonlinear static pushover analysis (NSP) is implemented which is reliable in its outcomes. For instance, the buildings are designed as per the design principles of the Uniform Building Code (UBC) suitable for Indian conditions. NSP is applied using two popular methods such as ATC-40 Capacity Spectrum Method and the FEMA-356 Displacement coefficient Method. The performance points such as spectral acceleration, spectral displacements, Base shear, and roof displacements are obtained and compared for the fixed base and STRP base. Moreover, the possible formation of hinges pertaining to life safety, immediate occupancy, and collapse prevention stages are significantly dealt with and reported for the buildings considered. From the investigation, it is evident that in the case of irregularly shaped buildings, the seismic response such as base shear and its corresponding roof displacements of plan irregular buildings is prodigious compared to vertical geometry irregular buildings. Nevertheless, the analysis reports that the response of regular-shaped buildings is prominent compared to irregularly shaped buildings with STRP as the base isolator.

Keywords*: STRP, SAP 2000, Nonlinear Static Push over Analysis, UBC-97, Capacity Spectrum Method, Displacement coefficient Method, Hinge formation.*

Numerical Analysis on Performance Of Z, Hat and Channel Shaped CFS Sections with and without Web Perforations

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ABSTRACT

Although hot rolled steel sections have been regularly employed in the construction sector for over a decade, they are not favored as a concrete substitute due to their substantial weight. Cold form steels, which are made by pressing and rolling thin gauge steel sheets at temperatures close to room temperature, are lightweight and preferred over hot rolled steel because of their high strength-to-weight ratio and post-buckling strength. The goal of this review is to look at the behavior of cold formed steel members with and without holes under similar loading circumstances in a variety of cross sections. Three various types of sections were used in this study, including C, Z, and Hat shaped sections with varying cross-sectional areas, and the selected sections are asymmetric. The selected specimens were examined analytically with ANSYS software, and the findings were compared for sections with and without web perforations to determine how well the three performed under static loading conditions.

Keywords: *CFS, ANSYS Workbench, Perforations, FEM, Asymmetric.*

Sustainability in Using Recycled Aggregate

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ABSTRACT

C&DW is among the most common types of trash collected around the world, and it's utilized to create recycled aggregates. Around the world, between 12 and 22 tonnes of construction trash are collected. Construction and demolition waste (C&DW) includes a diverse spectrum of materials resulting from a variety of operations, including construction, restoration, demolition, land clearing, and even natural disasters. Flakiness index, elongation index, and water absorption are all parameters of recycled aggregate. Recycled Concrete Aggregate (RCA) is a building material that can also be used for pavements and walkways. The debris gathered from building and demolition sites is pulverized into small pieces and used for a number of purposes. Most important problem that is to be considered is the growing demand for the natural aggregate as the population increases. In this paper, research on recycled concrete aggregate is conducted to address the shortage of raw materials and to analyze the performance of the RAC and natural aggregate. Recycled aggregate has been used as a constituent in concrete production. The life cycle assessment (LCA) of Recycle Aggregate and the natural aggregate is studies to know the sustainability of the material. LCA is a tool that is used for evaluating, comparing and improving the environmental impacts of the product within their life cycle. The recycled aggregates were collected from the construction wastes from the nearby sites. LCA for treated recycled aggregate and non-treated recycled aggregate were performed to know their performance. The use of LCA can improve the development of product and explore the properties.

Keywords*: Recycled Aggregate, C&DW, Life Cycle Assessment (LCA)*

Planning, Analysis and Design of an Intelligent Building for Sustainability

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ABSTRACT

Intelligent building is the future of building industries. Most modern public buildings are planned and build to decrease expenses by reducing energy consumption and to withstanding sustainably. The present work was carried out regarding residential building which was built in the form of intelligent building. The residential building was aimed to construct through interconnected with IoT (Internet of Things) enabled devices and with sensors in order to control the building with less energy consumption and additionally automotive timesaving process. This residential building that uses both technology and process to create a facility that is safe, healthy and comfortable and enables productivity and well-being of its occupants. Intelligent buildings yield cost reductions over all these areas by optimizing energy use through automated control, communication and management systems. They also guard against repair costs, employee time, productivity loss, revenue loss and the loss of customers to competitors. Developing a functional plan/master plan following the latest standards and the functional requirements of the building was carried out in AUTOCAD. The complete analysis of the structure was carried out in STAAD Pro. Various structural components comprising slabs, beam, column, footing, the staircase was designed manually. The manual design was confirmed to Indian Standards as per the different codes of the Bureau of Indian Standards, specifically have followed the limit state design of structures. The present work provided the necessary and essential exposure to various IoT devices and applications related to civil engineering.

Keywords: *Intelligent building, sensors, comfort, energy efficient, productivity*

Synthesis of Graphene Oxide and Study on Strength Properties of Graphene Oxide in Cement Mortar

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ABSTRACT

Being a binder cement helps in increasing the strength of cement-based product. Also act as pollutant by emitting CO_2. In order to control the emission of CO_2 quantity of cement is reduced and increase the strength by adding graphenebased Nano material. In This experimental study grapheme oxide (GO) is synthesized by Modified Hummer's method and it is added to cement mortar to find the approximate percentage of GO that enhance the strength property. The test specimens of size 70.6mm*70.6mm*70.6mm were used. The quantity of materials (cement, fine aggregate and water) were taken as per IS 4031 part 6. The percentage of graphene oxide taken for this study is 0, 0.025, 0.05, 0.075, and 0.1 by weight of cement. Cubes were casted for each percentage and tested for compression strength at the period of 3, 7, 14, 28 days and prism of sizes 100mm*75mm*75mm are casted for all the mixes and are tested for flexural strength. The compressive strength and flexural strength of the mix with 0.075% GO has shown a better result compared to rest of the mixes. Regression analysis were done to predict the strength values for any percentage of GO.

Keywords *Nano material, modified Hummers method, cement mortar, graphene oxide (GO), IS4031-part 6*

Impact on Greenhouse Gas Mitigation using Traditional Concrete and Partial Replacement by Copper Slag of Fine Aggregate

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ABSTRACT

Concrete is the building material commonly used in today's world. It is used by all forms of building processes. The researchers are developing new techniques in the construction field due to the demand and high level of concrete materials. Fine aggregate (sand), coarse aggregate, cement and water are found in normal concrete. River sand is a common type of fine aggregate used in concrete production. River sand replacements have been implemented due to increased costs and large-scale degradation of sources. Materials with identical physical and chemical sand properties may be viewed as an alternative to the sand of the river. As a partial substitute for sand, copper slag is used. Copper slag is an industrial by product abundantly available near copper processing industries. Copper slag, formed during the smelting and refining phase of copper ore, is a waste material. In order to implement strategies for the resection of energy usage and its environmental impacts to make them sustainable, buildings consume vast quantities of energy that are needed to be evaluated in the life cycle perspective. It was found that the expense of the construction could be minimized by better planning and design. In this study, the fine aggregate is replaced with various copper slag percentages (20 percent, 30 percent, and 60 percent) and tests such as compressive and breaking tensile strength tests are used to study hardened concrete properties. In this study, carbon emissions using the process of life cycle evaluation in both conventional and copper slag concrete.

Keywords*: Life Cycle Assessment (LCA), Life Cycle Inventory (LCI)*

Seismic Performance of Deep Column Structure

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ABSTRACT

Stiffness has been playing the major important role in RCC framed structures especially in columns. Most of the Structures collapsed due to its stiffness irregularity and stiffness distribution is not uniform throughout the structure. In this project G+8 structure is considered taken for analysis using ETABS and seismic performance is observed under various static and dynamic loadings with irregularities on the horizontal planes with a build-up area of 1284sqm approximately. The objective of this project is to study about the performance based design for deep column by varying stiffness of the structure using pushover analysis. In this study Type A structure is designed with deep column and also rectangular , T, L shaped columns. Type B structure is designed with deep column and replacing other column shapes with only rectangular shaped. Type C structure is designed by replacing the deep columns with normal RC column. In this analysis structure is classified into three types, TYPE A possessing 25mm displacement, TYPE B possessing 50mm displacement, TYPE C possessing 95mm displacement obtained for the maximum load combination by redesigning the stiffness. Response spectra is initially carried out to find the displacement and interstory drift. In order to understand the performance based design non linear performance is carried out in each types and comparing hinge patterns to find how the building behaves in each types. Further timehistory analysis is also performed and comparative analysis of different performances at economical impact is carried out in which aspect the structure performs well during an seismic event.

Keywords: *Performance based design, Deep column, Redesigning Stiffness, Response Spectra, Pushover Analysis, Time history Analysis*

An Investigation Study on Automatic Crack Detection Using Image Processing Techniques

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ABSTRACT

Cracks in concrete structures are of common occurrence. A building component develops cracks whenever stress in the component exceeds its strength. Cracks are classified into structural and non-structural categories. The structural ones are due to faulty design, faulty construction, or overloading which may endanger the safety of buildings. The non-structural cracks are due to internally induced stresses. There are numerous causes of cracking in concrete, but most instances are related more to concrete specification and construction practices than to stresses due to induced forces. Crack detection is done manually, it is an extremely time-consuming process. It is not practical since elements must be examined regularly, and it will take a long time for human capital. Moving ahead the concept of automatic detection has been created a footprint in the area of detection and measurement of concrete cracks. In the annals of automatic detection, the phenomenon of artificial neural networks coupled with machine learning forms the backbone in the line with this application. This paper addresses the fundamentals and recent advancements in the domain of automatic detection of cracks in concrete.

Keywords: *Construction Materials, Machine learning, Crack, Manual inspection, Image-Based detection*

Comparative Study on Fly Ash and Glass Powder as Pozzolana in Cement Mortar

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ABSTRACT

Cement is one of the most commonly used material globally. Although it has many advantages in the construction industry, it is one of the major sources of CO_2 emissions all over the world. There have been many researches and experiments to reduce the use of cement and its production by replacing it by alternative materials. These alternative materials include different types of mineral admixtures. Fly ash is one of such mineral admixtures which improves the quality of concrete. On the other hand, glass powder is a waste product obtained during polishing of glass which is dumped as landfill. However, from the literature review, it is clear that the glass powder has high content of silica with pozzolanic properties. The present research work shows the experimental investigation to evaluate the properties of glass powder and fly ash as pozzolana as per IS1727: 1967 and IS 3812(part 1): 2013. Thus, exploring the advantages and disadvantages of Glass powder over Fly ash as mineral admixture. In the current study, glass powder as shown promising result as mineral admixture and has good compressive strength over fly ash.

Keywords: *Glass powder, fly ash, Compressive strength, Mineral admixture, Pozzolana*

Comparative Study on Seismic Behaviour of Steel Shear Wall Located at Centre of Multistored RC Building

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ABSTRACT

As a new type of lateral resistance structure system, steel plate shear wall can bear most of the lateral loads in the structure, improve the initial lateral stiffness and horizontal bearing capacity of the structure, and act as the first line of defense before the main frame is destroyed so as to reduce the damage degree of the main frame and improve the collapse resistance of the structure. Dynamic studies were carried out on the shear strength capacity considering the effects of the relative stiffness and strength of the boundary elements on the shear capacity of the structure under seismic zone III. The multi storey RC structure was analyzed by Response spectrum method using STADD PRO V8i software. This study presents comparison of various parameters such as storey drift, lateral displacement, base shear on seismic analysis of G+9 storey RC building stiffened with bracings and steel shear wall. The performance of the building was studied with shear walls located at center. The Steel plate shear wall is analysed by the comparison of locations at the center and the edges. It was observed that structural capacity of the building was improved and also the lateral displacement and base shear were reduced with the addition of steel shear walls in a RC building.

Keywords: Steel plate shear wall, Response spectrum analysis, STAAD pro v8i

Preventive and Amicable Dispute Resolution Method in Ethiopian Road Authority

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ABSTRACT

Construction disputes are fairly common, and they vary in their nature, size and complexity. (Mark Appel), senior vice president of the American Arbitration Association, stated that he construction industry is really the industry that sponsors our work?". Contractual disputes are time consuming, expensive and unpleasant. They can add substantially to the cost of a contract and can also impact on the achievement of value for money. Inevitably, however, they do occur from time to time and the importance of bringing the dispute to a conclusion as efficiently and cost effectively as possible cannot be overstated. It is important to keep lines of communication with the Contractor open at all times when dealing with claims and to avoid adopting entrenched positions. The procedures applicable to dispute resolution in the contract should be adhered to but this does not preclude "without prejudice" discussions taking place between the contracting authority and the Contractor throughout the process with a view to arriving at a settlement of the dispute. From the onset of a dispute, it is important that it is managed actively and positively and at the appropriate senior level within the contracting authority, in order to encourage early and effective settlement. Unnecessary delays and inefficiencies can lead to rapid escalation of costs.

***Key words**: Construction, Dispute, Costs, Industry, Conflict*

A Review on Biocementation Under Different Injection Mechanisms

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ABSTRACT

In recent years, significant infrastructure development in cities has prompted engineers to improve the properties of soil to sustain the load transferred by those infrastructures. Mechanical compaction and chemical grouting are the two most used techniques. Their disadvantage include high cost, energy consumption and potential environmental pollution. Biocementation as a new emerging ground improvement technique has been investigated by numerous researchers, where cement or binding material are produced through microbial processes in situ. There is currently a body of literature on the various injection techniques used in biocementation, but a systematic review is lacking. As a result, this article examined the published literature on different injection mechanisms used in biocementation of soil, under different environmental conditions. The most used injection techniques were found to be surface percolation method, premixing method, continuous pumping, stopped flow and recirculating pumping. This article summarizes the collected literatures on injection mechanisms used in biocementation of soil and how these mechanisms affect the properties of biocemented soil.

Keywords: *Biocementation, Compaction, Injection, Percolation, Pumping.*

A Feasibility Study on Iron Ore Tailings as an Alternative for Fine Aggregate

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ABSTRACT

The production of steel has increased significantly over the years in order to meet the requirements of construction industry. Millions of tons of iron ore tailings (IOT) a solid waste produced during the beneficiation process of iron ore processing are disposed of every year in landfills, quarries, rivers, oceans causing serious environmental problems. On the other hand as the natural aggregates are gradually decreasing, there would be a need for alternative materials to be used as natural aggregate in concrete. Even though M Sand was found to be an alternative source, it is not considered to be a sustainable solution In this study, concrete specimens of M30 grade were cast by partially replacing the fine aggregate with IOT (10%, 20%, 30%, 40% and 50%). Specimens were tested for compressive strength and split tensile strength. The result shows that compressive strength in all the cases increased considerably when compared to the control cubes. The maximum increase in strength was around 13% for 40% replacement than the controlled cubes. Also the split tensile strength of concrete with 30% IOT increased by 7% was found to be the maximum.

Keywords: *Iron Ore Tailings, Compressive Strength, Split Tensile Strength, M sand*

Geopolymer Concrete with Several Mineral Admixtures – Study of Acid Resistance Properties

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ABSTRACT

The present experimental investigation is conducted to study the acid resistance properties as part of durability studies. Geopolymer concrete (GPC) equivalent to M40 grade was designed with fly ash, fine and coarse aggregates mixed with an alkaline solution consisting of sodium hydroxide (NaOH) and sodium silicate (Na_2Sio_3). Three more mineral admixtures like ground granulated blast furnace slag (GGBS), condensed silica fume (CSF) and metakaolin (M.K) were employed as part replacements to fly ash. GGBS was used as a replacement to fly ash at percentages varying from 0 to 100. In between, condensed silica fume and metakaolin were used as replacements at a constant percentage of 5. After mixing and casting, a two days rest period is given for demoulding the test specimens. The specimens were cured under ambient temperature for 28 days. The specimens were immersed in 5% solutions of sulphuric acid (H_2SO_4) and hydrochloric acid (HCl) separately. The change in the weight of specimens and the compressive strength were determined after exposing the specimens to acids over durations ranging from 7 to 60 days. It is found that the weight loss is more when exposed to HCl in the case of 100% fly ash and the loss is gradually getting reduced when GGBS with other mineral admixtures is used as a replacement to fly ash. In the case of exposure to H_2SO_4, there is no weight loss. The compressive strength loss is less for the specimens exposed to both HCl and H_2SO_4 over various exposure periods. The experimental study indicates that the performance of GPC under acid exposure is very much better and it is found that the specimens prepared with GGBS and other mineral admixtures are superior to specimens with 100% fly ash. Using the other mineral admixtures as a replacement to fly ash in the GPC mix further enhances its performance and durability when exposed to acids.

Keywords: *Alkaline Solution, Mineral Admixtures, Ambient Curing, Weight Loss, Compressive Strength*

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Krishna River Water Analysis Using Geospatial Technology

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ABSTRACT

The present study was done by the assessment of surface water quality which is carried out in Krishna River, Vijayawada, Andhra Pradesh. The Surface water quality study was assessed in all seasons. Surface water has significant role in the hydrological cycle and it is the part of precipitation that seeps down through the soil until it reaches rock material that is saturated with water. Due to rapid industrialization the quality of water is deteriorating gradually. Hence there is a need to assess the quality of surface water. Maps of surface water prospects zones prepared from satellite images, serves as efficient tools for detailed ground based hydro geological surveys which ultimately lead to the selection of suitable sites. Satellite data offers the unique capability for extracting information on geology, drainage, land use/ land cover and soil from a single image. Information on all these factors is essential in understanding the occurrence and movement of surface water. Considerable amount of data was generated between various parameters done by Geographical Information System 10.1 version software. Krishna River maps water prospects zones are prepared from the toposheets, serves as efficient tools for detailed surface based hydrogeological survey. Arc-GIS software is used assess the quality of surface water in Krishna River. This assessment will help in order to develop good water quality region successfully. Environmental changes taking place in the Krishna River water should be recorded with the help of GIS and Satellite base image maps should be used as basic input parameters for Environmental mapping and recording of Krishna River water environment.

Keywords*: Environment, GIS, Base Map.*

Solid Waste Management by using Remote Sensing Technology & GIS Applications-A Model Study

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ABSTRACT

The collection, processing, and recycling or deposition of the waste materials of human society has become a huge problem in urban city in Vijayawada today by using Geospatial and Remote Sensing Technology environmental sustainability is achieved. GIS is an effective map making tool for relating & integrating vast volume of separate types of data obtained from different sources. Waste minimization is achieved by segregation of the recyclable materials. Composting is the process of decomposition and the stabilization of organic matter under a controlled condition were done in the lab. The Soil samples have been collected from the dumping sites in Vijayawada. The collected samples were labeled indicating the exact position from where the samples are collected. Soil Samples are brought to the laboratory and analyzed for parameters such as chlorides, and total solids, TDS were by determined by standard methods. Remote Sensing Technology and GIS & Base map data of multiple information was useful in monitoring solid waste management by environmental analysis. Composting and vermiculture are the best methods of acquiring rich, humus material valued for the soil conditions increasingly effective in the urban area of Vijayawada city development. The spatial operation is performed in conjunction with maps functionality with GIS & Remote Sensing software. GIS Base map is basic input parameters for soil mapping and assessment of the pollution as it useful to analyses and get the solution easily with more accuracy. Remote Sensing and GIS database was useful in monitoring the solid waste management and composting, vermiculture is monitored effectively with the help of Geospatial Technology.

Key words*: Environmental Sustainability, Remote Sensing, GIS.*

Hyperboloid Parabolic Shell Roof using Bamboo as Reinforcement

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ABSTRACT

Designers have been progressively investigating shells and space constructions built of guadua bamboo while looking for innovative ways to build economical and appealing shells. Guadua bamboo poles are promising linear building components for curved grid systems because of their low mass, high strength, and excellent axial and bending stiffness. Guadua is also a renewable building material that can be easily harvested and deployed to create cost-effective, aesthetically pleasing, and long-lasting broad span roofs. However, in fact, rigorous numerical structural analyses of bamboo are uncommon. As a result, we describe the structural study of two roofs made up of a collection of hyperboloid parabola (hypars) that are being built in Cali, an area known for its abundance of the enormous bamboo species Guadua Angustifolia. More broadly, our research aims to show how an environmentally friendly, widely used, and low-cost material like bamboo may be used in a variety of applications. The relationship between the structural behaviour of hypar grids and their most essential bamboo junction is investigated in this work. To evaluate how the overall hypar effects the internal loads in the bamboo, a simple analysis as well as a finite element analysis are performed. Following that, laboratory testing is performed on the most crucial junctions that link the bamboo strips. The 'fish mouth' connection, both with and without mortar inserts, is given special care. A better knowledge of the flow of forces in the hypar grid, as well as a precise quantification of the behaviour of the 'fish mouth' joint, enables a more informed and effective use of the bamboo material utilized in these constructions. More broadly, our research aims to show how an environmentally friendly, widely available, and low-cost material like bamboo is utilized to its maximum structural capability in the design and construction of hypar roofs. A model of hyperboloid parabolic shell roof element is casted using cement mortar and after curing it has been tested for different loads. The results are compared with finite element analysis.

Keywords: *hyperboloid parabolic shell, roof structure, bamboo reinforcement*

Effect of Plan and Vertical Irregularities of Framed Structures in Earthquake Performance: A Case Study

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ABSTRACT

Earthquake is one of the major disasters which always being a threat for the building structures. As per the IS 1893(Part-I):2016 stipulations, out of the four main desirable attributes of an earthquake resistant building, the robust structural configuration is a most simple yet effective and important attribute. Unlike the other attributes, for structural configuration no additional cost may be required at all the cases. The performance of a building affected by the earthquake ground motion primarily depends on its configuration. One of the influential reasons for the building's collapse recognized from the precedent earthquakes is the irregular configuration of building. In this way, the analysis and design of a building with irregular configuration particularly, when it is located in a severe seismic zone, turn into a matter of concern. While designing an irregular building, it is essential to select an appropriate type, degree and location of irregularity. The current study deals with the seismic response of RC structures having various individual and combined complicated geometric irregularities. A regular building frame is customized by integrating various geometric irregularities in its horizontal and/or vertical planes. With the aim of gauging the significance of the regularity, a regular configured building along with three number of irregular configurations are analyzed and compared using the ETABS software as per IS 1893(Part-I):2016. The performance of all the models is made based on the Base shear, Fundamental period, Story Stiffness, Lateral-displacement and Story Drift.

Keywords: *Earthquake, Irregularities, Configuration, Geometry.*

Effect of Sugarcane Bagasse Ash, Lime Powder & Quarry Dust in Performance of Unburnt Bricks

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ABSTRACT

Environmental impact of construction industries is obvious as they depletes the natural resources by overconsumption and polluting the environment by emitting greenhouse gases. Emerging thoughts of sustainable construction, leads to experiments the ways to solve the issues related to these. Reuse of wastes as construction and building materials will, certainly help in achieving the sustainability goals. In this study an approach of utilizing the Sugarcane Bagasse Ash (SBA), a non-biodegradable waste generated by burning Sugarcane Bagasse for the energy production in sugar industries, for manufacturing of unburnt brick in place of clay, along with Lime powder and Quarry dust. Compressive strength and other physical properties have been correlated and discussed the benefits of usage of SBA in brick manufacturing.

Keywords: *Sugarcane Bagasse Ash (SBA); Unburnt brick; Waste Management; Sustainable building materials*

State-of-the-Art Review on Precast Composite Sandwich Slab Panels

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ABSTRACT

Precast construction technology is the one which rightly suits for today's world of quicker construction without compromising quality sometimes even with higher quality and performance. Precast composite sandwich slabs are one of the crucial developments in this aspect. Apart from faster in construction, composite technology yields good economy and additional benefits such as light in weight which further reduces cost of construction by effective usage of materials, insulation properties. In general, there is always a demand for improvement from existing technology at its prevailing state. It is important to assess the characteristics of various materials used for the composite sandwich slab panels from the wythe materials point of view, methods of manufacturing for better performance, nevertheless the significance of shear connectors their arrangement, pattern and material which ensures the composite action to achievement the full benefits of sandwich slab panels and to extend the service of the sandwich slab panels to large applications. This state-of-the-art review aims in providing an impression of the above and discuss the technical challenges available in front of the researchers.

Keywords: *Precast construction, Composite sandwich slabs, Composite Construction, Composite Materials.*

The Influence of Traffic Volume on Wheel Path Distribution and its Relationship with Pavement Design

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ABSTRACT

The amount and type of traffic in Ethiopia is increasing and changing at an alarming rate. This leads to the construction of road infrastructure, which necessitates the design of roads that are both economical and safe. Nowadays, flexible pavement roads are widely constructed, but surface failure occurs before the expected design period, posing a critical issue in the country. The study's main goal is to investigate a design traffic load factor (DTLF) for the road project that was not addressed during the design period. The study's objectives are to investigate the effect of traffic volume on heavy vehicle wheel path distribution across a carriageway width, to investigate the effect of the presence or absence of lane markings on heavy vehicle wheel path distribution on rural two-lane road pavement design, and to propose design traffic loading factor (DTLF) for the various variables that affect wheel path distribution. The design of flexible pavement in Ethiopia is based on the prevailing soil and material conditions as reported by the Ethiopian Roads Authority (ERA) Pavement Design Manual (Low and High volume), with the results compared to that of the AASHTO Structural Design Pavement manual. Finally, the thicknesses obtained with both design guides were compared. For the design of a two-lane rural road, the ERA high volume design manual recommends one directional traffic load for the pavement structures.

Keywords*: Traffic, Lane, Road, Pavement, Design*

Analytical Modelling on Stability Analysis of Earth Slope Failure South Wollo Ethiopia

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ABSTRACT

Landslides or moving of soil mass or rock masses are very common natural disasters all over the world, dealing with landslides is very challenging nowadays, it damages the structures such as highways, railways, buildings, etc. The country Ethiopia covers almost all the cities with slope area and mountainous, it is very common in Ethiopia the landslides and slope failures causing huge loss of life as well as government and public properties. The main objective of this research is to obtain the factor of safety and to provide remedial measures such as the construction of a retaining structure along the roadside to mitigate the further failure of slope and to facilitate the safety for the transport, public life, and property damage. The geotechnical engineering techniques are quite common to reduce the risk of landslides and the slope soil mass movement, the application of geotechnical engineering software such as slope/w analyses-GeoStudio to analyze the slope stability is quite easy and fast nowadays. This failure of soil slope or landslides occurred due to heavy rain and very less factor of safety provided before along the Kombolcha to Dessie main highway, due to this reason the road has been damaged and the discontinuity to public transport. By carrying detailed investigation, it is recommended to provide a cantilever retaining structure.

Key words: *Soil, Slope, Stability, Factor of safety, Landslides*

Influence of Application of Geosynthetic in Construction of Cobblestone Pavement in Ethiopia

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ABSTRACT

Ethiopia is facing challenges in the road construction industry, particularly in the construction of cobblestone pavements. Ethiopia is almost entirely covered by weak black cotton soil, which has more swelling and shrinkage characteristics, and as a result, failures in the construction of cobblestone pavements have been identified. In geotechnical applications, synthetic products are commonly used to change the physical and engineering properties of the weak soil. Geosynthetic refers specifically to permeable textile fabric material that can be used as a geotechnical engineering soil material. The main goal of this study is to improve the weak formations of sub grade black cotton soils in laying cobblestone road way construction by using geosynthetic fabrics made of polypropylene, polyester, or polyethylene materials and to strengthen the stability of the cobblestone pavement subgrade, maintain the proper evenness of the cobblestone pavement, minimize the cost of patch work maintenance, and avoid weeds between the cobblestone. Many developed countries use geosynthetics in road construction, erosion control, soil consolidation, slope stabilization, and other applications. Because Ethiopia is a developing country, we have the advantage of using geosynthetics for the reinforcement of subgrade weak black cotton soil in pavement construction.

Keywords*: Geosynthetic, Fabrics, Cobblestone, Subgrade, Weak Soil*

Studies on Mechanical Properties of GGBS Aggregate on Geopolymer Concrete

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ABSTRACT

The use of concrete has become more prevalent due to its versatile and low cost. Most of the coarse aggregate used in construction is obtained from quarries. Due to the increasing usage of natural resources, the demand for alternative materials has increased. This research aims at finding an eco-friendly and cost-effective material that can replace the conventional coarse aggregate. The use of an Eco-friendly material such as GGBS Clinker helps in reducing the impact of the environment on the society. This research looks at the benefits and drawbacks of GGBS clinker in concrete. The use of GGBS clinker as a substitute for conventional aggregate helps to prevent the depletion of conventional construction materials. Based on the results, it is concluded that GGBS Aggregate can be used by 100% replacement in Conventional concrete. It is observed that 7.23%, 3.5% and 3.67% decrease in Compressive, Flexural and Split tensile strength of GGBS Aggregate when compared to conventional concrete. The manufacture of G.G.B.S requires less than 20% of the energy and produces less than 10% of the CO_2 emissions compared to conventional aggregate.

Keywords: *Coarse aggregate, GGBS clinker, Durability, Eco friendly, Conventional aggregate.*

A Review on Various Alternative Materials for Coarse Aggregate in Concrete

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ABSTRACT

Concrete is becoming increasingly important in the building business as the world becomes more urbanised. Concrete use is rapidly growing, while important natural resources are being depleted. Cement manufacture also emits greenhouse gases such as carbon dioxide. Waste material, such as sintered flyash aggregate, palm kernel shell, or coconut shell, can be utilised as coarse aggregate to tackle the problem of coarse aggregate shortage, reducing waste disposal issues. As the need for concrete grows, one of the most efficient strategies to reduce concrete's detrimental effects is to increase its structural efficiency and durability. Building industry impacted by coarse aggregate availability or shortage, necessitating development of new alternative material to replace fine aggregate avoiding environmental harm.The feasibility of manufacturing structural lightweight aggregate concrete using sintered fly ash aggregate was investigated in this work. It is also feasible to make high-strength lightweight concrete with a compressive strength of up to 55 MPa. This study reviews recent studies on the use of sintered flyash aggregate and other waste materials as a partial replacement for coarse aggregate in the production of light weight concrete.

Keywords: *Fly ash, Light weight aggregate concrete, Sintered Fly ash Aggregate, palm kernel shell, coconut shell*

Resource Allocation and Levelling in Experimental Projects in a Geographical Neighborhood

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ABSTRACT

Resource allocation and leveling are the top challenges facing in the construction field nowadays. This can be minimized using the heuristic procedure and by using management software solution. One of the major problems that all the construction companies facing now is labor migration. Due to this, apparent labor scarcity occurs. Mobilization of new laborers with proper skill set is a major problem for all companies irrespective of their status. Projects get delayed due to non-availability of laborers. In most of the midsize projects, the planning is done manually which is time consuming and error prone. Very often laborer lay off also occur due to want of work. This is due to ill scheduled projects, which do not have a proper utilization plan of the laborers. Hence, there is a need for developing software tools that can predict the manpower requirements and to provide continuous work for them in this particular region. The main purpose of this work is to make use of the human resources to attain a sustainable work schedule all over the year and to retain them. The present study has been done with three live projects located in the region by assigning the resources with the help of Work Breakdown Structure (WBS), using the '*resource tool'* present in Primavera software, along with MSP AutoCAD and Microsoft Excel. This study thus explains "less work more gain" concept how to maximize utilization of resources in construction projects using software tools. On doing this type of work the labor gets more benefited by reducing their movement and stress relief by getting job in the same or nearby place. Further study also explains the labor stress to make relief from stress and welfare for them.

Keywords: *Management; Planning; Budget, Engineering & Work Breakdown Structure.*

The Study of Geosynthetics as Concrete Reinforcement

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ABSTRACT

In many regions, the usage of steel reinforcement in concrete has some drawbacks, such as corrosion, etc. Many innovative materials are being employed as alternative to steel reinforcement to alleviate the steel corrosion. Geogrid is a form of geosynthetic material mainly used in earth embankments, retaining walls and in some structural elements like slabs, beams, and columns. The geogrid material is used as an alternative to steel reinforcement, since it is good in both flexural and tension behavior. Engineers and designers have a lot of alternative for new applications because of the availability of many types of polymers and geometry of the geogrid materials. This leads to the difficulty in selecting the particular type of geogrid according to the need. This paper provides the complete analysis on different types of geogrids and their physical and mechanical properties which affects the strength and durability of the elements in which it is confined.

Keywords: *Polymer, Geosynthetics, Geogrid, Civil Engineering, Materials, Smart Materials.*

Experimental Investigation on Various Efficient Parameters of AAC Blocks with Conventional Bricks

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ABSTRACT

The transformation from natural soil to innovative material in the field of masonry construction has shown day-to-day progress in engineering technology. The innovative material is developed to overcome the sarcastic outcome – Aerated Autoclaved Concrete (AAC) blocks. AAC blocks are the new creation that plays a vital role in making globalized earth. This innovation focuses on Eco-friendliness and directs a path to sustainable development. It also satisfies the rules of 3R's reduce, recycle and reuse. This study focuses on various parameters of AAC blocks and compares them with traditional clay bricks and fly ash bricks. The investigation process is done in 2 stages, modeling and estimating the quantity of materials required for a model 10x10 feet wall and determining the characteristics such as durability, space occupancy, ultimate strength test and electrical conductivity. All the above results are compared with traditional bricks and fly ash bricks and thus the efficiency of AAC block is obtained. Quality optimizes time and cost. When quality is required in stipulated time then the role of initial cost remains high but reduces the future cost. Thus, AAC blocks are one such optimizer.

Keywords: *Aerated Autoclaved Concrete, Masonry Blocks, Light weight Block*

Basal Fibers in Geopolymer Composites: Advanced Thermal, Mechanical and Flexural Review

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ABSTRACT

In the recent few years, Basalt fibers and bars were of a great interest to the researchers as it is considered an inorganic, environmentally-friendly and cost-effective strengthening material especially in the case of geopolymer concrete. The thermal, mechanical and flexural properties of geopolymer composites with basalt fibers and bars have been discussed in terms of the most recent studies that have been done. The thermal properties of basalt fibers have been proved to be a major advantage. The mechanical and flexural properties have shown contradictive results, which requires further and more advanced research to be conducted in order to examine its mechanical and flexural performance.

Keywords: *Basalt Fibers, Geopolymer Composites, Basalt bars, Mechanical Properties, BFRP*

Studies on Strength, Durability and Microstructural Characteristics of Self-Healing Efficiency of Fibre Reinforced Sustainable Self Curing Concrete

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ABSTRACT

Green Building becomes one of the immediate solutions to reduce the global warming and climatic change. For that, we need buildings which have long lifetime and less maintenance because reconstruction and maintenance of the buildings are very costly and high energy consuming. One of the solutions for that is self-healing concrete (Bacterial Concrete). Bacterial self-healing is an innovative technology allowing repairing open micro-cracks in concrete by CaCO3 precipitation. This bio-technology improves the durability of the structure. Fibre Reinforced concrete is another technique which helps to increase the flexural strength of the concrete. Its main usage comes after the initial cracking of the concrete. These fibres present in concrete will not let the cracks to propagate more so we can attend the failure of the structure at early stages. The next one is Self-curing concrete, as we all know Construction is one of the industries which consume lots of water for its process. On which one of the consuming processes is curing and even using that much of water we cannot assure that the curing is perfectly processed. This leads to self-curing technology, which will retain the water in the concrete during the hardening process. This project deals with the collaboration of multiple hot topics in construction industry right now. We are using the advantage of this self-healing, fibre reinforced and self-curing technology to give durable concrete with low maintenance.

Keywords: *Bacteria, Durable, Fibre reinforce, Self-curing, Self-healing*

Extraction of Heavy Metal Ion from Industrial Wastewater by Using Bio-Nanomaterial Composite

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ABSTRACT

The need to develop more efficient adsorbent comparable to commercially available adsorbent, garnering a lot of attention as a viable adsorbent for industrial wastewater treatment. The application of Bio-nanomaterial composite as an adsorbent for the removal of lead from industrial wastewater is the focus of this research. Adsorption is a potential approach for removing heavy metals that have harmful effects on both the aquatic system and humans. The goal of this research is to remove lead using potential raw materials such as sugarcane bagasse and graphene oxide. In the adsorption of Lead, the raw material chosen for the experiment exhibited promising adsorption capabilities. Various analytical techniques, such as UV-Visible Spectrophotometer, were used to investigate the mechanism of interaction of Bio-nanomaterial with lead. Batch adsorption studies were conducted to optimise affecting parameters including contact time and adsorbent dosage.

Keywords: *Adsorption, Bio-nanomaterial, graphene oxide (GO), sugarcane bagasse (SCB), lead, batch study.*

Adsorption of Congo Red Dye from Water Using Carbonaceous Nanoparticles

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ABSTRACT

Adsorption is a promising technology for the adsorption of congo red dye from water of all which have hazardous effects on the aquatic system and also on human beings. The aim of this work is to use potential raw materials like clam shells in the Adsortion of congo red dye. The raw material selected for the experiment has shown has shown good adsorption capacities in the adsorption. The mechanism of interaction of carbonaceous nanoparticles using various analytical techniques such as UV-Visible spectroscopy. This is a clean and green technology where there is an almost insignificant amount of energy consumption at the initial stage for the preparation of adsorbents from raw materials; apart from this the entire process is passive.

Key Words: *Adsorption, Congo red dye*

Microstructural Studies of GGBS Aggregate on Geopolymer Concrete

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ABSTRACT

Concrete has grown more popular as a result of its versatility and inexpensive cost. Quarries provide the majority of the coarse aggregate needed in the building. The need for alternative materials has risen as a result of the rising use of natural resources. The goal of this study is to identify an environmentally benign and cost-effective material to replace coarse aggregate. The usage of an environmentally friendly material like GGBS Clinker helps to reduce the environmental burden on society. This study examines the advantages and disadvantages of using GGBS clinker in concrete. The use of GGBS clinker as a replacement for conventional aggregate helps to keep traditional construction materials from becoming depleted. Based on the results, it is concluded that GGBS Aggregate can be used by 100% replacement in Conventional concrete. It is observed that 7.23%, 3.5% and 3.67% decrease in Compressive, Flexural and Split tensile strength of GGBS Aggregate when compared to conventional concrete. Furthermore, between 7 and 28 days, it displayed a 60% decrease in porosity, with a well-compacted and thick ITZ at 28 days. Flexural strength showed a strong association with compressive strength, which similar to natural aggregate concrete. Overall, geopolymer aggregate concrete studied in this study has the potential to use as lightweight coarse aggregate in concrete.

Keywords: *Coarse aggregate, Durability, GGBS clinker, Microstructure, SEM analysis.*

An Experimental Investigation of Conventional Concrete by Replacement of M Sand with Crumb Rubber

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ABSTRACT

Basic lightweight total concrete is a critical and flexible fabric, which offers a extend of specialized, financial and natural and protecting preferences and is outlined to ended up a prevailing fabric within the unused thousand years. For auxiliary applications of concrete, the thickness is regularly more vital than the quality. A diminished thickness for the same quality level decreases the self-weight, establishment estimate and development costs. Basic lightweight total concrete by and large utilized to diminish dead weight of structure as well as to decrease the hazard of seismic tremor harms to a structure since the seismic tremor powers that will impact the gracious building structures are relative to the mass of those structures. In this consider, lightweight total concrete was outlined with the utilize of characteristic perlite totals that will give an advantage of lessening dead weight of structure and to get a more temperate auxiliary lightweight concrete by utilize of perlite powder and scrap elastic as a substitution of the cement. Six blends were delivered with diverse cement substance and with or without perlite powder. Sixes blends partitioned into two bunches agreeing to their cement substance. In addition, each bunch had three sub blends with 5%, 10% and 15% of perlite powder as cement substitution.

Keywords: *Crumb, Perlite, Dominant material, Versatile material, M-sand.*

Review on Fragility Functions for the Performance Assessment of Engineering Structures

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ABSTRACT

The fragility functions are used to assess the vulnerability of several infrastructure facilities due to natural hazards. Damage vulnerability assessment using fragility functions has started in early 90's. In this paper a review of the use of fragility functions for various engineering problems with special attention to those developed in the field of geotechnical engineering is reviewed. By referring to the above studies, the following conclusions can be derived. A brief summary on the fragility functions developed for different natural hazards are also reviewed. The relationships between the EDPs and IM are established and they are termed as probabilistic demand models (PDM). If the PDMs are developed for damage assessment due to seismic hazard, it is termed as probabilistic seismic demand models (PSDM). Using these PSDMs, the probabilities of exceeding the different damage states due to a seismic hazard can be plotted against the defined intensity measure of the seismic hazard. These plots are called as fragility curves. From the developed fragility curves, the probable damage state of the structure can be assessed for a given intensity measure. In turn, the expected loss and the retrofitting costs of the structure can be estimated for the future natural hazards.

Keywords: *Fragility Functions, Probabilistic Seismic Demand Models, PSDM, Damage Measure, Intensity Measure.*

Finite Element Modelling of GRS Bridge Abutment with Hypoplasticsoil Model

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ABSTRACT

Materials exhibit elastic behaviour during initial stages of deformation. With larger deformations, granular soils and soft soils exhibit irreversible displacements. The dense sands exhibit initially contraction and thereafter dilation during loading. The change of volume for increasing hydrostatic pressures can be specified in the plasticity models available in the commercial software available. However, the volume change should either be in the ascending or descending order. The reversing volume change characteristics of the sand are unable to be modelled using the in-built constitutive models. In order to model the contraction and dilation behaviour of sands appropriately, an user defined material model is used in the present study. New material models are formulated to represent the complex behaviour of granular soils. Hypoplastic model with intergranular strain concept is one such constitutive model which is exclusively used to represent the characteristics of sandy soils. This constitutive model has been used as VUMAT in the present study to analyse the stresses and strains in the GRS bridge abutments using finite element analyses. In order to assess the performance of the subroutine, the Founders Meadows GRS bridge abutment is modelled in FE and analysed under static loading conditions. The FE model and the VUMAT are observed to represent the behaviour of the prototype reasonably well. The FE model is also analysed under earthquake motion to study its response under seismic shaking.

Keywords: *Hypoplastic soil model; VUMAT; User material; GRS bridge abutment; static loads; seismic behaviour.*

Stress Analysis through the Construction of Tunnel and Comparative Study of the Tunnel Parameters by Finite Element Method

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ABSTRACT

The present research aims to study the stresses analysis during the construction stages of the tunnel. For this purpose, the finite element method (FEM) was adopted as an effective approach to analyze the test results using (SIGMA/W) program. The research includes the study of the behavior of soil due to excavation of tunnel by calculating the displacements and stresses in the three positions of tunnel (crown, wall, and invert) during the various stages of construction. The finite element analyses were carried out using (Elastic- plastic) and (linear elastic) models for the soil and the concrete liner respectively. Finally, the excavation process was done by excavating the tunnel in stages. In this study, different parameters are considered such as the effect of tunnel's depth and tunnel's diameter, soil properties, lining stiffness, surcharge value and surcharge position. The effect of these parameters on the stresses and displacements is considered.

Keywords: *Finite element method, stresses, displacements, surcharge.*

A Study on Equipment Management in Construction Site

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ABSTRACT

For speeding the task or project equipment are mandatory as it reduces human effort and precise the time. Whether the equipment is owned or leased it should maximize the productivity. The detailed estimation and the efficiency are to be calculated and compared with other site. Equipment should be at frequent use and idleness of equipment may lead to obstruct of work or loss to firm. The task must be given according to their capacity. The equipment cost may acquire one fourth of the project cost. Time, cost and money are the main restriction for conducting the task. Information is collected from the construction company site also the questionnaire survey is circulated to technical staffs for knowing their significant factors affecting them and how the future measures can be taken. Productivity Management has to be followed from bottom to top level in project. For productivity the major areas to be noted are ownership cost, depreciation, operating cost and linear scheduling. Some of the notable factors found were frequent breakdowns, maintenance, insufficient number of equipment, performance and efficiency of equipment and capacity of equipment.

Keywords: *Glass Equipment, Productivity, Maintenance Cost, Construction Site, Efficiency.*

Experimental Study on Flexural Behavior of Glass Fibre Mesh on Glass Fibre Reinforced Concrete

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ABSTRACT

It is well known fact that plain concrete is brittle in nature; it has low tensile strength and less ductility. Moreover, plain concrete suffers from cracking due to drying shrinkage and various other causes. It has been found that the use of fibers in plain concrete controls shrinkage cracking to some extent and also improves the tensile properties of concrete. Glass fibers serve the similar purpose with an additional advantage of being used in ornamental concrete This material is alkali resistant and less dense than steel, so the final product known as 'glass fiber reinforced concrete (GFRC)', is lightweight but strong. GFRC is composed of fine sand, cement, water, admixtures (if required) and alkali-resistant (AR) glass fibers in different ratios. In this paper, effect of using glass fibers on strength properties of concrete has been discussed. 8 different GFRC mixes were cast using different percentages of glass fibers by weight of cement at constant mix and water cement ratios. The properties of concrete like workability, compressive strength, tensile strength, flexure strength to be investigated by casting respective concrete samples of standard dimensions in the form of cubes, cylinders and beams. In addition to this, the experimental study on flexural behaviour of Glass fibre mesh in glass fiber reinforced concrete by casting various thickness of slabs with different layers of glass fibre mesh.

Keywords: *AR Glass fibre, Glass fibre mesh, Flexural behavior*

Seismic Performance of Multistorey Reinforced Concrete Buildings by Pushover Analysis

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ABSTRACT

The buildings are constructed mostly based on the usual standard codes considering the gravity loads consisting of the self-weight of the structure and the live load. These structures are experiencing low magnitude loads in their design life that leads only to the elastic range response, however, strong loads such as a sudden earthquake will lead the structure beyond its elastic limit. The performance of Reinforced Concrete structures will be nonlinear under seismic loads so the nonlinear behavior of reinforced buildings will be defined by the formation of plastic hinges and loss of considerable stiffness. In this case we need a method to evaluate the performance level of the structure in the plastic range, hence we used pushover analysis to evaluate the response of the structure to the lateral loadsFor the explanation above the best example can be the devastating earthquake of Nepal (25th April 2015) which has affected many buildings constructed based on traditional design ductile behavior for structure; this will avoid the collapse of the building and will surely ensure life safety. In present study pushover analysis is carried out on G+4, G+11 and G+21 Building situated in New Delhi (Zone IV) according to IS 1893:2002 classification of seismic zones in India. Pushover analysis was performed in SAP2000 after it was designed for gravity loads in STAAD Pro based on IS-456-2000. The pushover curve, capacity spectrum, demand spectrum and Performance point of the building was found from the results of SAP2000 and hence it was concluded that the building response is highly dependent on the materials used in the design. Mostly the failure was noticed in the columns of ground story of the buildings. After using increased amount of reinforcement in the ground story the buildings have reached life safety performance level.

Multi Walled Carbon Nano Tubes in Concrete – A Review

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ABSTRACT

Nanotechnology has been one of the leading technologies in the last two decades due to the interesting properties it has in various domains. It develops innovative properties and functions for materials, electronics, and systems. One of the most essential features of using nanotechnology is that when particles are in nano size, the proportion of atoms on the surface increases in comparison to those inside, resulting in unique characteristics. Concrete technology is not an exception, as many researchers have conducted experiments to clarify the expected merits and demerits that could be obtained by using nano particles in concrete. Multi walled carbon nano tubes is a promising material that was approved to be able to enhance the mechanical properties, durability and conductivity of concrete. This paper discusses in details the studies and experiments that were conducted by researchers to spot the light on the behavior of Multi walled carbon nano tubes.

Keywords: *Nanotechnology, Multi walled carbon nano tubes, Mechanical Properties, MWCNT*

Experimental Study of Mechanical Properties of Interlocking Blocks Made Using GFRG with Fly Ash

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ABSRACT

Concrete is considered as the second largest material consumed after water. Sustainable design and construction of structures using green material is an alternative to the depletion of aggregates and increase in the price of cement. To find an efficient and cost-effective solution, a new concept of construction is investigated with innovative self-interlocking blocks. Each blocks will have two interlocks as projection 'tongue' part and depression 'groove' part. This helps to resist the lateral movements and horizontal compressive stresses. The projection of one block fits in to the depression of the next so that they always align perfectly. It was observed that the horizontal and vertical groves helped in maintaining the stability of the wall. In addition, assembly and disassembly of wall are assisted by the groves, and it helped in maintaining the vertical plumb of the wall. A partial replacement of fly ash and gypsum, to cement is attempted here. Gypsum and Fly Ash are green products, which can be used as a replacement product of cement. They are more economical than other conventional materials and glass fiber increases the crack control and resistance against alkali attack. Our main aim of this work is to create a new self-interlocking block made using glass fiber reinforced gypsum and fly ash and to study the properties of interlocking blocks. The building constructed using Interlocking blocks will be rapid in construction, economic, light in weight, fire resistant, etc. In general, conventional wall requires high cost and its strength is less when compared with glass fiber reinforced gypsum and fly ash interlocking blocks.

Keywords**:** *Self-Interlocking blocks, Stability, Glass fiber reinforced gypsum, Fly Ash, Non-conventional materials.*

Experimental Investigation of Self Compacting and Self Curing Cement Paving Blocks Incorporated with Hypo Sludge and Silica Fumes

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ABSTRACT

Paving blocks are essential in construction works. In 9000 BCE, use of unfired bricks was initiated. The fired bricks are in use since 4000BC. Even though, fired bricks boost the mechanical properties but they have drawback of emission of CO2 and scarcity of clay. Now a days, usage of fired – clay red bricks and fly ash bricks are common in the construction Industry. The paper industries produce huge amount of hypo sludge which are to be disposed of cost effectively and environment friendly. An effort is made to manufacture unfired pavement bricks with hypo sludge and silica fumes with cement. Good cement pavement blocks can be made in combination with mineral admixture like fly ash, quarry dust and additives materials like lime and gypsum. Hypo sludge (5%) and silica fumes (5%) are found to be optimum and the paver blocks, thus prepared produce adequate results. Curing is obtained in the cement paving blocks by adding self-curing agent such as polyethylene glycol PEG 400. The compressive tests for various specimen are conducted and the optimum value is obtained from the results. These paving blocks can also be used as precast masonry blocks.

Keywords: *Cement, Hypo sludge, Silica fumes, self curing, Pavement*

Mechanical and Thermal Properties of Hempcrete

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ABSTRACT

Industrial Hemp is one of the maximum available and broadly produced best fibers with higher content cellulose. Hemp-concrete is a innovative bearable concrete material where hemp fibers are combined in the mix, four diverse contents of M1, M2, M3 and M4 an addition of constant Hemp fiber. The first three mixes (M1, M2 and M3) of cement content is reduced through 30% of the concrete volume of Hemp fiber and added by fly ash, RHA respectively. And fourthmixes (M4) of concrete is reduced by 10% of marble chips in coarse aggregate. The physical and chemical properties of Hemp fiber, Fly ash, Rice husk ash, and Marble chips were first assessed. Compressive strength, flexural strength, split tensile strength; sorptivity, acid test, and thermal test remained among the constraints examined. The test results show the value of long-term stability.

Key words: *Hemp fiber, Fly ash, Rice husk ash, Marble chips, Sorptivity.*

Evaluating the Potential of Bamboo: A Sustainable Alternative for Building Construction

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ABSTRACT

This paper emphasizes issues pertaining to sustainability and carbon emissions of building construction, keeping the Indian construction industry in mind. Globally, India holds the second position in the production of Bamboo. The amplified reliance on conservative construction constituents is seized to be accountable for the concentrated wood capitals and for degradation of the environment, which has directed the thought of substituting steel and wood with bamboos. Bamboo is recognized as a simple economic, rapidly emerging, and sustainable material. According to the review, two variety of bamboo has been identified which is bamboo schard and dendrocalamus strictus these two bamboo species have the highest compressive as well as tensile strength. Consequently, it is vital to optimizing the use of eco-friendly resources for structures. Bamboos as an amalgamated material could be cast-off in several exteriors as well as in the interior of buildings like flyovers, foundations, multi-story buildings, dwellings, large span structures in recreational facilities, and interiors of airports. The present work focuses on Bamboo's perspective to be used as supportive substantial in construction industries rather than its conventional use and what not to do while adopting Bamboo as a construction material.

Keywords*: Carbon Emission, Sustainability, Bamboo, Eco-Friendly, Compressive and Tensile Strength.*

Numerical Analysis and Evolution of the Slope Factor of Safety of CFG Pile Supported Embankment Against Deep Seated Failure

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ABSTRACT

One of the most approaches for improving embankment stability is to supported cement fly-ash and gravel into the soft underlying soil. To increase the stability of problematic soil as well as greater height road embankment need a ground improvement technique. The cement flyash gavel (CFG) pile is one of the effective techniques. The Effect of partially replacing deficient foundation soil with CFG pile on greater high embankment performance has to be investigated using a three-dimensional finite element model, the performance of (CFG) Cement fly ash gravel pile and geosynthetic-cement Fly-ash and gravel (GCFG)–supported embankments is investigated (PLAXIS3D). The impact of several elements such as the spacing to diameter ratio (S/D) was quantified using parametric research. The effect of encasement stiffness, soil cohesion, CFG pile friction angle, and embankment friction angle on the factor of safety against deep-seated failure. The findings demonstrate that encasing CFG improves embankment stability. Reduced column spacing (S/D) improves stability, lowers excess pore pressure development, and lowers average settlement. Increases in geotextile layers as reduced the embankment load, cohesion of underlain soft soil, friction angle of CFG in MC (Mohr-Columb model), and embankment friction angle increase embankment performance while also reducing average ground settlement. Results of the parametric study factor of safety were used to develop of data-driven models. The factor of safety of greater height embankment increased remarkable in soil treated with CFG.

Keywords: *CFG Piles, Embankment, FEM Analysis, Lateral Displacement.*

Study on High Performance Green Concrete Incorporating Zeolite

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ABSTRACT

Concrete is the single most and widely used building material around the globe. It is a heterogenous composite that consists of a combination of readily Basic materials. The reason behind the enormous use of concrete in construction lies in itself .It is versatile ,reliable and sustainable in nature because of its strength ,rigidity durability ,mouldability ,efficiency and economy .Basic materials like cement, fine aggregate and coarse aggregate are unavailable or scarce .To meet the global demand of concrete in the future it is necessary to use alternative materials in construction which can fully or partially replace basic materials without affecting the fresh and hardened properties of concrete .Global warming and environmental destruction have become the major issue in recent years .The major principle of global warming is Carbondioxide .Green concrete made with concrete wastes produces less energy in its production and produces less carbon dioxide than normal concrete .It improves strength ,workability and durability of the structures. Zeolite is a type of natural Pozzolanic material which is used as an alternative to improve the durability of concrete. It is a crystalline solid structure made up of silicon, aluminum and oxygen that forms a form work. Zeolite is available in powder and in sand form. It has a good Pozzolanic activity and ability to absorb carbon dioxide from the atmosphere. Cement and fine aggregate have been partially replaced by zeolite. Using of zeolite in concrete can prevent bleeding, segregation and minimize cracking. Due to this zeolite products have been successfully applied to overcome some construction difficulties in engineering practices

Keywords: *zeolite, carbon dioxide, durability ,Pozzolanic, Bleeding*

A Study on The Properties of Aerated Concrete -Fine Aggregate Partially Replaced with Marble Powder

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ABSTRACT

Aerated concrete is a homogeneous material when compared to normal conventional concrete as its density is relatively low and shows vast variations in properties. The properties of aerated concrete depend upon its microstructure composition, which are influenced by the types of binders and materials used, curing methods. The past research investigated results showed that, how far the concrete can be made into a light weight material by reducing the density of the concrete, which ranges from 300 kg/m3 to 1850 kg/m3. The main aim of the work is to increase the strength of the lightweight aerated concrete and to examine its physical and mechanical properties. The results of the various trail mixes with me use of materials like gypsum, lime, marble powder and fly ash at proportions are listed. Aluminium powder is used as the aerating agent. The proper mix of the above mentioned materials in concrete is cast in the cubes of standard size 100 mm x 100 mm x 100 mm and steam cured at 100 degrees for 8 hours. The results showed the specimen designed with 0.45& water to cement ratio and 0.l5& conplast mixed with l0& of lime, gypsum and marble powder plays an enhanced performance in the all aspects of mechanical property .

Keywords: Aerated concrete, gypsum, lime, marble powder, Aluminium powder, mechanical properties.

Experimental Investigation on the Mechanical Properties of Printed Circuit Board (PCBs) Fibre Reinforced Concrete

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ABSTRACT

Numerous studies have been conducted to substitute the constituent materials in concrete to address the scarcity of available raw materials, and they have proven to be beneficial up to a certain point. However, in this study, we are focusing on improving the structural behaviour of concrete by incorporating printed circuit board (PCBs) fibres without substituting any constituent materials. The purpose of this work is to conduct an experimental investigation into the strength properties of concrete when printed circuit boards fibres are added after removing all the metallic components from it. The addition of PCBs fibres to concrete has many benefits, the most notable of which helps in minimising environmental pollution and waste management concerns.in this experimental work, PCBs fibres of aspect ratio (AR) of AR10 and AR20 are added at 3%,4% and 5% for the weight of cement to the conventional concrete of Grade M40 with a water-cement ratio of 0.45. Both fresh and hardened properties of PCBs fibre reinforced concrete is tested and compared to conventional concrete. The quality of PCBs fibre reinforced concrete has also been tested by conducting UPV tests and Rebound Hammer tests. Compressive strength of PCBs fibres reinforced concrete are compared with Rebound hammer test results, both results are found to be significantly close enough. Based on the results of the tests, the discussions and conclusions are drawn. This study also discovered that repurposing hazardous electronic waste into the construction industry would aid in waste management and the prevention of environmental issues caused by electronic waste.

Keywords: *E-waste, E-waste Fiber, PCBs Fiber, Fiber-reinforced concrete, solid waste.*

Identifying Suitable Smaller Study Area from a Relatively Larger Area for Groundwater Studies

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ABSTRACT

In general, larger study areas lack sufficient data for modelling. Collecting field data becomes a laborious and time-consuming process. Thus, spatial area is critical in terms of groundwater modelling. Reducing the spatial area will be difficult because it must accurately represent the modelling objective. A method is proposed in this study for obtaining a representative smaller area for modelling studies in the Cheyyar River Basin, Tamil Nadu, India. Two critical maps are included in this study: a map of the Groundwater Potential Zone and a map of the Block-by-Block Stage of Groundwater Development. The Groundwater Potential Zone map depicts the critical areas with Poor to Good groundwater potential. The Central Groundwater Board report was used to create a block-by-block category map of the Stages of Groundwater Development. The zones that exhibit anomaly are selected as the hotspot areas for detailed follow-up studies. The Cheyyar River Basin covers an area of 4358 km2, which is a large area, and the lack of data makes it difficult to identify smaller zones.

Keywords: *Stage of Groundwater Development, Groundwater Potential Zone, Groundwater Modelling, Area Identification.*

A Study on Buckling Behavior of Column Filled with Rubber and Graphite Powder

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ABSTRACT

The main objective of the study is to reduce the dead load and to determine the strength of column using concrete filled with rubber and graphite powder. At present the disposal of waste tyres is becoming a waste management problem in the world. It is estimated that 1.2 billions of waste tyre rubber produced globally per year. In this 11% of post used tyres are exported and 27% are sent to landfill, stockpiled or dumped illegally and only 4% is used for civil engineering projects. Several studies have been conducted to use various applications of recycled tyre rubber. Rubber powder is a waste material that is ideal for use in concrete applications. It reduces the usage of natural aggregates in the production of concrete. A study is carried out on a concrete containing waste chipped rubber & graphite powder filled pvc pipe. The specimens were casted, tested and compared with conventional concrete in terms of workability and strength. The standard sizes of 1000*150*150 mm of columns were used with a curing period of 7, 14 and 28days to determine the buckling strength of concrete.

Keywords: *buckling strength, rubber powder, graphite powder, pvc pipe, dead load.*

Study of Design of Wall Using Interlocking Blocks Madeup of Gypsum and Mineral Admixture

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ABSTRACT

Concrete is considered as the second largest material consumed after water. Sustainable design and construction of structures using green material is an alternative to depletion of aggregates and increase in price of cement. To enable an efficient and cost- effective solution, a new concept of construction was investigated with innovative wall structure made up of self-interlocking block. Each block has two interlocking parts as 'tongue' part and 'groove' part, this helps to resist the lateral movements and horizontal compressive stresses. The projection of one block fits in to the depression of the next so that they always align perfectly. It was observed that the horizontal and vertical groves helped in maintaining the stability of the wall. Also, the assembly of wall is assisted by the groves, and it also helped in maintaining the vertical plumb of the wall. And a partial replacement of fly ash and gypsum to cement is done. They are more economic than other conventional materials. Our main aim is to create a new interlocking block wall using gypsum and other mineral admixtures like fly ash, GGBS, Silica fume, Metakoline and to study its properties as an interlocking block wall. In the end, interlocking wall will be compared by its strength and mechanical property to the conventional interlocking hollow block wall made up of cement, sand and stone dust.

Keywords: *Eco-friendly, Gypsum, Interlocking blocks, mineral admixture*

Study on Flexural Performance of Composite Slab Using EPS as Core with HPC as Bottom Wythes

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ABSTRACT

Sandwich construction is a new technology. composite sandwich slabs are nowadays used for the best optimality in strength and cost. By introducing the sandwich into the slab can reduce the concrete portion. Precast construction technology is the one which rightly suits for today's world of quicker construction without compromising quality or even with improved quality and performance. Precast composite sandwich slabs are one of the crucial developments in this aspect. Apart from faster in construction, composite technology yields good economy and additional benefits of versatile performance such as light in weight, insulation. In this study composite sandwich slabs made with Expanded Polystyrene (EPS) panels as core and self-compacting concrete and steel fibre reinforced concrete as the top and bottom wythes respectively has to be casted with dimensions of two-way slab as 1.2 m x 1 m x 0.8 m and test for flexural action will be done to compare their performance with conventional reinforced concrete (RC) slabs. Three different slabs are planned to cast to investigate the effect of SFRC in failure mode of the slabs and its flexural performance over the conventional slabs with cost effectiveness are selected as study parameters. Experimental study and result analysis will be carried out

Keywords: *Flexural behavior, Composite sandwich slab, EPS*

Clogging Studies: Effect of Sandy Soil Sediment on Clogging of Pervious Concrete

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ABSTRACT

Permeability is the predominant property of a pervious concrete mix. The permeability of pervious concrete reduces during its service life and the reasons attributed are inadequate void content of the mix, poor drainage facility, improper design and clogging due to sediment deposition. Clogging of pervious concrete due to sediment deposition is the major concern for permeability reduction. The pervious concrete pavement will be subjected to different sediment depositions depending on the surrounding soil and also due to the soil deposited by vehicles. Sandy soil is one such sediment which gets deposited on the pervious concrete pavement during its service life. In the present study, four pervious concrete mixes of different composition were subjected to clogging using sandy soil as sediment in the laboratory and the reduction in permeability is observed. In addition the pervious concrete mixes were also subjected to different rates of clogging. It was found that the permeability reduced significantly for slow rate clogging (90%) compared to medium and high rate clogging (75%). The study also revealed that the four pervious concrete mixes designed in the present study were good enough to withstand the clogging effect due to sandy soil. The designed pervious concrete mixes were able to withstand a sediment load of up to 0.64g/cm^2 for slow rate clogging and 1.02g/cm^2 for medium rate clogging.

Keywords: *Pervious concrete, Clogging, Permeability, Sandy soil, Sediment.*

AAC Blocks an Innovation as Eco-friendly Material in Construction

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ABSTRACT

In the current scenario with the increasing population growth, there is a need for innovation in managing resources. Sustainable urbanization became a key interest for societies in terms of environmental efficiency and intelligent employment of resources. To accommodate this aim one of the best way is to utilize the industrial waste in a productive way. This paper aims to promote the use of (Autoclaved aerated concrete) AAC blocks. By utilising fly ash in the manufacturing of AAC blocks, we can get one of the best "green products". The (Autoclaved aerated concrete) AAC is about 3 to 4 times lighter than conventional bricks, therefore, easy handling and cheaper to transport. The use of AAC blocks reduces overall dead load of a building, thereby allowing construction of taller buildings. It is an accepted eco-friendly building material. Its weight is only about 50 per cent of a standard concrete block. Using AAC blocks construction cost can be reduced by about 2.5 per cent for buildings. It helps to bring down at least 30% of environmental waste as opposed to going with traditional concrete. There is a reduction of 50% of greenhouse gas emissions. It also reduces the construction time by 20%. AAC has very excellent properties and can be used in many construction works, because of its excellent properties.

Keywords: *Autoclaved aerated concrete, pulverized fly ash, ecofriendly material, Cost effective*

Effect of h/D Ratio in Seismic Analysis of R.C. Elevated Circular Water Tank

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ABSTRACT

Elevated water tanks are considered a living structure and therefore, their earthquake safety is a matter of great concern. Water storage tanks shall function even after the earthquake for the access to drinking water in the earthquake-affected areas and to fulfill the need for fire fighting. To design a structure to remain elastic or undamaged is uneconomical and difficult to justify for an infrequent earthquake type loading. Instead, it is common design principle to accept some structural as well as non-structural damage during severe earthquake in a structure, provided it does not lead to collapse of structure. The present study focuses on seismic analysis of RC circular water tank for 200Cu.m capacity. Seismic analysis is performed in accordance with IS 1893 (Part-2):2014.The analysis of tank is carried out for four seismic zones (Zone-II, Zone-III, Zone-IV and Zone-V) with three types of soil conditions (Rocky or Hard Soil, Medium Stiff Soil and Soft Soil) as per Indian standard. Further three different h/D ratios with tank full condition, tank half-filled condition and tank empty condition are considered in this study. From the analysis, it is found that the tank design is governed by tank full condition. Values of design horizontal seismic coefficient in impulsive mode (Ahi) are less than those for convective mode (Ahc), for tank full condition. This is due to lower values of time period in impulsive mode. For the same soil condition, values of design horizontal seismic coefficient in impulsive mode (Ahi) and convective mode (Ahc) increases for higher seismic zone. The values of base shear and base moment are found to be governing in tank full condition as compared with tank half-filled and tank empty condition.

Keywords: *Elevated water tank, Seismic analysis, Base shear, Base moment, Impulsive and convective modes, seismic coefficient*

A Comparative Study on Conventional Reinforced Concrete and Prefabricated Concrete Floor Slab Systems for Mass Housing in Ethiopia

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ABSTRACT

The severe housing shortage in Ethiopian cities has led to spontaneous settlements of the impoverished in metropolitan regions and within cities. As a result of this large-scale mass housing development, a new automated building technology that is less expensive must be implemented. Conventional concrete-cast-in-place floor slab construction is widely used in our country and requires a long time and a lot of materials. Additionally, the system takes longer to run and may cause project delays because of it. When constructing buildings, the implementation of a relatively cheaper and modern automated system will not only have economic benefits, but will also reduce the reliance on conventional systems. A precast prestressed concrete floor slab was designed and analyzed, and the cost of concrete and reinforcement steel was compared to that of a cast-in-place concrete floor slab system, in order to determine the advantages of the precast prestressed concrete floor slab system. A review of current practice in precast prestressed concrete floor slab systems are the first step in this study, which is followed by proof concept analysis and design before a comparison of two floor slab systems is made. When compared to cast-in-place solid slabs, the precast prestressed concrete floor slab technique was shown to be more cost-effective.

Keywords: *Precast concrete, Floor slab, Large-scale construction, pre-stressed concrete, Cast-in-situ, Ethiopia*

The Influence of Elevated Temperature on the Strength of Concrete

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ABSTRACT

Fire accident is the most frequently occurring accident that could happen to any service structures in unexpected times. A repeated and hazardous fire accidents causing loss of valuable human life, failure of structures and the difficulty to control fire within a shorter time, increases an interest in design of structures for fire. Properties of concrete under normal temperatures are mostly well understood and those properties have been used for the design of concrete structures. However, under higher temperature, our knowledge of these properties is not enough. This paper focused on studying the effect of fire in the form of elevated temperature on concrete strength. Experimental investigation was carried out on cylindrical concrete specimens by taking different concrete grades to see the effect of fire on the properties of concrete. It has been found that temperature reduces much compressive strength of concrete. Higher concrete grade shows better resistance for elevated temperature.

Keywords: *Concrete, Compressive strength, Concrete grade, Fire resistance, Temperature, Stress, Strain*

Effect of Temperature on Load Carrying Capacity of a Plain Concrete Beam

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ABSTRACT

Fire requires a little source to be ignited but takes much more effort and cost to be controlled. In our country, Ethiopia, there were so many fire accidents which damage many structures and part of structures. Our knowledge on the properties of concrete under extreme temperature is limited and not well documented and makes it difficult to take into account fire resistance in the design of structures. This paper focused on studying the effect of temperature on the performance of plain concrete beam. Performance here indicates the response of plain concrete beam subjected to higher temperature; it includes variation of vertical displacement and variation of load carrying capacity with the reference of load-displacement curve for different temperature and temperature exposure duration. In this study; concrete grade, temperature and duration of temperature exposure are taken as factor to be considered for concrete strength. Experimental investigation was carried out on a plain concrete beam for four different concrete grades to compare the load carrying capacity after it has been exposed to a desired temperature. And it has been found that C-15 and C-25 plain concrete beam significantly affected by exposed temperature magnitude and C-30 and C-40 plain concrete beam significantly affected by exposed temperature duration. It has shown that higher concrete grade shows better resistance for fire. The rate at which the plain concrete beam lost strength for each concrete grade is also investigated.

Keywords: *Load carrying capacity, Plain concrete beam, Concrete grade, Temperature, Displacement*

Drainage Morphometric Analysis Using the Geo-Spatial platform

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ABSTRACT

The morphological features retrieved using Arc Hydrology methods with the input of digital elevation model earth observation datasets are significant in comprehending the spatial arrangement of stream network feature. These are widely applied in deriving detail linear, relief, and areal morphometric parameters. Drainage density differs from 2.75 to 3.11 km/sq.km with a mean density of 2.8 km/sq.km indicating a coarse-grained texture. The sub-watershed in the study area displays a lower overland flow length of 0.2 km. Therefore high precipitation is vital to contribute a substantial surface runoff volume to the acquittal stream in the basin area. Hence DEM is considered as an advanced data source in the GIS platform to extract and store digital databases for water resource management.

Keywords: *Linear, Areal, Relief morphometric parameters, Prioritization of subwatershed*

Investigation on the Performance of RC Elements with Mechanical Connectors as an Alternate to Lapping

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ABSTRACT

Conventionally, rebar lapping has been the method of use in reinforced-concrete construction to ensure reinforcement continuity. Codes of practice globally recommend huge lapping lengths to ensure efficient force transfer mechanism between connected rebars with Indian standards recommending a lap length 30 times the rebar diameter and ACI 318 recommending provision of at least 40 times rebar diameter for both flexural and direct tension. In the case of higher diameter rebars, the lap lengths can be more than a meter and cause the lap region to be highly congested, creating construction issues. Couplers have been gaining momentum as the preferred method of rebar joining compared to lapping due to the reduction of lap length and rebar congestion. But, the cost of the couplers and workmanship required to limit the application to mass construction compared to common residential construction. This research work explores other alternate possibilities using economical mechanical connectors with reduced lap length compared to the standard recommendation.

Keywords: *Lap length, Mechanical connectors*

Mechanical Properties and Durability Analysis of Coir Fibre Reinforced Composites – State of Art Report

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ABSTRACT

In the present era of concrete innovations, natural fibers hold an important role owing to their abundance in tropical countries like India, along with their eco-friendly nature. They out-shadow the synthetic or steels fiber with its cost-effectiveness, environmental friendliness, unhazardous production, nil heat generation to medium, and many property-oriented benefits. Amongst natural fibers, coir fibers dominate the local availability and have better mechanical and durability properties. In this paper, the comparative analysis of mechanical properties and durability of coir fiber reinforced cement composite (CFRCC), along with the general failure of natural fiber and countermeasures are reported. CFRCC with high compressive, tensile, and bond strengths and also least water absorption of cement medium at saturation made to take over the rest of local coastal natural fiber reinforced concrete. CFRCC was found to possess a predominant strength under impact loadings due to the hard nature and appreciable setup of constituent materials in the coir fiber. Here, an overview of the mechanism behind attaining corresponding strength studied on the elementary level. Further, the predominant terminologies and models of mechanical behavior for understanding material performance without mathematical details are discussed. In addition, the general failure mechanism of natural fiber with specific improvement based on coir fiber was dealt with in the work. References from the authors of various time scales included as a means of comparing durability enhancement methods are discussed in this work. CFRCC held the appreciable improvement of the properties amongst the other modified natural fiber reinforced cement composite, including the durability aspects.

Keywords: *Coir fiber reinforced cement composite (CFRCC), Mechanical properties, Durability and its enhancement, Failure mechanism.*

Experimental Investigation on Biogas Recovery and Treatment of Leachate

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ABSTRACT

The major issue in municipal cities is solid waste generation. The Landfilling is one of the techniques for disposal. Though there are advantages in disposing the waste, it also creates some long term effects to the surroundings such as Leachate, unwanted gas emissions etc. In this project, we made a solution to the problem. The unwanted gas containing 70 to 80% of Methane is collected by Biogas digestion process. We experimentally made a small budget bio digester by using waste material and equate a relation of how much gas can be collected at a certain range of wastes. Another important issue called Leachate, which pollutes the groundwater in great level, especially nitrates in higher amounts can cause **"Blue baby syndrome**". This can be treated by efficient method called solar photo-catalytic process, comes under the Advanced Oxidation Process (AOP) and Denitrification process. The experiment was carried out with different concentrations of TiO2 salts which are in dosage of 1,1.5,1.8,2g/500ml.The Photocatalytic experiment was conducted under 5hrs for each sample collected. Finally, at certain values of obtained BOD, COD, Nitrates, Dissolved solids, Phosphates, Iron, Chlorides, Turbidity etc. found, the removal efficiency results are discussed and tabulated.

Keywords*: Biogas digester, Leachate, Solar-Photocatalysis, Advanced Oxidation, Denitrification,TiO_2.*

Combined Effect of Rice Husk Ash and Fibers on The Mechanical Properties of Concrete

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ABSTRACT

The current goal of the research is to examine the strength properties of hooked end steel-fibrillated polypropylene hybrid fiber concrete with Rice Husk Ash (RHA) as a partial substitute for cement. The concrete consists of various percentages of steel fibers and polypropylene fibers, and cement is partially replaced by rice husk ash with 8% by weight. At 0.5% and 1% by volume fraction, hooked end steel fibers were included. The fibrillated polypropylene fiber was added at 0.5% by weight fraction. At 28 and 56 days, cube compression test, split tensile strength test on cylinder and flexural strength tests on prism were performed. Optimal combination of steel and polypropylene hybrid fibers was evaluated from test findings. Results confirmed that the combination of RHA with fibers enhanced the concrete strength properties at 28 and 56 days curing periods. Concrete with hybrid form gave more strength than fiber in mono form. Among all the mixes considered in this investigation, hybrid mix 1% steel + 0.5% polypropylene fiber gave the highest compressive strength, split tensile strength and flexural strength at both 28 and 56 days curing periods. In this mix, the compressive strength was increased by 29% and 31% at 28 and 56 days respectively than control concrete. The split tensile strength was increased by 38% and 46% at 28 and 56 days respectively than control concrete. The flexural strength was increased by 47% and 57% at 28 and 56 days respectively than control concrete. To validate the test results, statistical mathematical models were created. The results revealed that the empirical mathematical models are in concurrence with the actual test findings.

Keywords: *Rice Husk Ash, Steel Fiber, Polypropylene Fiber, Strength Properties, Statistical Mathematical Models.*

Cyclic Performance of RC Column Embedded With X-Braced Ties

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ABSTRACT

In reinforced concrete (RC) structures, the seismic force resistance is significantly improved by the confinement reinforcement configurations provided in the column. The influence of various reinforcement configurations provided to the confinement reinforcement in the columns was explored experimentally in this present research. The cyclic behaviour of conventional confinement reinforcement embedded RC column specimen is compared with X-Shaped braced confinement reinforcement embedded RC columns. A 1:3 scaled RC column with cross section of 150 mm x 150 mm and length of 1.1 m is considered for the investigation. Except the confinement reinforcement configuration, all other features, such as section size and reinforcement percentage, are identical in RC columns. The RC column specimens are subjected to in-plane reverse cyclic loading along with the constant axial load. The structural parameter includes hysteresis response, energy dissipation behaviour, displacement ductility property, stiffness characteristics were studied. The results showed that the RC column embedded with X-shaped braced confinement reinforcement effectively enhanced the ductile hysteresis response along with augmented energy dissipation capacity and enriched resistance to stiffness degradation behaviour.

Keywords: *Confinement reinforcement, Hysteresis behaviour, Energy dissipation, displacement ductility, Stiffness characteristics*

Study of Sustainable Concrete Properties GGBFS as Constituent Material

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ABSTRACT

Today with the expanding pace of development, concrete is being produced on the planet for a huge scope. It is significant for the development of framework for a long time. Yet concrete expends a ton of common assets because of which it isn't considered as a domain well disposed material. Portland cement is a significant constituent of solid which creates carbon dioxide gas during its creation which adversely antagonistically influences the environment. Likewise, different fixings, for example, sand and coarse aggregates are draining at a quicker rate in this way expanding the expense of development. Because of this, there is a need to recognize exchange materials for cement, sand and coarse aggregates. In this investigation, we can create a solid which is using the quality of some mechanical waste or side-effects, as an incomplete substitution of its significant fixings for example cement, sand (fine aggregates) and coarse aggregates. Such a concrete might be characterized as a Sustainable or Green Concrete. Furthermore, the objective is to locate the optimum percentage of the particular materials.

Investigation of The Major Causes of Pavement Distress in Relation to Base, Sub Base, and Sub Grade Material Condition

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ABSTRACT

Weather, a deficiency of appropriate design and quality control, high traffic loads, and inadequate assessment prior to performing maintenance and rehabilitation typically result in different types of road degradation than in temperate regions. Distress on the surface of the pavement can be caused by a variety of factors, all of which must be identified and addressed prior to corrective action being taken. While both causes appear to be identical, the solutions to each may be quite different. Prior to taking any corrective action, it is necessary to identify and address the underlying cause of the problem. The road connecting Dessie and Hayke is in poor condition at the moment. There is a great deal of traffic generated by buses, large trucks, cars, and minibuses. Roads may deteriorate further as a result of increased traffic volume. The purpose of this study is to determine the current condition of asphalt pavements, determine the causes of pavement distress, and propose solutions for the main route connecting Dessie and Hayke in Ethiopia's Amhara Region. This is the busiest route, which makes it more susceptible to serious distress and thus requires frequent maintenance and repair. A variety of laboratory tests were conducted on the road segment to gain a better understanding of it. Traffic, weather, and pavement materials were identified as the primary causes of pavement distress. According to the study, subgrade and base materials have low plasticity indexes and CBR values in comparison to industry standards. This portion's designed traffic load is greater than the actual traffic.

Keywords: *Pavement Distress, Plasticity, CBR value, Road Maintenance.*

Behaviour of Laterally Loaded Pile Group in Clay with Stabilized Pond Ash Compaction Pile

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ABSTRACT

The behavior of piles under lateral loads, analysis and forms which is an important aspect in the design of piles. The design of the laterally loaded pile is mainly governed by the property of the soil present at the proximity of the pile. Highly compressible clays are always prone to long-term settlement (Consolidation) and subsequent failures. Hence, such types of clay deposit are essentially to be stabilized before commencing any type of construction activities. An innovative solution adding pond ash, will be adopted to stabilize this problematic soil. Because, due to rapid industrialization energy generation is increasing day by day which leads to generation of pond ash as waste product is a big threat to our society and environment. Due to specific advantages, pond ash have been considered as a replacement to natural soils. The properties of pond ash is depends upon the coal used and may vary from one power plant to other power plant. Pond ash has potential to improve the engineering behaviour of soil. Silica content in Pond ash is very high. Such high content of silica is reason for the pozzolonic activity up to some extent. The attempts are taken place to understand the behavior of laterally loaded piles in a soil (Soft Clay) stabilized with pond ash compaction pile. The primary advantage of these pond ash compaction piles is that the usage is often considerably cheaper when compared to other similar ground improvement techniques. These piles do not have sufficiently high permeability to function as effective vertical drains during earthquakes. The reported work is mainly for the pile embedded in uniform clay layer subjected to lateral load. Experimental results showed that the lateral load capacity of pile increases with increase the spacing of compaction pile from the pile group.

Keywords: *lateral loads, compressible clays, pond ash, compaction piles, pile, lateral load carrying capacity.*

Effect of Alkali Treatment on Behavior of Oil Palm Empty Fruit Bunch Fibers

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ABSTRACT

Tensile strength is an essential aspect of cement composites. The tensile strength of cement composites can be enhanced using various methods. Out of all the available methods, natural fibers improve the tensile resistance with a positive impact on the environment. Various natural fibers are in use, and they are chosen depending on availability. The present study aims to effectively use oil palm fibers extracted from palm oil trees. Palm oil industries are growing rapidly, and a vast amount of oil palm empty fruit bunch fibers are disposed of every day. The oil palm empty fruit bunch fibers can be used directly in cement composites or treated before usage for better performance. In the present study, the oil palm empty fruit bunch fibers (spikelet and stalk fibers) are treated with different sodium hydroxide (NaOH) solutions to improve their mechanical and durability properties. This study also focusses on the effect of treatment duration for different concentrations of sodium hydroxide solution. It was found that spikelet fibers treated using 5% NaOH solution with an immersion period of 12 hours has improved the tensile resistance and water absorption properties compared to 3% and 10% concentrated NaOH solution.

Keywords: *Oil Palm fruit Empty bunch fibers, Spikelet fiber, Stalk fiber, Tensile strength, Water absorption, Alkaline treatment, Mechanical properties and Durability properties.*

An Experimental Work on Utilization of Sisal Fibre and Crushed Tile in Concrete

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ABSTRACT

In accordance with conservation efforts, this research focuses on ceramic tile waste as partial coarse aggregates replacement for concrete production, prevention of environmental pollution with considering the elements of sustainable and cost-saving construction projects, especially material usage. It provides same quality as that of a normal aggregate made of stones. In this project coarse aggregate is replaced by waste ceramic tile along with addition of sisal fibre. Sisal fibre is natural fibre and it is renewable, cheap, and easily available. It has also exhibited good tensile strength and can significantly improve the performance of concrete. The coarse aggregate is replaced with 20%, 30 % and 40% by waste ceramic tile and sisal fibre were added in the mix at percentage of 1.0% by weight of cement. The design Mix used for the project is M30 grade with W/C Ratio 0.45.

Experimental Studies on Mechanical Properties of Sisal Fiber Embedded Groundnut Shell Concrete

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ABSTRACT

Concrete is the most widely utilized "manmade" material globally for construction in many developing countries in all types of civil engineering works. Also, concrete is an environmental – friendly material and in areas of growing environment – related awareness that is of prime importance. Many of investigations were attempted by the researchers to improve the quality, strength and durability against adverse exposures, since decades. River sand is considered to be a really a rare material for concrete. The major replacement for river sand is M-sand. Now a days M-sand is been used in all type of construction. This project is an experimental study to use groundnut shell powder for the replacement of M-sand. The experimental investigation consisting of casting and testing for compression and split tensile tests were conducted on 150x150x150mm cube and cylindrical specimens with and without sisal fiber of volume fractions 2%, 3%, 4% based on the results the superior crack resistance, compressive strength and split tensile strengths are investigated. The proposed sample will be tested at 7 days, 14 days and 28 days age of curing. These results will show whether the fiber embedded groundnut shell concrete is suitable for proper confinement or not for structures subject to extreme load conditions.

Critical Review on the Rehabilitation Technique of Corrosion-Damaged Reinforced Concrete (RC) Beams Using Composites

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ABSTRACT

Premature deterioration of materials in reinforced concrete (RC) structures is one of the major problems caused because of the polluted environment and the use of poor-quality materials. Deterioration of (RC) structural members such as beams, slabs, and columns due to corrosion attack in the polluted environment affects the safety, serviceability, and durability of RC structures. The corrosion level and degradation of physical properties of the concrete structure have to be assessed using Non-destructive Testings (NDTs) including half-cell potentiometer, concrete resistivity, Carbonation, Ultrasonic Pulse Velocity (UPV), and Rebound Hammer. Appropriate retrofitting and rehabilitation techniques have to be adopted based on the deterioration level to enhance their lifespans. There are many techniques available for retrofitting of corrosion damaged structures, which includes the application of external wrapping of FRP composites, fabric-reinforced cementitious matrix (FRCM), fiber-reinforced geopolymer concrete (FRGC), combined impressed current cathodic protection and structural strengthening (ICCP-SS), ferrocement with stainless steel mesh, etc. This article presents an overview of the NDTs on the corrosion damage structure and rehabilitation techniques. The influence of various strengthening techniques on the performance of RC beams has been critically analyzed and discussed. The durability property of rehabilitated structures has also been discussed.

Keywords: *RC beams, Corrosion, Rehabilitation, Durability, FRP-Strengthening.*

Effect of Ductility Class on The Earthquake Performance of RC Structures

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ABSTRACT

These days, assessing a structure's seismic performance is crucial. Modern structural design mandates the use of ductility, which reduces costs while boosting overall safety. A structure's ductility can be increased by allowing a piece of it to be damaged. The goal of this study is to discover the best ductility provisions for constructions. According to EBCS EN 1998-1:2014, G+4, G+8, and G+12 reinforced concrete buildings constructed as high- and medium-ductility-class structures on strong rock (Ground type A) were compared in an analytical study. EBCS EN 1998-1:2014 specifies the criteria and requirements for using capacity design principles in the building's design. ETABS software was used to conduct a performance evaluation of the buildings after they had been designed to withstand an oncoming earthquake. The capacity curve, story displacement, inter-story drift, and plastic hinge distribution of the building are used to evaluate the seismic performance of the building. As the ductility increase from DCM to DCH the result becomes (i) base shear increased by 7.89%, 9.62% and 4.21% and increased by 8.02%, 11.5% and 5.19% along in the X and Y direction respectively. (ii)Top Displacement is increased by 21%, 18.96%and 13.65% and increased by 18.59%, 14.18% and 12.52% along in the X and Y direction respectively. (iii) Inter Story drift increased by 17.92%, 20.68% and 13% and increased by 17.7%, 11.97% and 22.96% along in the X and Y direction respectively. (iv)Plastic hinge distribution at the last step of pushover analysis at the range greater than CP in DCM is higher than DCH and at the performance points the performance of the three sample buildings become IO but the number of plastic hinges distribution on level A-B and B-C are not identical for DCM and DCH.

Keywords: *Ductility Class, Performance Level, Plastic Hinge, Pushover Analysis*

The Impact of The Overstrength Factor on The Global Earthquake Performance of Reinforced Concrete Structures

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ABSTRACT

Designing earthquake-resistant structures based on performance has become popular in recent years. Today, the prediction of inelastic seismic responses and the evaluation of the seismic performance of a structural building are extremely important topics. The philosophy of capacity design is the subject of this investigation. EBCS EN 1998-1: 2014 specifies the criteria and requirements for the design of the building using capacity design philosophies. There are four structural parameters that are used to compare the overall seismic performance of the structures. ETABS 2016.1.0 software was used to model and analyze the structure of a ten-story regular framed reinforced building. Seismic action effects were analyzed using the lateral force method. In order to meet the code's requirements, the structure was designed using the capacity design philosophy and four different column-beam overstrength factors. To achieve the necessary energy dissipation, critical areas were meticulously detailed. Using static nonlinear analysis methods, the performance of the buildings was analyzed following the earthquake's design. Finally, the impact of the over-strength factor on the overall seismic performance of the structure was examined. The capacity curve, story displacement, interstory drift, and plastic hinge distribution of the building are used to evaluate the seismic performance of the structures.

Keywords: *Capacity DesignPerformance Level, Overstrength Factor, Plastic Hinge.*

A Comparitive Study on Removal of Colour by Using Natural Adsorbent in The Treatment of Textile Water and That Treated Water Used in Concrete

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ABSTRACT

About 2 000 000 billion litres of water is consumed globally every year. The amount of potable water available is reducing due to pollution of various water bodies. The textile industry waste water is one of the sources of pollution. There are problems associated within handling dye waste water, with the treatment process, and with several environmental problems that also occur. On the other hand, about 700 million litres of potable water is used for the production of concrete. Using the waste dye water in concrete reduces the overall water consumption and at the same time it provides a solution to dye waste water disposal problem, making it beneficial in socioeconomic as well as environmental terms. This study explored the possibility of 100% replacement of potable water with textile dye waste water in concrete. The preliminary study indicated that strength of concrete made using potable water and textile dye waste water (untreated water) are comparable .One of the greatest problems that the world facing today is that of environmental pollution. Environmental effects consists five basic types of air, water, soil, noise and light. Environmental pollution is the contamination of the physical and biological components of the earth to such an extent that normal environmental processes are adversely affected. Additives used during the dyeing process include harmful substances such as alkalis and acid. Wastewater from textile dyeing also affects plant life in the water, because many dyes have substances that decrease photosynthesis, the process by which plants get nutrients. Among all the dyes using in industries textile industries placed in the first position in using of dyes for coloration of fiber it has been projected that textile and manufacturing industries are using more than 10,000 commercially available dyes and the consumption of textile industry is more than 10,000 tones/year and about 10 – 15% of these dyes are discharged into waste streams as effluents during the dyeing process so this method helps in removal of colour by using natural adsorbent material in the treatment of textile water and that treated water will be used in concrete.

Keywords: *concrete, raw effluent, adsorbtion material, tertiary treated outlet*

Experimental Investigation on Self Compacting Concrete by Rice Husk Ash Partial Replacement of OPC

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ABSTRACT

Self-compacting concrete (SCC) is commonly compacting in own weight and flowing concrete, that does not require vibration tools such as mechanical vibrators, tamping rods, etc. In this project an attempt have been to a part of replacimg cement by Rich Husk Ash, super plasticer gelniumand Viscosity Modifying Agent to improve some of the properties of concrete. self compacting concrete with adding different water percentage reductions , the compressive and flexural strength is to be determined. superplasticisers are significantly used to increase the ease and rate of flow. The self compacting concrete (SCC) simplicities the pouring and eradicates construction difficulties. The Self-Compacting Concrete made by partially varying coarse aggregate with different replacements. The mix ratio of M50 for SCC is to be determined. In order to obtain the optimum mix ratio different combination are to be tried by varying the water content.

Keywords *– self compacting concrete, compressive strength, tensile strength, flexural strength*

Implementation of Augmented/Virtual Reality Technologies in BIM

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ABSTRACT

Visualization and immersive interaction are an integral element missing in the construction process. In this era of remote working, BIM coupled with AR/VR is the game changer in the construction industry. The wide ranging applications of AR-BIM have tackled the many inconsistencies and flaws in the field usage of BIM. In the times of faster and efficient construction or Construction 4.0, integrating BIM with AR/VR will facilitate Lean Construction, which is the need of the hour.

Some of the lucrative applications are:

- Simulation of project for presentation to client
- Safety training for new recruits/labour will determine if approval to work on site is given.
- 3D Visualisation for design phase
- Tracking of progress of project
- Locating structural/building components

For the purpose of understanding the shortcomings in the current industry workflow, an onlinesurvey was developed to understand the grassroots level expectations from this concept of an individual. Also, a projectoriented survey of 2 different sites of L&T were obtained to get a clearer picture of the current scenario. Intent of survey is to understand the most practical use case scenario of BIM integrated with AR/VR. The paper found that Revit and Unity were the most utilized BIM AR/VR software and Progress Monitoring/Tracking was found to be the most suitable Use Case. The major challenge perceived was the Reluctance/Non-Adaptiveness to new technology. There are many industry relevant Workflows available. Many of them have certain gaps or flaws caused due to challenges such as cost, non-adaptiveness, lack of expertise etc. The intent of this thesis is a creation of Workflow to bridge those gaps using existing solutions and innovate new processes utilizing integration of BIM with AR/VR.

Keywords: *BIM (Building Information modelling), AR (Augmented Reality), VR (Virtual Reality), Lean Construction.*

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Review on Design of Sacrificial Anodes

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ABSTRACT

Corrosion process is both electrical and chemical, that is, electro - chemical process. Oneof methods of protecting against corrosion is use of galvanic anode such as zinc(less noblemetals). This anode corrodes preferentially, liberating electrons known as Sacrificial anodecathodic protection Its advantages are simplicity, cost savings, availability of wide range of anodes and low maintenance,Disadvantages with the SACP are requirement of periodicreplacement of anodic metal due to its dissolution in the process, limited control over the system and driving voltage is low and may be inadequate to provide full cathodic protection in all situations, factors need to take into account were requirement of sufficient current, minimizing the acidification anode anode, avoid hydrogen embrittlement., in order to achieve this Various design parameters are suggested such as - Maximum ratio of mass of galvanic anode metal (g) to the surface area of galvanic anode metal (cm2) , Minimum calculated pH throughout the service life of galvanic anode , Minimum porosity of encapsulating mortar , Critical pore size , Material of tie wire , Minimum distance between tie wires (if more than 1 tie wire is used) , The connection between anode metal and tie wire need further examination Therefore, this paper reviewed the published literature to Study the effect of increasing conductivity encasing mortar using red mud material in improving performance of galvanic anode.To identify Parameters which influence anode performance like mass/surface area and spacing and design them in critical locations such that maximum service life is available,Design of tie bars.To check if the designed anode satisfies the required levels of depassivation set by ISO-EN 12696.

Keywords: *Sacrificial anode cathodic protection, conductive encasing mortar, critical location, depassivation criteria, tie wires.*

Ethiopia's Landslide Retaining Structure Design and Stability Analysis

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ABSTRACT

Ethiopia's almost mountainous, hilly, and highlands are frequently afflicted by landslides; numerous landslides have been reported in the last 30 years, triggered by heavy rainfall, such as earth slides, earth flows, and rockfalls, resulting in the loss of many human lives, damage to many houses, and loss of agricultural lands. Recently, landslides triggered by unusually heavy rain occurred in Dessie, in the south Wollo region of Ethiopia, causing a massive mass of soil to slide downward and closing the existing Kombolcha to Dessie Road. The primary goal of this paper is to design and analyse a reinforced concrete cantilever retaining wall to support a massive mass of soil. The detailed investigation in this research paper is carried out using experimental methods, while the design and analysis are carried out using the conventional method.

Keywords: *Landslides, Earth, Retaining wall, Slope, Design*

Analysis of Traffic Accidents on Amhara Region Main Roads

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ABSTRACT

When one vehicle collides with another, with a pedestrian or an animal, with road debris, or with another stationary object, such as a tree or utility pole, it causes injury, death, or property damage. In 2020, road traffic injuries will be the second leading cause of death worldwide. It is now the leading cause of death among young people aged 15 to 29. Every year, over a million people are killed or injured on the world's roads, causing billions of dollars in damage. Ethiopia has a higher rate of road traffic accidents (RTA). Because the Amhara region of Ethiopia is a developing region, there are road traffic accidents as a result of personal and environmental factors. The purpose of this research is to identify the root causes of high road traffic accidents in the Amhara region. These case studies help the community understand the major risk factors that contribute to the Amhara region road traffic accidents and injuries. The study's goal is to identify the major causes of road traffic accidents in northern Ethiopia's Amhara region. Despite the fact that funds were limited, the study was completed by adding personal finance and property for two years. Despite the lack of local publications, the study was supported by a review of various local and international publications. The study area corresponds to the RTA well. 177 Data is primarily gathered through interviews, but it is also gathered through focus group discussions, observations, and measurements. Secondary data from the Amhara region police commission bureau has been thoroughly evaluated. There is also a density of accidents per kilometer and a rate of accidents per million. It is calculated to enter Vehicles. The outcomes of the discussions reveal the primary cause of regional road accidents. The driver's, vehicle's, and pedestrian's errors are all listed and ranked. Road traffic accidents are well-advised, as are prevention strategies.

Keywords: *Road, Traffic, Accident, causes, Vehicle, Amhara region*

Zero Carbon Hempcrete Construction – An Overview

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ABSTRACT

With growing concern regarding global warming, focus on environmental sustainability is a promising factor throughout the world. Construction industry accounts for almost 40% of the world's energy usage. The possible material with suitable technical properties based on renewable resources is hemp fiber concrete – hempcrete. Carbon confined in hempcrete is not going back to the atmosphere so it is a revolutionary material which is flourishing as carbon alternatives to conventional materials. This paper presents an overview on the material properties and environmental impact of the hempcrete derived from plant extract which is renewable and recyclable. The paper focuses on the mechanical and hygrothermal properties of hempcrete and its use in structures. Hempcrete is thick and porous so it can take in humidity and release it. Temperature will buildup in the wall and slowly radiate so temperature and humidity will be stable throughout the year. Hempcrete are not load bearing materials so it must be associated with supporting structures such as wooden frame or supporting masonry.

Keywords: *hempcrete, hygrothermal, renewable, load-bearing , humidity*

An Absolute Review on Strengthening of Scorched Concrete by Means of Bio Influenced Self-Medicate Mechanism

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ABSTRACT

The review study identifies research gaps in bacterial concrete as well as the benefits of using different bacillus strains to rehabilitate charred structures. A structural fire accident is an unfavourable circumstance that can occur at any time on the building. As a result, the structure's strength and durability will deteriorate, resulting in significant economic losses. Fire in the structure leads to prominent increase in crack and spalling of the surface concrete and to address this issue, retrofitting is one of the most effective techniques to ensure that a badly burnt structure is safe for future use with the help of bacterial concrete. Biomineralization is one of the most eminent techniques over a decade in auto-healing of cracks in the structure by itself with different bacillus strains such as Bacillus subtilis, Bacillus pseudofirmus, Bacillus pasteurii, Bacillus sphaericus, Escherichia coli, Bacillus cohnii, Bacillus balodurans, Bacillus halodurans, etc. Strengthening with the bacillus strain is the emerging techniques that give a good improvement in results and performance of the scorched structure. In this review paper we compiling the many research authors work in the understandable manner with subheading of appropriate techniques with results from the experimentation of various authors.

Keywords: *Bacterial Concrete, Scorched Concrete, Strengthening, Bacillus, calcium carbonate precipitation*

Seismic Analysis of a G+6 Multistorey Storey Building Under Actual Soil Condition for The Indore City

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ABSTRACT

In the region of Madhya Pradesh state the major part of soil includes the black cotton soil. The various developing city are situated in this region such Bhopal, Indore, Gwalior, Jabalpur etc. The Indore city is currently demanding in the infrastructure such as high-rise, tall building, multi storey, bridges, transportation such roads & metro constructions. The Indore city is high demand for business and carriers approach by various levels of company and youngster as a carrier approach so it is also known as mini Mumbai. The soil profile under the structure also plays an important role in the construction of the superstructure together with the substructure at its location. The construction is said to be acceptable if it meets the design criteria and if it is kept in the same location to withstand lateral forces. To show the importance of the soil under the construction area, soil research was conducted in the city of Indore. The research articles deal with the assessment of the actual condition of the soil under the multi-storey building under seismic forces. The location is considered as a city of Indore. Software modeling and analysis was taken for G + 6 models and eleven different cases. Reference survey data taken for this total of 11 bole hole wells. The paper analyzes different well locations for efficient construction of buildings and the effectiveness of residential housing. After identifying the necessary needs and fixing goals. The input parameters of the soil profile used in this study are based on a part of the urban area of Indore. After analyzing the output parameters, the main points were noted. The conclusion of the project is based on an efficient location for construction under different wells with the lowest parameters of results under seismic loads.

Keywords *– Bore Holes, seismic loads, G+6 Multistorey Storey Building, Indore city, soil profile*

Mechanical Behaviour of Bio-Degradable Polymer Composites from Waste Paper Powder Filled Epoxy Composites as Sustainable Insulation Material in Construction

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ABSTRACT

Sustainable materials gaining popularity almost in all fields of application due to the concern on the environment and polymer composites is one among them. The reinforcement of filler is the novel technique to enhance the mechanical properties of polymers. This work pertaining to the mechanical behaviour of micron range coir filler reinforced epoxy matrix composites. The epoxy composites are fabricated using hand lay-up technique. For the development of composites, we used waste paper micro-fillers as reinforcement which are uniformly dispersed in the epoxy matrix. The following mechanical testing performed to assess the mechanical properties of the micro-composites and neat polymer: tensile test, flexural test, and hardness test. The maximum mechanical properties were noted when the filler concentration was maximum. Dynamic Light Scattering (DLS) particle size analysis shown the size distribution of waste paper micro-particles and the avg. size of micro-particles was 0.27 µm.

Keywords: *Micro-composites, Dynamic Light Scattering, Mechanical tests, waste filler, recycling.*

The Adoption Rate of Prefabricated Construction: Review and Future Directions

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ABSTRACT

The global construction industry is attempting a range of techniques to improve its standards at all levels. Prefabricated Construction (PC) is one such technique where a component or entire structure is manufactured in a controlled environment and then installed on the construction site. Regardless of the fact that prefabricated construction dates back to the late mid-1950s, it really has started to receive more attention in the last two decades. The construction industry throughout the world is always attempting to enhance prefabricated technology acceptance by adding latest technologies such as BIM and IoT applications, yet the rate is either very low or moderate. Although the construction industry is gradually implementing the PC, still it has its own way to improve in many aspects. This study aims to bring out the adoption rate of PC in the global level and the impacts made by the PC in the real market by studying the research articles published in the various journals. The three-step procedure used in this study comprised bibliometric search, coupled with quantitative and qualitative analysis. According to the statistical analysis, the United States, Canada, Australia, and the United Kingdom, as well as China, are the most popular countries for modular construction, followed by Malaysia, Singapore, Hong Kong, Germany, South Korea, Sweden, and India. The qualitative approach revealed current research trends in the PC as well as information gaps in the current study, such as a lack of design codes, transportation challenges, a lack of training and investors, a lack of connectivity systems, and managerial concepts. In addition to the foregoing, there is a prospective study direction in PC that may aid researchers in their efforts to enhance technology adoption in this field.

Keywords: *Prefabricated Construction, Modular Construction, adoption rate, BIM, IoT applications*

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Identifying Movability Contributions to Creating Interacting, Responsible, and Adaptive Architectural Spaces

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ABSTRACT

The capability of users' welfare provision is a crucial criterion for evaluating an architectural phenomenon. Kineticism application in architecture is one of the many innovations suggested to fulfill the need. However, since a structure is usually static and unable to adjust itself to climate changes or inhabitants' requirements, it is almost impossible to achieve the goal through the old immovable architecture style. Thus, to provide inhabitants with a higher welfare level, movability enables constructions to interact with the surrounding environment and accredit them to better respond to ever-changing users' needs. Moreover, the inclusion of kinetics in an architectural project can serve diverse purposes, like adaptation & interaction with climate changes, responsibility to users' needs, comfort enhancement, optimization, plus hazard mitigation. This study aims to determine how movability has contributed to creating spaces to respond, adapt and interact considering climate/users demands and to investigate what are the potentials for further contributions based on relevant literature review. To serve the purpose, a brief history including movability & kinetics main definitions plus their backgrounds are provided. Finally, a case study was conducted to highlight movability application trends, kinetic fundamental elements, and their effectiveness in the design process. Expert consultations were done to validate the results. The main-key elements of kinetic architecture plus its means are provided as the study conclusion, also different algorithms and frameworks for categorizing movable architecture components and trends are comprised. Moreover, although it's less than a century since an official definition for movable architecture is stated, it is derived from a literature review that movability application history is long and kinetics have highly contributed to users' architectural experience during times, this field has strong potential from many aspects for further contributions, especially aiding of consistent technology upgrading.

Keywords: *Moveable Architecture, Movability in Architecture, Kineticism in Architecture, Environmentally responsible Spaces*

Research status on Electrical and Electronic Waste as a Construction Material: An Overview

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ABSTRACT

Electronic waste is the most emerging issues nowadays. Every year huge amount of electronic waste is generated globally. In formal handling of electronic waste causes environmental, problems and cause treats to public health. Dealing with disposal of e waste becomes a difficult problem because there is a possibility of emission of hazardous substance in environment during recycling process. One of the safe disposals of electronic waste is to use as a part of construction material. As the cost of the ordinary construction material increases, it forces the civil engineers to find suitable substitutes. E-waste is used as a substitute for construction materials like coarse aggregate and fine aggregate if it satisfies the concrete property requirement. This paper presents an overview on possible use of E-waste as construction material by the different researchers in recent years. Their research strongly shows possibility of E-waste being used as replacement of fine aggregates and coarse aggregates in different building components. The electronic waste was used in huge amount as construction materials, reduces the cost of construction, saving the natural resources and protect the environment and making as green concrete.

Keywords: *E-waste, partial replacement, strength test, concrete.*

Utilization of Coconut Shell and Bagasse Ash in Concrete for Sustainable Built Environment

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ABSTRACT

Despite of the growing popularity in the construction sector, there is a need for better research to find new alternative materials used in construction activities. This paper argues the efficiency of using sugarcane baggase ash as a pozzolanic material and coconut shell as a cost effective material in the production of concrete. Sugarcane bagasse ash is known to be an additional cement ingredient that can address the environmental concerns associated with its disposal. Coconut shell is also an agricultural waste which is abundantly available and facing serious disposal problems. This paper discusses the usage of these materials as a alternative of fine and coarse aggregates with replacement dosages varying from 5% to 20% by weight. The result proved that the usage of coconut shell and baggase ash promoted an increase in the compressive strength of concrete without affecting its hardened properties. The optimum replacement ratio of 15% have yielded an marginal increase in the compressive strength. Moreover this will double the benefit of reducing both the cost of building materials and the problems of disposal

Study The Characteristic on Polymer Concrete with Waste Materials

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ABSTRACT

To counteract the environmental problem, industrial waste materials is used in the field of construction which is also economical. Ground granulated blast furnace slag (GGBS) and fly ashes are examples of industrial by-products that can be used to partly substitute cement in concrete and are environmentally friendly. This paper describes an experiment that was conducted to explore the properties of polymer concrete with waste materials. Highly desirable mechanical is mostly on the out performs of polymer concrete. The compressive strength, tensile strength, curing period, these materials improve impact resistance, chemical resistance, and freeze-thaw toughness. To make polymer concrete, two types of resins (unsaturated polyester and epoxy resin) were mixed with fly ash, GGBS, and sand. The aim of this study is to use M20 grade concrete to investigate the flexural behaviour of beams containing GGBS and FA.Polymer concrete specimens by using industrial wastes with monomers are prepared with various proportions like 30 and 35% GGBS and 35 and 40% Fly ash. To determine the optimal waste dosage of materials, these test results were compared to ordinary concrete specimens.

Keywords- *Fly Ash, GGBS (Ground Granulated Blast Furnace Slag),Flexural behaviour, unsaturated polyester Resin, Epoxy Resin.*

Estimation of Groundwater Recharge in Thiruvallur District

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ABSTRACT

Groundwater resources is one of the most valuable natural resources. Due to the climatic changes, it is increasing the water demand for domestic, agricultural and industrial uses etc. Groundwater recharge is a fundamental component in the water balance of any natural resources which is a challenging task in worldwide. Precise evaluation of groundwater recharge is vital for its sustainable management and efficient use for various sectors of the economy. An overview of different groundwater recharge estimation techniques is presented in this study. The techniques covered in this study include mathematical approaches like Water Table Fluctuation method and Rainfall Infiltration Factor etc., The groundwater estimation committee norms are followed in this study to identify the recharge estimation through rainfall and field percolation. This tracer techniques are revealed extensively used in water-scarce areas like Thiruvallur district. This is especially important in arid and semiarid climate, with scarce in surface water and which economy is based on those resources. In this regard, the estimation of aquifer recharge is one of the aspects needed to quantify and manage the availability of groundwater resources. In this study, the WTF and RIF methods are used to improve the knowledge about groundwater resources and their quantification.

Keywords: *Aquifer recharge, Infiltration; Groundwater Recharge; Numerical model; Run-off,*

Biogas Generation Using Anaerobic Treatment for Poultry Slaughterhouse Waste

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ABSTRACT

Poultry waste is one of the major pollutants, if not managed properly. Poultry farming wastes containing excreta, bedding material, waste feed, dead birds, broken eggs, feathers, and offal could emerge into the environmental problems. It is a Proven technology and disposal methods are necessary to mitigate their threat on the environment. So, this study investigates on the management of poultry offal waste in Mettupalayam municipality, Tamil Nadu, India. The quantitative and qualitative analysis of poultry offal waste is carried out and analyze the potential of anaerobic digestion for material recovery and energy production from Poultry slaughtering by-products and waste. For this energy production using Continues Stirred Tank Reactor (CSTR) for anerobic treatment with an effective organic loading rate. This CSTR respond with a biological process in which organic matter is degraded to methane under anerobic condition. Energy produced from the CSTR will be utilized for slaughterhouse utilities to replace the fossil fuels and thereby to reduce the CO_2 emission.

Keywords: *Anaerobic digestion, Methane production, Poultry slaughtering wastes, Energy Production, Renewable energy*

The Study of Laterally Loaded Piles in Different Layers Using Finite Element Method

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ABSTRACT

Pile foundations are used for the transfer of loads from superstructures to the earth or ground. They can be used individually for supporting loads or can be grouped together. It has been found to give a reasonable prediction for a single pile subjected to dynamic lateral loading. Dynamic and static responses of a pile subjected to external excitation are complex phenomena resulting from the interactions between the pile and the surrounding soil. This study investigates the bulging and load-settlement behavior of single floating layered piles and soft clay piles embedded in semi infinite clay layers considering the linear elastic-perfectly plastic response for both sand piles and soft clay deposits. Studying the bulging behavior of layered soil piles aims at understanding the effect of various properties of various materials and soft clay on the bulging depth, maximum bulging, and the corresponding depth. Nonlinear analysis is utilized in this study. To predict the lateral deflection of individual piles with different slenderness ratios (L/D) under static and dynamic loading. The lateral and static loading is necessary in pile design, whereas the dynamic loading is the major challenge. The main objective of this study is to assess the lateral deformation of pile in sand, fine clay, and silt clay with elastic and elastoplastic behavior, under lateral static and dynamic loading.

Keywords: *Finite Element Method, Lateral deflection, soft clay, layered soil*

Static and Dynamic Performance Analysis of SPWM Inverter for Agricultural Applications

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ABSTRACT

This paper deals with a pulse width modulation (PWM) switching strategy through carrier modification. The Proposed Sinusoidal PWM (SPWM) technique, which compares the sinusoidal reference signal and a carrier triangular signal. It has a better spectral quality and a higher fundamental component compared to the conventional PWM (PWM) without any pulse dropping. It improves the fundamental output voltage, especially for lower Modulation index ranges, by reducing total harmonic distortion (THD) and device switching losses are minimized. The presented mathematical Preliminaries for SPWM give a conceptual understanding and a comparison of the strategies. For varying levels of modulation index, full comparisons of the harmonic content were discussed. This inverter will be modeled for agricultural applications.

Keywords: S*inusoidal carrier pulse width modulation (SPWM), Inverter, THD.*

Experimental Investigation on Flexural Strengthened RC Beams using FRP Bonding System - A Review

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ABSTRACT

In the past decades, widespread experimental research had conducted to understand the structural strengthening performance of carbon and glass fibre reinforced polymer (FRP) laminated / bonded reinforced concrete (RC) beams under static loading. Various studies include bond, flexural and shear strengths, debonding, durability properties like resistance to chloride ion penetration, the behaviour of FRP lamination at an elevated temperature and freeze-thaw exposure, corrosion resistance, and seismic behaviour, have been carried out. This paper reviews 415 beam specimens from the existing studies, especially on flexural strengthened RC beams using externally bonded FRP laminates. Critical observations were made, on the various aspects, like beam dimension, concrete strength, area of tensile steel reinforcement, FRP type, load-carrying capacity, and failure mode. The paper also suggests a proficient method for the externally FRP strengthening RC beams by incorporating different volume fractions of randomly oriented discrete short-fibres into the fresh-state of a concrete matrix to sort out the common (i.e., ductility depletion, debonding) issues.

Keywords: *CFRP, GFRP, Strength, Ductility, Debonding*

Evaluation of Hydro-Geochemical Characteristics of Ground Water Quality Parameters in and Around Tiruvallur District, Tamil Nadu, India

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ABSTRACT

The overall study aims in evaluating the hydro geochemical quality index for the drinking purpose around the Thiruvallur district of Tamil Nadu. In the current scenario, it is much more important for investigating several factors for influencing the groundwater quality and also the overall suitability for the drinking purpose. Furthermore, the survey was done by the Central Ground Water Board (CGWB) in several blocks and several sites within the district of Thiruvallur between Krishna and Cauvery River basin. The survey is done for understanding the overall pH level and also for analysing the level of the chemical contaminants are increasing or decreasing. After the overall analysis it is seen that, the pH level was maximum in in the year 2016 and minimum in the year of 2010. Therefore, it proves that the purity of the groundwater is decreased in the recent years. Hence, the water quality index of that area is falling under the excellent category and the groundwater is suitable for the purpose of drinking water. The current research paper has detected that, presence of different geo physical components in drinking water is beneficial. Four specific areas were chosen to collect water sample. Collection of water sample from different areas helped to detect the irrigation suitability in Tamil Nadu. The accessibility of the groundwater is much important goal, and these effects are felt within the developing countries. The actual benefits for understanding the geochemistry of groundwater are only for ensuring the better quality of water for drinking purposes.

Keywords: *Carbonate and bicarbonate, pH, Central Ground Water Board, Water Quality Index, Electrical Conductivity*

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