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**NADAR SARASWATHI COLLEGE OF
ENGINEERING & TECHNOLOGY**



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Theni Melapettai Hindu Nadargal Uravinmurai (TMHNU) proclaims to society its tremendous service in providing quality education. The pioneers of TMHNU (1898) started the primary school in 1919, named Nadar Saraswathi Vidhyasala, with 38 students and 2 teachers. Now, that small seed has flourished into a large tree. With the blessings of Annai Sri Bathrakaliamman, 17 educational institutions now function under this bower, providing quality education. Over 22,000 students study here, with more than 1,000 teaching and 1,000 supportive staff members.

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Mr. M.M. Anandhavel, M.B.A.,

At ICAMS – 2K25, we unite under a shared vision: to explore, evolve, and elevate the frontiers of advanced material science. This conference is more than a venue — it is a catalyst for growth, collaboration, and transformative discovery. Within these sessions lie the seeds of future innovations, driven by your knowledge, curiosity, and commitment. Let us make this an opportunity not just to share research, but to forge bonds, embrace challenges, and inspire new pathways forward. Welcome to a space where scientific brilliance meets global purpose.

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Mr. M.Palaniappan

A warm and heartfelt welcome to all participants of ICAMS – 2K25. Your presence is a testament to your dedication to science, sustainability, and societal advancement. This conference is a vibrant intersection of disciplines, ideas, and aspirations. Each paper shared, each dialogue held, and each perspective offered has the power to drive transformative change. Let us make the most of this gathering by nurturing collaboration, encouraging exploration, and embracing the shared mission of a brighter, more sustainable future. Thank you for being a part of this remarkable scientific endeavor.

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PROMINENT PERSONALITIES OF NSCET



Secretary
Mr. A. Rajkumar, B.B.A.,

Welcome to ICAMS – 2K25, where innovation meets insight and research meets real-world relevance. It is a privilege to host this community of forward-thinkers, creators, and changemakers committed to redefining the future of material science. May this conference be a launchpad for revolutionary ideas, impactful partnerships, and lasting contributions. Let every session challenge perspectives, every interaction build bridges, and every effort lead us closer to solutions for a better tomorrow. Together, we turn ideas into action and science into global impact.

PROMINENT PERSONALITIES OF NSCET



Secretary

Mr. A.S.R. Maheswaran, B.Sc.,

We are honored to welcome you to ICAMS – 2K25, a dynamic forum for knowledge exchange and scientific collaboration. This event brings together the brightest minds working toward sustainable innovation and advanced technologies. Through your research, discussions, and shared goals, we move closer to addressing the complex challenges of our time. May this conference empower bold thinking, cross-disciplinary learning, and meaningful impact. Your presence fuels the mission of ICAMS — to envision and realize a better future for all.

PROMINENT PERSONALITIES OF NSCET



Joint Secretary

Er. S. Naveen Ram, B.E., M.B.A.,

ICAMS – 2K25 is more than a conference — it is a celebration of human potential, perseverance, and scientific progress. It is a space where ideas are cultivated, innovations are born, and connections are strengthened. We are deeply grateful for your contributions and engagement. Let us use this opportunity to challenge the status quo, forge powerful alliances, and drive solutions that will shape generations to come. In the realm of advanced material science, every discovery is a stepping stone toward a more resilient and sustainable world. Together, we build that future

PROMINENT PERSONALITIES OF NSCET



Principal

Dr. C. Mathalai Sundaram, M.E., M.B.A., Ph.D., MISTE.,

As we welcome you to ICAMS – 2K25, we are reminded of the profound impact of collective knowledge and shared ambition. This platform is designed to amplify your research, inspire collaboration, and ignite innovation in the realm of material science. Your participation symbolizes a dedication to excellence and meaningful change. May the conversations and discoveries that unfold here guide us toward breakthroughs that transcend disciplines and borders. We look forward to the possibilities that emerge when passionate minds unite.

ABOUT THE CHIEF GUEST



Dr. Ankit Kathuria

**Associate Professor, Department of Civil Engineering,
& Humanities and Social Sciences Department
IIT Jammu.**

It is with great joy and pride that I join you for ICAMS – 2K25, a landmark event for those who believe in science as a force for global transformation. In every keynote, panel, and paper, I witness the power of collaboration and creativity. Material science is not just a field — it is the foundation of sustainable solutions and future technologies. Through your hard work, innovation, and vision, we edge closer to a world defined by progress and purpose. Let us together champion scientific inquiry, sustainable development, and a commitment to excellence. Thank you for making this event a beacon of hope and discovery.

Head of the Department Message



Dr. E. Anantha Krishnan, Ph.D.,
Head Incharge,
Department of Civil Engineering.

It is with great joy and pride that I join you for ICAMS – 2K25, a landmark event for those who believe in science as a force for global transformation. In every keynote, panel, and paper, I witness the power of collaboration and creativity. Material science is not just a field — it is the foundation of sustainable solutions and future technologies. Through your hard work, innovation, and vision, we edge closer to a world defined



Mr. N. Nagarathinam
Head Incharge,
Department of Structural Engineering.

It is with great joy and pride that I join you for ICAMS – 2K25, a landmark event for those who believe in science as a force for global transformation. In every keynote, panel, and paper, I witness the power of collaboration and creativity. Material science is not just a field — it is the foundation of sustainable solutions and future technologies. Through your hard work, innovation, and vision, we edge closer to a world defined by progress and purpose. Let us together champion scientific

Paper ID	Paper Title	Author and Co Author	Page No
ICAMS 2025-001	A review on high strength PVA fiber reinforced concrete.	Ragavan V, Madasamy Hariharan M, Aashik Anton M, Balaji.M	1
ICAMS 2025-002	A review of application of geosynthetics for tank bund stabilization -a mini case study	Rajha Rajeswaran, T. A.	2
ICAMS 2025-003	Experimental analysis on recron fiber reinforced concrete.	Kannan.G	3
ICAMS 2025-004	Assessment of recycled concrete aggregates in fly ash–GGBFS geopolymer concrete: a sustainable approach to strength and microstructural performance	Mahavir Singh Rawat, Gaurav Hawadiya	4
ICAMS 2025-005	Experimental investigation of concrete attributes by adding glass shard, ballast and addition of disaccharide as an admixture.	Ranjima Rajan E K	5
ICAMS 2025-006	A review on analysis and design of school building	Kalaimani R, Nivedha S, Viyani Blessy A,	6
ICAMS 2025-007	Experimental investigation on concrete attributes by adding glass shard, ballast and addition of disaccharide as an admixture	Benzy Ashok S	7
ICAMS 2025-008	Delineating highly permeable zones in irrigation tanks to improve groundwater recharge	Allwin D Dr. Praveen Verma	8
ICAMS 2025-009	Comprehensive safety approach in construction industry using cohen's D,	E.S. Archana	9
ICAMS 2025-010	Assessment of material and time waste factors in construction projects using pareto analysis	G. Aswini	10
ICAMS 2025-011	Performance and mechanical properties of RC inverted T- beams with and without partial replacement of cement by nano silica	Hebinsha S, Vanaja C, Mary Benisha G	11
ICAMS 2025-012	Borewell rescue	S. Vasikaran P. Tenzing	12
ICAMS 2025-013	Experimental study on the strength of concrete by partial replacement of fine aggregate by egg shell powder and coconut shell ash using masterglenium (BASF) as admixture	Jenifer Darthi D .	13

Paper ID	Paper Title	Author and Co Author	Page No
ICAMS 2025-014	Soil stablization by using plastic waste	V.Nivaas	15
ICAMS 2025-015	A study on properties and beneficial uses of end product from various sewage sludge through different techniques used for construction	Pratheba.S .	16
ICAMS 2025-016	An comparative study on strength of replaced concrete by using natural vs artificial mineral admixtures	R.Pradeepa , A.Manoharan	18
ICAMS 2025-017	Strengthening of soft story using steel frames in multi-storey buildings	Vishnu R , Dheva Rajan S, Zulfa Hamed Said Al- kharusi	19
ICAMS 2025-018	Impact of inadequacy of welfare measures on the performance of hardhat workers	T. Subisha	20
ICAMS 2025-019	Permanent benchmark establishment at KCET campus using total station	D. Velumani,	21
ICAMS 2025-020	Highway runoff rainwater harvesting system using modern surveying techniques	D. Velumani,	22
ICAMS 2025-021	A review on assessment of durability properties of high strength concrete including copper slag	Dr.T Chockalingam , Akash Kumar N, Pandiaraj S	23
ICAMS 2025-022	Finite element analysis of subway tunnel under internal blast loading using explicit dynamic method.	Sajid Ali , Shakeel Ahmad , Rehan Ahmad Khan	24
ICAMS 2025-023	Mathematical modeling of structural response of the tunnel under internal blast loading as a function of scaled distance.	Sajid Ali , Shakeel Ahmad , Rehan Ahmad Khan	25
2ICAMS 2025-024	Experimental investigation on self curing concrete with different self curing agents	Netheswaran .	26
ICAMS 2025-025	Performance -based design of tall buildings in high wind zones.	Sabisha S.	27
ICAMS 2025-026	A comparative review of Building Information Modeling (BIM) and automatic computer aided design (AUTOCAD) in modern construction	Saksheshwari	29
ICAMS 2025-027	Evaluation of the effects on time energy component of sustainable engineering in residential building	S.S.Anushiya.	30
ICAMS 2025-028	Experimental study on effect of green corrosion inhibitors used in steel reinforced cement concrete	D.Nandakumar, M.Arunkumar, S.Mohan & R.Prasanna	31

Paper ID	Paper Title	Author and Co Author	Page No
ICAMS 2025-029	Experimental study on strength behaviour of glass fiber rebar in cement	S.Vivek, S.Giri Vasanthan, R.Gokul Jeyaram, K.Sanjay	32
ICAMS 2025-030	Feasibility study of non - motorized transport in thrissur	Archana S, Raveena V. Abhilash B.L.	33
ICAMS 2025-031	Effect of addition of carbon fibre on mechanical properties of concrete	M.Janarthanan, S.Rohit, Dr.S.Nagan, A.Leema Margret	34
ICAMS 2025-032	Analytical study of beam-column joint using abaqus	Kodi prabhu T, Nagarathinam M	35
ICAMS 2025-033	Acid resistance on geopolymer mortar under ambient curing condition	Jeyasri P, Gayathri S	36
ICAMS 2025-034	Experimental investigation of mechanical properties on Engineered Cementitious Composties (ECC)	Easwaran.P, Sindhu.M	37
ICAMS 2025-035	Structural analysis and design of high rise building using etabs	Vanitha V, Kanimozhi M	38
ICAMS 2025-036	A study on marine-sourced chitosan biopolymer for environmental safe soap alternatives	C.M. Balamurugan, A S Jagadheeswari, A. Anandhan, V. Gopalakrishanan	39
ICAMS 2025-037	Ai- driven prediction and analysis of physico-chemical properties of water in theni	E.Anantha Krishnan, R.Nathirun Sabinash, Hariprabha V,Abirami E, Vasantha Prabha E, Vellinela S	40
ICAMS 2025-038	Geo-spatial mapping and hydro-chemical analysis of water quality in theni district	B.Sowmiya, Swetha.S, Hema.T, Sivaranjani S, Haseena Banu S	41
ICAMS 2025-039	Experimental study on the behavior of steel fiber reinforced concrete	Jenish.A.	42
ICAMS 2025-040	Recycled construction and demolition concrete waste as aggregate for structural concrete	Arul Jebaraj P, Santhana karuppan A , Dhinesh kumar V , Sarvesh waran V	43
ICAMS 2025-041	Experimental Investication of Flexural Behavior of Reinforced Concrete Beam Strengthened with Textile Reinforced Concrete	Davidson T	44

A REVIEW ON HIGH STRENGTH PVA FIBER REINFORCED CONCRETE.

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ABSTRACT

High-strength polyvinyl alcohol (PVA) fiber-reinforced concrete (HSFRC) has gained significant attention due to its superior mechanical properties, including enhanced tensile strength, ductility, and crack resistance. Meanwhile, the utilization of industrial by-products like copper slag (CS) as a partial replacement for fine aggregates presents a sustainable solution to reduce environmental impact and conserve natural resources. This review paper critically examines the mechanical properties of high-strength PVA fiber-reinforced concrete incorporating copper slag as a partial substitute for fine aggregate. The study evaluates key mechanical parameters such as compressive strength, flexural strength, split tensile strength, and durability aspects, along with microstructural behavior. The influence of PVA fiber content, copper slag replacement ratios, and their synergistic effects on the performance of concrete are discussed. Additionally, the paper highlights the potential benefits, challenges, and future research directions for optimizing the use of copper slag and PVA fibers in high-strength concrete applications. The findings suggest that an optimal combination of PVA fibers and copper slag can enhance mechanical performance while promoting sustainable construction practices.

Keywords: High-Strength Concrete, PVA Fiber, Copper Slag, Mechanical Properties, Sustainable Construction

A REVIEW OF APPLICATION OF GEOSYNTHETICS FOR TANK BUND STABILIZATION -A MINI CASE STUDY

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ABSTRACT

The paper describes a mini-case study of application of GeoSynthetics – in this case – the use of GEOCELL - for the stabilization and strengthening of a tank bund of a temple near Chennai. The tank is designed and maintained such that even during summers, water is maintained at least in the minimum levels with the help of appropriate RWH - Rain Water Harvesting measures installed around the tank from the temple. However the tank is having a shortcoming of lack of stone steps or concrete lining for its bund slopes, which renders the slopes vulnerable for erosion and sliding. As a preventive and protective measure, the concerned local authorities have initiated the installation of GEOCELL Lining of the tank bund slopes. This method of lining the tank bund slope with geosynthetics is a cost effective technique for soil stabilization of the bund slope as against the old methods of lining the soil slopes with Stone Pitching or concrete. The use of GeoCell makes the slope protection method cheaper and also long lasting as well as less stressing and straining on the already weakened soil slopes, since the geocell is almost of zero deadweight. The paper discusses the techno-economic and as well as the sustainability features of the technique.

Keywords : soilslope, geocell, stabilization, cost, sustainability

EXPERIMENTAL ANALYSIS ON RECRON FIBER REINFORCED CONCRETE.

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ABSTRACT

Currently India has taken a major initiative on developing the infrastructures such as express highways, power projects and industrial structures etc., to meet the requirements of globalization, in the construction of buildings and other structures. Concrete plays the key role and a large quantum of concrete is being utilized in every construction practices. River sand, which is one of the constituents used in the production of conventional concrete, has become very expensive and also becoming scarce due to depletion of river bed. Therefore M-sand is introduced in the place of sand. The use of M-sand as the fine aggregate decreases the cost of concrete production in terms of the partial replacement for natural river sand.

The main focus of this research is the study of strength of concrete with manufactured sand as fine aggregate. The project work deals with the determination of strength of concrete using various percentage of M sand by replacing River sand as 10%,20%,30%,40%,50% and also including Recron 3S fiber of 0.1% of weight of cement in M30 grade concrete. Various tests were conducted for materials such as fineness modulus, specific gravity, Impact test, sieve analysis before concrete mixing and slump cone test, compaction factor test are conducted before casting cubes. The result obtained from compressive test was compared with plain cement concrete. Researches about M- Sand indicate that this material is suitable for use in construction in the view of strength and workability.

Keywords: M-sand, Recron 3S fiber, concrete strength, fine aggregate replacement, M30 grade concrete, compressive strength, workability

ASSESSMENT OF RECYCLED CONCRETE AGGREGATES IN FLY ASH–GGBFS GEOPOLYMER CONCRETE: A SUSTAINABLE APPROACH TO STRENGTH AND MICROSTRUCTURAL PERFORMANCE

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ABSTRACT

The increasing reliance on conventional concrete has resulted in the overuse of natural aggregates and a rise in construction and demolition waste, creating significant environmental concerns. To address these issues, this study explores the use of recycled concrete aggregates (RCA) in geopolymer concrete (GPC) as a sustainable alternative to traditional Portland cement concrete. GPC was produced using fly ash and ground granulated blast furnace slag (GGBFS) as aluminosilicate precursors, activated with a combination of sodium hydroxide and sodium silicate solutions. RCA was incorporated at replacement levels of 0%, 25%, and 50% to partially substitute natural coarse aggregates (NCA). The GPC mixtures were assessed for workability, compressive strength, durability via water sorptivity, and microstructural characteristics using scanning electron microscopy (SEM) to evaluate overall performance. The results showed that GPC containing RCA maintained good mechanical strength and durability. Microstructural analysis revealed a compact and uniform matrix, indicating strong bonding between the recycled aggregates and the geopolymer binder. These findings suggest that RCA can be effectively used in geopolymer concrete without compromising its structural performance. This study highlights the potential of RCA-based GPC as an environmentally responsible construction material that supports resource efficiency and waste reduction, aligning with sustainable development goals in the construction industry.

Keywords: Geopolymer concrete; Fly-ash; Ground granulated blast furnace slag; Recycled Coarse Aggregates; Mechanical; Durability; Microstructural analysis

**EXPERIMENTAL INVESTIGATION OF CONCRETE
ATTRIBUTES BY ADDING GLASS SHARD, BALLAST AND
ADDITION OF DISACCHARIDE AS AN ADMIXTURE.**

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ABSTRACT

The main motive of this research is to provide an enhancement in the strength of concrete with the influence of certain non-bio degradable minerals that are easily available, but may be a threat for pollution in earth. Also the cement manufacturing industry, on an average emits 7% of greenhouse gases to earth's atmosphere which leads to a great threat for environment. In order to address these environmental effects, extensive research is ongoing into the use of cement replacements, using many waste materials and industries by products to form a composite & economical concrete mixture. The report deals with the concrete, with the mixture of non-bio degradable minerals and certain easily available minerals of the earth. These findings indicate that some non-bio degradable wastes can be used as an alternative of aggregate that may pave the way for the disposal of hazardous waste. Being amorphous, crystalline and containing relatively large quantities of silicon and calcium, glass is, in theory, pozzolanic or even cementitious in nature when it is finely ground. Also the Disaccharide admixture when makes its contribution with the concrete mix, it enhances the properties of the concrete after hardening, leading to a heavily strengthened concrete with the mixture of ballast. The findings of those mix proportions and the strength details on PCC and RCC specimens were investigated.

Keywords: Non-biodegradable waste, cement replacement, environmental sustainability, pozzolanic materials, glass powder, disaccharide admixture

A REVIEW ON ANALYSIS AND DESIGN OF SCHOOL BUILDING

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ABSTRACT

The objective of this project is to analyse and design a safe, functional, and sustainable school building that meets modern educational and architectural standards. The study incorporates both structural and architectural design considerations to ensure that the facility supports effective learning environments while maintaining cost-efficiency, durability, and compliance with building codes and safety regulations.

The structural analysis involves determining appropriate loads (dead, live, wind, and seismic) and designing critical elements such as beams, columns, slabs, and foundations using standard engineering software and manual calculations based on IS Codes (or applicable standards). The architectural design prioritizes space optimization, natural lighting, ventilation, accessibility, and future expansion. Key areas include classrooms, administrative offices, laboratories, restrooms, recreational spaces, and emergency exits. Sustainability and energy efficiency are addressed through material selection and passive design strategies. The final design ensures structural stability, user comfort, and alignment with environmental, safety, and educational requirements. The project demonstrates a multidisciplinary approach combining civil engineering, architecture, and environmental considerations to deliver a holistic school infrastructure solution.

Keywords: architectural planning, IS Codes, sustainable construction, energy efficiency, educational infrastructure, load calculations, space optimization, passive design, safety regulations, multidisciplinary approach.

EXPERIMENTAL INVESTIGATION ON CONCRETE ATTRIBUTES BY ADDING GLASS SHARD, BALLAST AND ADDITION OF DISACCHARIDE AS AN ADMIXTURE

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¹PG Student, Department of Civil Engineering, Maria College of Engineering & Technology, Attoor

ABSTRACT

The main motive of this research is to provide an enhancement in the strength of concrete with the influence of certain non-bio-degradable minerals that are easily available, but may be a threat for pollution in earth. Also the cement manufacturing industry, on an average emits 7% of greenhouse gases to earth's atmosphere which leads to a great threat for environment. In order to address these environmental effects, extensive research is ongoing into the use of cement replacements, using many waste materials and industry's byproducts to form a composite & economical concrete mixture. The report deals with the concrete, with the mixture of non-bio-degradable minerals and certain easily available minerals of the earth. These findings indicate that some non-bio-degradable wastes can be used as an alternative of aggregate that may pave the way for the disposal of hazardous waste. Being amorphous, crystalline and containing relatively large quantities of silicon and calcium, glass is, in theory, pozzolanic or even cementitious in nature when it is finely ground. Also the Disaccharide admixture when added to the concrete mix, it enhances the properties of the concrete after hardening, leading to a heavily strengthened concrete with the mixture of ballast. The findings of those mix proportions and the strength details on PCC and R C C specimens were investigated.

Keywords: Waste materials, glass powder, disaccharide, cement replacement, sustainable concrete, PCC, RCC.

DELINEATING HIGHLY PERMEABLE ZONES IN IRRIGATION TANKS TO IMPROVE GROUNDWATER RECHARGE

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ABSTRACT

Groundwater depletion is a growing concern in many regions due to over-extraction and limited natural recharge. Irrigation tanks, traditionally used for water storage and agricultural support, also present significant potential for groundwater recharge if their subsurface characteristics are properly utilized. This study focuses on delineating highly permeable zones within irrigation tanks to enhance groundwater recharge efficiency. By integrating remote sensing, GIS techniques, and field-based hydrogeological assessments, the research identifies areas with high infiltration capacity based on parameters such as soil texture, lithology, slope, and drainage patterns. The Analytical Hierarchy Process (AHP) was employed to assign weights to influencing factors, and a composite recharge potential map was generated. Results highlight specific zones within tank beds that exhibit favorable conditions for artificial recharge structures like percolation wells and recharge shafts. The findings support targeted interventions for sustainable water resource management and provide a scientific basis for optimizing recharge strategies in semi-arid and water-stressed regions.

Keywords: Groundwater, Irrigation Tanks, Permeable Zones, Analytical Hierarchy Process.

COMPREHENSIVE SAFETY APPROACH IN CONSTRUCTION INDUSTRY USING COHEN'S D,

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ABSTRACT

In the realm of construction projects, ensuring the safety of workers is of paramount importance due to the inherently hazardous nature of the industry. Statistics reveal that the risk of fatal accidents in construction is alarmingly five times higher than in other manufacturing sectors, and the injury rate is approximately three times greater. This study aimed to systematically develop and enhance the safety behaviors of construction workers while simultaneously raising overall safety awareness. The ultimate goal was to create a significantly safer working environment and to evaluate the consequent improvements in performance metrics rigorously. To effectively reduce the fatality rates within construction sites, a comprehensive set of strategies was meticulously implemented, employing Cohen's d formula for statistical analysis. The study was structured in three distinct phases: the preexperiment phase, where initial safety assessments were conducted; the baseline phase, during which standard safety practices were documented; and the intervention phase, where targeted safety initiatives were introduced and actively monitored. The intervention results were promising, revealing a notable reduction in risk percentages—from nearly 50% to an impressive 30%. Concurrently, safety compliance levels surged from approximately 50% at baseline to an encouraging 70% during the intervention phase. An effect size calculation further illustrated that these safety improvements were indeed significant, although it is worth noting that the cost-effectiveness of some strategies varied. In addition to these findings, I proposed guidelines tailored to the unique challenges of construction sites. I also developed an innovative laser beam alarm system designed specifically for high-risk areas, aimed at providing an additional layer of protection against potential hazards.

Keywords: Construction safety, safety behavior, intervention strategies, Cohen's d, laser alarm system.

ASSESSMENT OF MATERIAL AND TIME WASTE FACTORS IN CONSTRUCTION PROJECTS USING PARETO ANALYSIS

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ABSTRACT

Waste is a considerable concern in the construction industry, with significant amounts generated on-site. This issue extends beyond just the quantity of materials and encompasses various factors, including overproduction, waiting times, material handling, and environmental conditions. The presence of waste adversely affects construction projects, leading to strained working relationships, disputes, and potential project abandonment. This project seeks to evaluate the factors that contribute to material and time waste in construction projects. Data will be gathered through a questionnaire survey, and the analysis will utilize Pareto analysis. The primary driver of material and time waste is inadequate planning during the construction process. The questionnaire is designed to collect insights on the factors influencing effective waste management and will be distributed to seasoned professionals across multiple construction companies. A Likert scale will be employed to gauge the significance of each factor. Furthermore, the factors contributing to waste at construction sites will be ranked using the Relative Importance Index, with Pareto analysis conducted using SPSS software. I have developed and distributed questionnaires to experienced professionals to investigate the causes of material and time waste in construction projects. The results indicate that many companies lack a waste minimization strategy. Moving forward, it is crucial for all industries to implement strategies to minimize waste and strive for sustainability.

Keywords: Construction waste, time waste, Pareto analysis, waste management, Relative Importance Index, SPSS, planning inefficiencies, sustainability, Likert scale, material handling.

PERFORMANCE AND MECHANICAL PROPERTIES OF RC INVERTED T- BEAMS WITH AND WITHOUT PARTIAL REPLACEMENT OF CEMENT BY NANO SILICA

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ABSTRACT

In this modern world, technology is evolving in a faster pace, and the population of the world also increases drastically. In order to meet the necessary needs of the Population - Residential, commercial and industrial buildings are to be built, to live comfortably in the world. Similarly, the strength of those buildings should be taken into account. The strength of the concrete should always have an increasing value, in order to build a strong building. In this project, Reinforced concrete inverted T – Beams are manufactured to study the performance and its properties with and without adding the partial replacement of cement by Nano Silica Particles. For this purpose, 6 concrete mixes were designed and applied. Nano Silica (NS) were used at replacement contents of 0.5%, 1%, 1.5%, 2%, 3% and 4%. The compressive strength, split tensile strength and flexural strength of the concrete are improved for the NS added percentage between 0.5% to 1.5%. The ideal ratio was when using 1% nano-silica (NS) which increased the compressive strength of concrete by 8.5%. Then the behaviour of 5 inverted concrete T-beams were studied. In terms of nano-silica impact and change of reinforcement ratio (flexure and shear) in beams and the results show increased concrete properties such as Ultimate load, Initial crack load, and toughness of inverted T- beams containing 1% NS as partial replacement of cement by 6.6%, 31.4%, and 16.65% respectively compared to control beam without Nano silica.

Keywords: Mechanical Property, Reinforced Concrete, T section Beams, Nano Silica

BOREWELL RESCUE

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ABSTRACT

In past few years, children get trapped into the bore well hole which is left uncovered. The rescue process to save the child from bore well is long and complicated. To avoid this, there have been several rescue robot designs available currently. Even now the existing robots are not satisfactorily used to rescue the child from bore hole. For this reason, a morphological chart is designed from existing and new robot designs. From the morphological chart, various combinations of rescue robot design are formulated. Finally, the designs are compared for the best performance. An additional component like digital oxygen supply system, digital integrated camera, strain measuring pressure sensors, rope and pulley drive are added to the design to improve rescue operation. A lot of other hassles are avoided by this alternative technique. The proposed design is to rescue trapped child from bore well within short period and with safely.

Keywords: Borewell rescue, rescue robot, morphological chart, child safety, digital oxygen supply, integrated camera, pressure sensors, rope and pulley system.

**EXPERIMENTAL STUDY ON THE STRENGTH OF CONCRETE
BY PARTIAL REPLACEMENT OF FINE AGGREGATE BY EGG
SHELL POWDER AND COCONUT SHELL ASH USING
MASTERGLENIUM (BASF) AS ADMIXTURE**

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ABSTRACT

The wish and rising cost of building construction in developing countries have been a source of concern to government and private developers. This study investigated the use of Egg Shell Powder and Coconut Shell Ash as replacement for Fine Aggregate in M-40 Grade concrete. MasterGlenium (BASF) is a high-performance polycarboxylate ether-based superplasticizer that provides excellent water reduction (up to 40%), improved workability, and enhanced strength development in concrete, making it ideal for high-performance and self-compacting concrete applications is used as an admixture. The both materials are used to replace the Fine Aggregate partially by 10%, 15%, 20%. Compressive strength, Split tensile strength and Flexural strength are evaluated at 7 days and 28 days. The reduction in cost up to 10% can be achieved for every cubic meter of concrete production with use of materials. In the last decades, the use of residue in civil construction, especially in addition to concrete, has been subject of many researches due to besides to reduce the environmental polluter's factors, it may lead several improvements of the concrete properties. The world Coconut Shell Ash is estimated in 500 million tons per year, and India is the second producer. This project evaluates how different contents of Egg Shell Powder (ESP) and Coconut Shell Ash (CSA) added to concrete may influence its physical and mechanical properties. Due to its high pozzolanic activity, both strength and durability of concrete are enriched. This may increase the strength of concrete against cracking. Previously, investigation on the corrosion performance of Coconut shell ash and Egg shell powder blended concrete is very limited.

Keywords: Egg Shell Powder, Coconut Shell Ash, fine aggregate replacement, concrete strength, sustainable construction.

SOIL STABILIZATION BY USING PLASTIC WASTE

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ABSTRACT

The process of improving the physical and engineering properties of soil such as shear strength and bearing capacity is known as Soil Stabilization. Indian terrain is mostly occupied by black cotton soil. It is highly expansive soil which shows more swelling, shrinkage and settlement problems. Thus, Construction of buildings and other Civil Engineering structures on this soil is risky. Use of compaction technique or suitable admixtures like cement, lime and waste material like fly ash, etc., can bring out the soil stabilization. But these are expensive additives. That we studied here suggest and proved that the use of plastic waste for stabilization of soils would reduce the problem of disposing plastic waste and also reduce environmental problems. It is seen that CBR test, Proctor test, Sieve analysis are performed to check the suitability of plastic waste as soil stabilizer.

Keywords- Optimum Plastic Content, Plastic Waste, Dry Density, Plastic strips, Shear strength, California Bearing Ratio (CBR) test, Compaction test.

A STUDY ON PROPERTIES AND BENEFICIAL USES OF END PRODUCT FROM VARIOUS SEWAGE SLUDGE THROUGH DIFFERENT TECHNIQUES USED FOR CONSTRUCTION

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ABSTRACT

This project is designed to tackle the environmental challenges posed by the wastewater sludge generated from various industries, namely dairy, tannery and textile. The main objective of the project is to develop an integrated treatment approach to manage this waste efficiently, with a focus on transforming it into valuable resources that contribute to environmental sustainability. By treating the wastewater sludge and extracting useful products, this project aims to reduce the environmental footprint and promote resource conservation. The study explores several advanced techniques for treating these different types of sludge. Isolated microbial decolorization is the method applied to treat the textile dye effluent sludge, as this sludge contains synthetic dyes that require specific microbial strains for effective decolorization. This approach will help remove the toxic chemicals, reducing the environmental impact of dye wastewater. For tannery sludge, the project utilizes coagulation, sedimentation, and reverse osmosis to remove pollutants. The tannery industry produces sludge with high levels of chromium and other toxic metals. By using coagulation and sedimentation techniques, followed by reverse osmosis, the contaminants can be efficiently removed, and clean water can be recovered for reuse. Vermicomposting, a technique that uses earthworms to break down organic matter, will be used to treat the dairy sludge. Dairy wastewater typically contains high organic matter, and vermicomposting will convert it into nutrient-rich compost that can be used as a fertilizer, promoting sustainable waste management in the dairy industry.

The final treated sludge is expected to have several valuable uses, including as a raw

material for construction materials. One of the key goals is to explore its potential as an additive in bricks. By incorporating treated sludge into brick production, the project not only reduces the volume of sludge but also contributes to the creation of sustainable building materials. This innovative approach can address both waste management and resource scarcity challenges in the construction industry.

Keywords: Decolorization, vermicomposting, Sedimentation, Reverse osmosis, Waste water quality Index, Sustainability.

AN COMPARATIVE STUDY ON STRENGTH OF REPLACED CONCRETE BY USING NATURAL VS ARTIFICIAL MINERAL ADMIXTURES

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ABSTRACT

Concrete is the world's most versatile, durable and reliable construction material. Ordinary Portland cement production is major generator of carbon-di-oxide which pollute the atmosphere, in addition to that large amount of energy was also consumed for the cement production. Hence it is inevitable to find An Portland cement. In this study, cement is 40% replaced by natural and artificial mineral admixtures such as rice hush ash, sugarcane bagasse ash, silica fume, ground granulated blast furnace slag. This experiment will conclude with comparing difference between the strength of conventional concrete and admixtures replaced concrete of grade M20. The test is taken in 7, 14, 28 days from the curing is started. The compressive and split tensile strength is calculated. Admixtures are anything added to the mixture other than coarse aggregate, fine aggregate, binding material, and water to modify the property of the mix. Admixtures are the Fourth ingredient, in addition to cement, aggregates, and water. IS: 456 permits the use of Pozzolana as admixture for concrete. Admixtures have increased both compressive strength and durability of concrete through their water/cement (w/c) reduction, hydrophobic effect, pore reduction/blocking, increased density etc. This has tremendously increased their use in the construction industry today.

Keywords: Cement replacement, mineral admixtures, rice husk ash, sugarcane bagasse ash, compressive strength.

STRENGTHENING OF SOFT STORY USING STEEL FRAMES IN MULTI STORY BUILDINGS

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ABSTRACT

In multi-storey buildings, soft story is a story which is having stiffness less than 70% and it is usually a weak story and easily collapse during an earthquake. In most of the apartment buildings, the ground floor is reserved for car parking that are vulnerable one and collapses suddenly during a moderate earthquake. This leads to sudden collapse of the entire building and this unexpected collapse poses significant risks to the occupants. To enhance the strength and stiffness of soft story, braced frames, shear walls, or infill walls are usually constructed. Construction of these walls are expensive one, needs scaffolding, materials and manpower. Moreover, the space between columns is useless.

Keywords: soft storey, storey drift, drift ratio, stiffness, lateral displacement, steel frames.

IMPACT OF INADEQUACY OF WELFARE MEASURES ON THE PERFORMANCE OF HARDHAT WORKERS

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ABSTRACT

An estimated 8.5 million workers across the nation are actively involved in building and construction activities. This significant workforce represents one of the largest and most vulnerable segments of unorganized labor in India. Unfortunately, the lack of adequate welfare measures profoundly hampers their overall performance and well-being. To enhance both productivity and job satisfaction among these workers, it is imperative to implement comprehensive welfare programs. Research has revealed that the primary factors contributing to diminished performance among construction workers are directly linked to the absence of essential welfare facilities. These critical amenities include statutory provisions such as access to clean drinking water, nutritious food options through canteens, designated resting areas, and creches for the children of women workers. In this investigative phase, a thorough review of relevant journal articles was conducted, and data was meticulously collected to develop a well-structured questionnaire aimed at interviewing the workers. The subsequent data analysis will employ the Chi-square test, allowing for a robust interpretation of the findings. Based on these insights, thoughtful suggestions and recommendations will be crafted to address the issues identified and improve the overall conditions for construction workers.

Keywords: Construction workers, welfare facilities, unorganized labor, job satisfaction, Chi-square analysis.

PERMANENT BENCHMARK ESTABLISHMENT AT KCET CAMPUS USING TOTAL STATION

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ABSTRACT

A benchmark (BM) is a permanently established survey point with a known elevation relative to Mean Sea Level (MSL). The Survey of India has precisely established these benchmarks across the country, providing essential reference points for elevation measurements. Determining a site's Reduced Level (RL) requires a benchmark with a known elevation, making it a crucial element in surveying. Traditionally, this process involved using an automatic or dumpy level, which is labor-intensive and time-consuming. To enhance efficiency, this study employs an Electronic Total Station (ETS) to transfer a permanent benchmark from Kalligudi railway station to KCET campus. This modern approach significantly reduces time while maintaining high accuracy. The MSL of Kalligudi railway station is 149.977 meters, and using fly leveling and ETS, the benchmark was transferred via National Highway 44 (NH44) to the KCET campus, where the final benchmark was determined to be 162.267 meters, a level difference of 12.270 meters. A comparison with Google Earth data validated the accuracy of the results, showing a close match. This study demonstrates the efficiency and precision of ETS-based benchmark transfer, making it a valuable approach for modern surveying applications. Establishing a reliable benchmark on the KCET campus provides a stable reference point for future construction, topographical mapping, and infrastructure development. This benchmark will be instrumental in conducting elevation surveys, flood risk assessments, and various civil engineering projects within the campus. The integration of advanced surveying techniques like Total Station and GIS mapping ensures high precision, operational efficiency, and long-term usability, making this method a significant improvement over traditional leveling techniques.

Keywords : Mean Sea Level, Benchmark, Total Station, Reduced Level

HIGHWAY RUNOFF RAINWATER HARVESTING SYSTEM USING MODERN SURVEYING TECHNIQUES

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ABSTRACT

Water Scarcity has become a major constraint to socio-economic development and a threat to livelihood in increasing parts of the world. India is facing a serious problem on natural water resource scarcity. We here review a variety of indicators that have been developed to capture different characteristics of water scarcity. Water availability is the key elements of these indicators. Most of the progress made in the last few decades has been quantification of water availability. In this we have studied about the National Highway (NH44) Rainwater Harvesting from Virudhunagar Collector office to Kamaraj college of engineering & technology, Virudhunagar District. This is done by using modern Surveying techniques like GPS (Global Positioning System) surveying and GIS (Geographical Information Surveying) surveying. With the help of GPS, we have collected the coordinates of the study area. The GPS Surveying is done for conveying Rain Water by channel using Road Pavement. With the help of GIS we are able to digitize the National Highway and Water Bodies which is used for Conveyance of Rainwater. We proposed the solution to transfer the Highway runoff rainwater into the water bodies located near to the Highway. Run off rainwater can be transferred into the water bodies through the channels. We have designed three different types of channels to effectively convey the water from High way to nearby water bodies.

Keywords: Runoff rain water, GPS, GIS & Digitization.

A REVIEW ON ASSESSMENT OF DURABILITY PROPERTIES OF HIGH STRENGTH CONCRETE INCLUDING COPPER SLAG

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ABSTRACT

The growing demand for sustainable construction materials has led to increased research on the incorporation of industrial by-products, such as copper slag (CS), in high-strength concrete (HSC). This review paper comprehensively assesses the durability properties of high-strength concrete incorporating copper slag as a partial or full replacement for fine aggregate. Key durability aspects evaluated include chloride penetration resistance, sulphate attack resistance, carbonation depth, water absorption, porosity, and alkali-silica reaction (ASR). The influence of varying copper slag replacement ratios (0% to 100%) on the long-term performance of HSC is critically analysed, along with its interaction with supplementary cementitious materials (SCMs) like fly ash and silica fume. The findings indicate that copper slag, due to its low water absorption and dense microstructure, can enhance the durability of HSC by reducing permeability and improving resistance to aggressive environments. However, optimal replacement levels must be identified to mitigate potential drawbacks, such as increased risk of ASR in certain conditions. This paper also discusses the sustainability benefits of utilizing copper slag, including reduced landfill waste and conservation of natural sand resources. Finally, research gaps and future directions for improving the durability performance of copper slag-based HSC are outlined.

Keywords: Copper slag, high-strength concrete, durability, fine aggregate replacement, sustainability.

FINITE ELEMENT ANALYSIS OF SUBWAY TUNNEL UNDER INTERNAL BLAST LOADING USING EXPLICIT DYNAMIC METHOD.

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ABSTRACT

The present study deals with the non-linear 3D-Finite Element analysis of subway tunnel with cast iron lining under internal blast loading using explicit dynamic method in ABAQUS. The CONWEP technique is used for the analysis purpose. The surrounding ground media are modelled using Drucker Prager elasto-plastic model while cast iron lining is modelled using Von-Mises elasto-plastic model. The structural responses are recorded in terms of stress and strain of tunnel lining at the vault of centre of tunnel. Parametric sensitivity studies are done through time history analysis of structural responses for different charge weights, stand-off distances (location of the point of response record from the point of detonation), and surrounding rock mass. The result proves that the structural responses are directly proportional to charge weight while inversely proportional to the stand-off distance and rock qualities.

Keywords: Finite element analysis, internal blast loading, CONWEP, numerical simulation.

MATHEMATICAL MODELING OF STRUCTURAL RESPONSE OF THE TUNNEL UNDER INTERNAL BLAST LOADING AS A FUNCTION OF SCALED DISTANCE.

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ABSTRACT

The primary objective of this study is the formulation of peak structural responses of the tunnel under internal blast loading, in terms of scaled distance. A typical subway tunnel of 5.0 m diameter, embedded at a depth of 13.0 m with cast iron lining is analyzed under internal blast loading using the dynamic explicit finite element method in ABAQUS, through CONWEP technique. The structural responses are recorded in terms of Mises stress and logarithmic strain through time history analysis and maximum values are considered for the mathematical modelling purpose. Stresses and strains are recorded at the various stand-off distance locations along the tunnel length from centre of the tunnel lining in different loading conditions. Furthermore, results are compared for two types of surrounding ground media: Saturated Soft Soil (SSS) and Intact Rock Mass (IRM). Power-law relationship resulted as the best fit, with the highest R-squared value showing the strong correlation between structural responses and scaled distance. The study provides insights for designing blast-resistant underground structures.

Keywords: Internal Blast, Tunnel, Finite Element Method, CONWEP, Scaled Distance.

EXPERIMENTAL INVESTIGATION ON SELF CURING CONCRETE WITH DIFFERENT SELF CURING AGENTS

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ABSTRACT

Concrete is recognized as a versatile construction material globally. Properties of concrete depend upon, to a greater extent, the hydration of cement and microstructure of hydrated cement. Congenial atmosphere would aid the hydration of cement and hence curing of concrete becomes essential, till a major portion of the hydration process is completed. But in areas of water inadequacy and concreting works at considerable heights, curing is problematic. Self-Curing or Internal Curing technique overcomes these problems. It supplies redundant moisture, for more than sufficient hydration of cement and diminish self- desiccation. Self-Curing agents substantially help in the conservation of water in concrete, by bringing down the evaporation during the hydration of Concrete. The present study focuses on the impact of self-curing agents such as Poly Ethylene Glycol (PEG) with percentage variation of 0.5%, 1.0%, 1.5%, 2.0%, Poly Vinyl Alcohol (PVA) and Super Absorbent Polymer (SAP) with percentage variation of 0.25%, 0.5%, 0.75%, 0.1% on the concrete mix of M25 grade (reference mix) .The effect of these agents on strength properties of Concrete such as compressive strength, split tensile strength and flexural strength was observed on a comparative basis which revealed that PEG 4000 was the most effective among all the agents.

Keywords: Self-curing concrete, Polyethylene Glycol (PEG), internal curing, water conservation, strength properties.

PERFORMANCE -BASED DESIGN OF TALL BUILDINGS IN HIGH WIND ZONES.

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ABSTRACT

The rapid urban growth fuels increased demand for tall and supertall edifices, many of which are located amidst severe wind activity. These tall buildings' design poses unique problems, as wind forces generate summary lateral loads, dynamic effects, and serviceability glitches such as huge lateral drifts, accelerations, and discomfort to the occupants. The conventional, code based methods of design, while having their benefits to an extent, act more as a general outline, trying to ensure minimum safety standards on a one size fits basis, rather than addressing the optimization of the building's overall performance in its particular environment.

Hence, Performance Based Design (PBD) could be the answer to all these problems with a more usable and all encompassing framework in which the design objectives are set in terms of the specific set of performance criteria, such as: life safety, immediate occupancy, collapse prevention, and serviceability against various levels of wind intensities. Moving away from prescriptive rules to specifying performance heterogeneously allows the engineer to use state of the art analytical tools, dynamic simulations, and nonlinear procedures to better predict the response of a building to an extreme wind event. This study seeks to explicate how Performance Based Design concepts can be incorporated into the explicit domain of tall buildings subjected to high winds. Apart from an exhaustive treatment of wind structure interaction phenomena, the investigations will also focus on dynamic characteristics of tall structures and more uniform simulation approaches provided by Computational Fluid Dynamics (CFD) and time history analysis. Therefore, case studies of world famous tall buildings such as Burj Khalifa and Shanghai Tower will be developed, thus fleshing out a comparative study of traditional code based versus performance based approaches. Consequently, one will

arrive at a strong design methodology that ensures structural ample strength, serviceability, comfort of personnel, and cost effectiveness of tall buildings subjected to a harsh wind environment.

One hopes that it will yield a more flexible, sustainable, resilient design philosophy prepared to address the challenges posed by the next generation of tall buildings. These tall buildings will remain safe and functionally expressive even under severely challenging wind conditions.

Keywords: Performance-Based Design, tall buildings, wind loads, dynamic analysis, Computational Fluid Dynamics (CFD).

A COMPARATIVE REVIEW OF BUILDING INFORMATION MODELING (BIM) AND AUTOMATIC COMPUTER AIDED DESIGN (AUTOCAD) IN MODERN CONSTRUCTION

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ABSTRACT

The development of digital tools has greatly changed how buildings are designed and built. This paper compares Building Information Modeling (BIM) and Automatic Computer- Aided Design (AutoCAD), two key technologies used in today's construction industry. AutoCAD has been used for many years to create 2D and 3D drawings for buildings and structures. It is helpful for designing and drafting. But BIM software is new technology it creates a smart 3D model including important information like materials, costs, schedules and how the building will be maintained over time. BIM helps with planning, design, construction and building maintenance. Bim allows architects, engineers and builders to work together on the same model, making it easier to solve problems early and avoid costly mistakes. BIM reduces mistakes, cost and saves time. Although BIM takes more time to learn and set up, it saves time and money in the long run. As technology improves and construction becomes more complex, BIM is becoming the preferred choice. This review shows that Building Information Modelling software is not just a design tool but a full process that supports better building from start to finish.

Keywords: Building Information Modeling (BIM), AutoCAD, construction technology, design collaboration, project efficiency.

EVALUATION OF THE EFFECTS ON TIME ENERGY COMPONENT OF SUSTAINABLE ENGINEERING IN RESIDENTIAL BUILDING

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ABSTRACT

In today's rapidly evolving landscape, minimizing project costs while embedding sustainability measures presents a noteworthy challenge for construction teams. The goal is to not only conserve renewable energy effectively but also to optimize its integration at every stage of the project. By doing so, construction professionals can foster a synergistic approach that enhances both economic viability and environmental responsibility, ultimately contributing to a more sustainable built environment. The integration of sustainable engineering practices in residential building projects has received considerable attention in recent years, particularly in terms of reducing environmental impact and enhancing energy efficiency. This analysis presents a sophisticated approach to construction project planning and illustrates how this methodology can be applied to modern construction management, emphasizing sustainability and its implications for project costs. This project primarily aims to implement sustainable engineering practices, focusing on renewable energy and time management within construction. Different activities have varying energy consumption requirements, which are crucial to consider. By incorporating renewable energy sources, such as solar energy, in the early stages of construction, it becomes possible to achieve better cost management. This strategy allows for a comprehensive understanding of the energy needs for various tasks, facilitating the transition from conventional electrical sources to renewable alternatives. In today's context, minimizing costs while integrating various aspects of sustainability remains one of the major challenges for any project.

Keywords: Sustainable construction, renewable energy integration, cost optimization

EXPERIMENTAL STUDY ON EFFECT OF GREEN CORROSION INHIBITORS USED IN STEEL REINFORCED CEMENT CONCRETE

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ABSTRACT

Inhibitors of corrosion can be either organic or inorganic; the inorganic inhibitors contain substances that are toxic and harmful to humans. In this investigation, the economically viable, biodegradable, and ecologically benign natural source of organic inhibitory method was used. The green corrosion inhibition analysis has been done on Tor steel immersed in acidic medium (1M HCL) Solution in both absence and presence of Dracaena Trifasciata Leaf Extract (DTLE) as a green corrosion inhibitor in a concentration of 500 ppm. The comparison of test results has been done through the corrosion studies (weight loss, Half- cell, Accelerated corrosion test), surface studies (SEM, EDX, AFM test) and spectroscopic studies (FTIR test). These test results show the formation of the Inhibition thin layer above the steel surface that contains S, N, O and P as well as phytochemical Compounds like alkaloids, tannins, flavonoids and steroids.

Keywords- Phytochemical compounds, Eco Friendly green corrosion inhibitor, Surface studies, Spectroscopic studies

EXPERIMENTAL STUDY ON STRENGTH BEHAVIOUR OF GLASS FIBER REBAR IN CEMENT

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ABSTRACT

The fibre reinforced concrete shows a different behaviour compared to behaviour of plain cement concrete. It is observed from the literature that percentage content of fibre and types of fibre are major factors influencing the behaviour of concrete. Keeping this in view, the aim of this project was to study the behaviour of concrete containing.

In this report, the definition of fibres and different types of fibres used in concrete are discussed. The physical and mechanical properties of FRC, various test performances on it and their results are also discussed. In this project, we have used steel bars and glass fibres as fibre material in concrete. We have cast a total number of 33 cubes, 18 cylinders and 12 beams for 7, 14 and 28 days for M25 grade of concrete. Compressive, tensile and flexural tests have been performed on all concrete specimens.

The main problem encountered in steel reinforced concrete structures is the corrosion of the steel bars which eventually results in the failure and disintegration of the structure. Fibre reinforced polymer (FRP) rebar has been considered as an alternative for this since corrosion is a material problem. The purpose of this research was to investigate flexural behaviour of GFRP and steel reinforced beams. The beam sections used in this research are of size 150 x 200 mm and of 1600 mm length. Flexural strength was determined and crack pattern studies were carried out.

Keywords: Fibre Reinforced Concrete, GFRP rebar, flexural strength, corrosion resistance, steel reinforcement.

FEASIBILITY STUDY OF NON - MOTORIZED TRANSPORT IN THRISSUR

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ABSTRACT

Thrissur metropolitan area is in the process of finding solutions for transportation issues, as a growing city. Traffic, traffic jams, delays, pollution, inadequate means of transport, accidents etc., the issues are mounting every day. With a change of life status of people, the passage of people has also been changed to a great extent. The increase in income levels have led to a growth in motorization and vehicle ownership and has in turn given rise to traffic woes again. The concept of Non Motorized Transport (NMT), although not a recent concept, increasingly pertinent in this regard. The viability of the NMT policies will be analysed in this article in relation to the Thrissur city. Public policy works only if it has social acceptance. Hence the study determines the people perception of NMT through questionnaire surveys. Again, the condition of existing facilities also needs to be evaluated for proposing any new facilities as well as improvement measures. So the geometric survey has been conducted as part of this.

The surveys have yielded positive results regarding willingness to accept NMT by the public. It was found out that there is a lack of quality of existing infrastructure for pedestrians in the city. So the study gives insights regarding the need to strengthen the NMT infrastructure in the city both in terms of quality and quantity.

Keywords: Non motorized transport, Traffic problems, Transportation sector, Public policy, Geometric survey

EFFECT OF ADDITION OF CARBON FIBRE ON MECHANICAL PROPERTIES OF CONCRETE

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ABSTRACT

Fibers are known to enhance the durability and performance of concrete, with carbon fibers standing out due to their exceptional mechanical properties. This study investigates how varying carbon fiber content affects the strength of concrete and compares it to that of conventional concrete. The mechanical properties evaluated include compressive strength, split tensile strength, and flexural strength, with carbon fibers added at varying percentages (0%, 0.25%, 0.5%, 0.75%, 1%, and 1.25% by volume of concrete). The results clearly indicate a percentage increase in all three strength parameters—compressive, split tensile, and flexural—for M25 grade concrete at both 7-day and 28-day curing periods, corresponding to the varying fiber content. The highest strength gains were observed at a 1% fiber addition, which is identified as the optimum dosage.

Keywords: Carbon fibers, Reinforced concrete, compressive strength, split tensile strength, flexural strength

ANALYTICAL STUDY OF BEAM-COLUMN JOINT USING ABAQUS

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ABSTRACT

During the dynamic loading condition the beam column joints are identified as the weaker portion in framed structure. The failure of joint region which is lead to catastrophic failure of structure. Shear failure of beam-column joints is identified as the principal cause of collapse of framed buildings during earthquakes. In these case, Effective and economical strengthening techniques for the upgrade of the shear resistance capacity in RC structures are needed. The objective of this research is to develop effective techniques used to enhance the reinforced concrete beam-column joints using advanced fibre materials. And A ABAQUS computer simulation used to analysis the member.

Keywords: Beam-column joints, Shear failure, Reinforced concrete (RC), Fibre reinforcement, ABAQUS simulation

ACID RESISTANCE ON GEOPOLYMER MORTAR UNDER AMBIENT CURING CONDITION

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ABSTRACT

This study investigates the acid resistance of geopolymer mortar under ambient curing conditions. Geopolymer mortar, an alternative to conventional cement-based materials, is known for its sustainability and durability. The research focuses on the effect of various acidic environments on the performance of geopolymer mortar. Mortar specimens were cured at ambient temperature and exposed to acidic solutions for varying periods. The results show that geopolymer mortar exhibits superior acid resistance compared to conventional cement mortar. The binder composition, including fly ash and alkaline activators, significantly influences its resistance to acid degradation. The findings suggest that geopolymer mortar offers a promising solution for applications in highly corrosive environments, enhancing durability and longevity.

Keywords: Geopolymer mortar, Acid resistance, Ambient curing, Fly ash, Durability

EXPERIMENTAL INVESTIGATION OF MECHANICAL PROPERTIES ON ENGINEERED CEMENTITIOUS COMPOSTIES (ECC)

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ABSTRACT

The primary aim of this research was to study the mechanical properties (i.e. compressive, tensile and flexural strengths) of the engineered cementitious composites (ECC). To achieve the aim of the project, an experimental study was carried out to investigate the properties of ECC mix with PVA fiber contents (poly vinyl alcohol) at different maturation time of 14 & 28 days respectively. The effect of different fiber contents (0, 0.5, 1, 1.5 and 2%) on compressive, flexural, and tensile strengths as well as ductility was experimentally investigated. 6 Nos of cube 6 Nos prism beam specimens were casted according to ASTM standards, Furthermore, the effect of increasing PVA fiber contents on the properties of fresh ECC (workability and density) was also studied. The test results showed improved compressive, flexural and tensile strengths at higher content of fibers. The compressive and flexural strengths of ECC was found to be maximum at a fiber dosage of 2% and 1.5 % respectively. Similarly, increasing PVA fibers increased the tensile strength of the ECC as well. However, workability of concrete was found to decrease with increasing fiber contents in ECC.

Keywords: Engineered Cementitious Composites (ECC), PVA fiber, Mechanical properties, Compressive and flexural strength, Workability

STRUCTURAL ANALYSIS AND DESIGN OF HIGH RISE BUILDING USING ETABS

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ABSTRACT

This project focuses on the structural analysis and design of a high-rise building using ETABS software. High-rise structures require advanced analysis due to their height, complexity, and load conditions. ETABS provides an efficient platform for modeling, analyzing, and designing multistory buildings under various loads. The study involves creating a 3D model of a high-rise building, applying dead, live, wind, and seismic loads as per relevant codes. Structural components such as beams, columns, slabs, and shear walls are designed for safety and serviceability. The analysis includes checking for lateral stability, story displacement, and base shear. Results demonstrate that ETABS ensures accurate, economical, and code-compliant design. The study highlights the software's effectiveness in handling complex high-rise projects.

Keywords: High-rise building, Structural analysis, ETABS, Seismic loads, Lateral stability

A STUDY ON MARINE-SOURCED CHITOSAN BIOPOLYMER FOR ENVIRONMENTAL SAFE SOAP ALTERNATIVES

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Abstract

Marine-origin polysaccharides have been used in recent research because they are readily available, reasonably priced, biocompatible, and biodegradable. Since it can be made from leftover marine crustaceans, chitosan is becoming more and more valuable in a variety of applications. The structural component of fungi, insects, and crustaceans, chitin is the second most common biopolymer on Earth, behind cellulose. Chitin can be deacetylated to produce chitosan, a deacetylated derivative of chitin. Because the amino groups that give the polymer its many characteristics are present, it is a functionally versatile biopolymer. Though it has been employed in many industrial applications, biodegradable chitosan soap is one of the more recent uses for it. The properties of chitosan have been enhanced through a variety of techniques, including the use of plasticizers and cross-linkers, the embedding of fillers like fibers, whiskers, and nanoparticles, and the blending of the polymer with other natural and synthetic polymers as well as with natural extracts and essential oils. To get this biopolymer to industrial levels for use in biosoap and bioplastic applications, however, a lot more research is still required. Foamability, Total Alkali, TFM, pH, Hardness, and Antimicrobial are the characteristics of biosoap.

Keywords: Chitosan, Biosoap, Marine Biopolymer, Biodegradable, Tissue Engineering

AI- DRIVEN PREDICTION AND ANALYSIS OF PHYSICO- CHEMICAL PROPERTIES OF WATER IN THENI

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ABSTRACT

The study of water quality evaluates the current status of usable water for both domestic and industrial purposes. This research focuses on the Theni district, encompassing major rivers, municipal water supplies, and borewell sources, with special attention to pollution-affected areas. The investigation involves the analysis of physico-chemical characteristics during the period of March to April 2025. A total of 100 water samples were collected-20 samples per week from 20 different locations over five weeks. Sampling sites were chosen to reflect a wide geographical spread, particularly near industrial zones, where water pollution is a significant concern due to the discharge of industrial waste. These pollutants contribute to the deposition of nitrites, chlorides, heavy metals, and result in decreased pH levels, causing the water to become more acidic. Such changes in water quality negatively impact aquatic life and the overall health of water ecosystems. To analyze the collected data, we employed Python programming for data processing, visualization, and statistical analysis. Additionally, we leveraged results on AI to identify patterns and predict contamination risks more effectively. By the end of this project, we aim to propose practical remedies to address the water quality issues affecting the river basins.

Keyword: Theni district water intake ,Water Analysis, Potability of water, Physical and chemical parameters.

GEO-SPATIAL MAPPING AND HYDRO-CHEMICAL ANALYSIS OF WATER QUALITY IN THENI DISTRICT

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ABSTRACT

Availability of clean and safe water is a basic human requirement essential for drinking, agricultural, and industrial uses. In Theni district, Tamil Nadu, groundwater and surface water are extensively utilized, but their quality is getting degraded due to natural processes as well as anthropogenic influences. This research will evaluate the quality of water in Theni district based on an intensive hydro-chemical analysis with the help of geo-spatial mapping methods to demarcate the zones of contamination and spatial patterns. The core objectives of the study include evaluating various hydro-chemical parameters. A total of 50 water samples were collected from different locations across the district. These samples underwent laboratory testing to determine both physical and chemical characteristics, thereby assessing their suitability for consumption and agricultural use. In order to visualize and interpret water quality distribution, Geographic Information System (GIS) tools were utilized. GIS-based spatial distribution maps were created to identify the pollution hotspots and monitor water quality changes over time. The outcome of this research provides a basis for suggesting interventions in order to enhance water quality and ensure the sustainable management of water resources in the area. Not only do the findings identify areas of concern that need urgent action, but they also stimulate public awareness and the establishment of policy for the long-term conservation of water in the Theni district.

Keywords: Water Quality, Hydro-Chemical Analysis, GIS, Spatial Mapping, Theni District, Contamination, Sustainable Water Management

EXPERIMENTAL STUDY ON THE BEHAVIOR OF STEEL FIBER REINFORCED CONCRETE

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ABSTRACT

In recent years the applications of high strength concrete have increased many parts of the world. This growth has been possible as a result of recent developments in technology and demand for high strength concrete. There are many advantages in using high strength concrete in building construction. As in the case of conventional concrete, the use of steel fiber substantially increases the energy at break of high strength concrete. Although the initial cost may be high. Significant long-term saving would be ensured in reducing the needs for maintenance, repair and rehabilitation. The experimental program was designed to the effect of steel fibers on compressive strength, split tensile strength of high strength concrete and testing of cubes of size (150mmX150mmX150 mm), cylinders of 150 mm diameter, height of 300 mm. The mix proportion for M30 grade of concrete. Then, the steel fiber were added in the proportions.

Keywords: Steel Fiber, Concrete.

RECYCLED CONSTRUCTION AND DEMOLITION CONCRETE WASTE AS AGGREGATE FOR STRUCTURAL CONCRETE

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ABSTRACT

The construction industry is a major contributor to global waste, with construction and demolition (C&D) activities generating significant volumes of concrete debris. This presentation explores the viability of using recycled concrete aggregate (RCA) derived from C&D waste as a sustainable alternative to natural aggregate in structural concrete applications. Through a comprehensive review of current research and experimental data, we assess the mechanical performance, durability, and structural integrity of concrete incorporating RCA. Key factors such as aggregate quality, processing methods, and mix design modifications are analyzed to identify best practices for maximizing performance. Using Silica fume as mineral admixture enhanced the performance of RAC due to better interfacial zone between new and old mortar attached to RCA and working as a micro filler. Replacing proportions AQ from 25% to 50% of NCA with RCA achieved a good performance of concrete mixes. Replacing 25% of NCA with RCA has no significant adverse effect on structural concrete performance. When the replacement ratio increased to 50%, the compressive strength reduction ranged from 7% to 13% with a smaller reduction in splitting and elastic modulus. Results indicate that, with appropriate treatment and grading, RCA can be successfully used in structural concrete without compromising safety or long-term performance, contributing to a more circular and environmentally responsible construction sector. This study supports the advancement of sustainable construction practices by promoting the adoption of recycled materials in structural applications.

Keywords: RCA, construction and demolition, Concrete waste, Interfacial zone, Silica fume, Sustainable, Structural concrete, Micro filler.

EXPERIMENTAL INVESTIGATION OF FLEXURAL BEHAVIOR OF REINFORCED CONCRETE BEAM STRENGTHENED WITH TEXTILE REINFORCED CONCRETE

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ABSTRACT

This study presents an experimental investigation into the flexural behavior of reinforced concrete (RC) beams strengthened with Textile Reinforced Concrete (TRC). The research aims to evaluate the effectiveness of TRC as an external strengthening material to enhance the load-bearing capacity and ductility of RC beams. A series of RC beam specimens were cast and divided into control and strengthened groups. The strengthened specimens were externally retrofitted using TRC layers composed of high-performance mortar and alkali-resistant glass textiles. Flexural tests were conducted under four-point bending to assess performance parameters such as load-deflection behavior, first crack load, ultimate load, and failure modes. The results indicate a significant improvement in flexural strength, stiffness, and crack control for the TRC-strengthened beams compared to the control specimens. This study confirms the potential of TRC as a lightweight, durable, and effective material for structural retrofitting of RC elements.

Keywords:Textile Reinforced Concrete (TRC), Reinforced Concrete Beam, Flexural Strength, Structural Strengthening, Load-Deflection Behavior, Ductility, Crack Control, Experimental Investigation, Retrofit, Composite Materials

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