

**NATIONAL CONFERENCE ON
RECENT ADVANCEMENTS
IN
CIVIL ENGINEERING RESEARCH**

17th - 19th AUGUST, 2020

PROCEEDINGS

Organized by

THE DEPARTMENT OF CIVIL ENGINEERING



MEA ENGINEERING COLLEGE
P E R I N T H A L M A N N A

VENGOOR - PATTIKKAD PO, PERINTHALMANNA, MALAPPURAM DISTRICT, KERALA - PIN 679325



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ABOUT THE COLLEGE

MEA Engineering College, the first NAAC accredited self-financing engineering college in Malappuram district, is committed to provide excellent and value-based education with a flair for ethics and professionalism. The College is located amidst panoramic natural beauty over-looking the hills and valleys at Nellikunnu, near Perinthalmanna – a town of various educational institutions- on the Perinthalmanna-Melattur road. The College is easily accessible by road, rail and air. The College is governed by the MEA sponsored by the “Samastha Kerala Jammiyyathul Ulama”, a society instituted by topclass intellectuals of the Muslim community. Janab Panakkad Sayyid Haydar Ali Shihab Thangal is its charismatic head. The institution is affiliated to the APJ Abdul Kalam Technological University and approved by the A I C T E. The college offers 6 B.Tech programmes, 3 M.Tech programmes and Ph.D programmes. The College Management has chosen this backward area for establishing the College with the aim of sharing the responsibility of uplifting the people of the area by making technical education affordable and within reach. The Management has no motive of making profit from the College but aims at creating a Center of Excellence in Engineering and Technology.

ABOUT THE DEPARTMENT

The Department of Civil Engineering started in the year 2011 and the first batch of students passed out in the year 2015. The Department offers undergraduate course in Civil Engineering. In all, there are around 480 students in undergraduate programme. It has faculty with expertise in diverse fields. Presently, the department has 23 qualified, sincere and dedicated teaching faculty members. The Department has established a state of the art experimental facilities and laboratories in different fields of Civil Engineering. The Department strongly believes in continuous efforts to strive for excellence by exploring new frontiers of knowledge, imparting the latest technical knowledge to the students and conducting high quality research.



MEA ENGINEERING COLLEGE
P E R I N T H A L M A N N A

VENGOOR - PATTIKKAD P.O, PERINTHALMANNA, MALAPPURAM DISTRICT, KERALA - PIN 679325



VISION

To provide top class education to the community by achieving excellence in engineering education and mould world class engineers with competence, integrity and social commitment.

MISSION

To provide the best faculty, excellent infrastructure, commendable facilities for excellent academic ambience to encourage research and development and to strengthen employability and campus placements.

DEPARTMENT OF CIVIL ENGINEERING

VISION

Emerge as an excellent centre for Civil Engineering education by building up professionally competent Civil Engineers.

MISSION

- Develop professionally competent and socially committed Civil Engineers with ethical values, entrepreneurship, and leadership qualities.
- To impart quality education by implementing state-of-the-art teaching-learning methods to enrich the academic competency, credibility and integrity of the students.
- Inspire and create interest towards learning the subjects, and train diversified students to achieve academic excellence.
- Our code of conduct-Safety first, work for quality, treat others kindly and earn respect.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- Be employed in industry, government, or entrepreneurial endeavors to demonstrate professional advancement through significant technical achievements and expanded leadership responsibility.
- Demonstrate the ability to work effectively as a team member and/or leader in an ever-changing professional environment.
- Progress through certificate programs, advanced degree, and research in Civil engineering and other professionally related fields.

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Schedule
RACER'20

**National Conference on Recent Advancements in Civil Engineering
Research - 2020**

Department of Civil Engineering , MEA Engineering College Perinthalmanna - 679325

Day 1 : 17 - 08 - 2020 Monday

Platform for conference : Google Meet

Inaugural Session : 2.30 PM to 3.30 PM

- Prayer** : Mohammed Rashid K, Student , S5CE1
- Welcome Address** : Dr. Hema Nalini A.V. Dean Research & HoD , Department of Civil Engineering, MEAEC
- Presidential Address** : Dr. G Ramesh , Principal MEAEC
- Inaugural Address** : Dr. E.J. James, Pro Vice Chancellor, Karunya Institute of Technology and Sciences , Coimbatore
- Felicitation** : Prof. (Dr) V H Abdul Salam, Director MEAEC
: Mr. Zubair C.K. Administration Manager MEAEC
: Prof. Haneesh Babu K T, Vice Principal MEAEC
: Prof. Sreeram S, Dean Academics MEAEC
- Vote of Thanks** : Ms. Shahana Sheril P.T, Assistant Professor, Department of Civil Engineering, MEAEC

Invited Lectures : 3.40 PM to 6.00 PM

Invited Lecture - 1

Speaker : Dr. Kasthurba A.K, Professor, Department of Architecture, NIT Calicut

Invited Lecture - 2

Speaker : Dr. Darsana O, Assistant Professor , Department of Civil Engineering, NIT Thiruchirappalli

Invited Lecture - 3

Speaker : Dr. George K. Varghese, Assistant Professor , Department of Civil Engineering, NIT Calicut

****** Day 1 Ends******

Schedule RACER'20

National Conference on Recent Advancements in Civil Engineering Research - 2020

Department of Civil Engineering , MEA Engineering College Perinthalmanna - 679325

Day 2 : 18 - 08 - 2020 Tuesday

Platform for conference : Google Meet

Technical Session - 1

Review Panel

Chairman : Dr. George K. Varghese, Assistant Professor , Department of Civil Engineering, NIT Calicut

Members : Mr. Prajith V , Scientist B, CWRDM Calicut
Mrs. Yasmin N , Associate Professor, Department of Civil Engineering, MEAEC Perinthalmanna

Time	SI No	Paper Title
From 2.30 PM onwards	1	GROUNDWATER FLOW MODELLING OF KADUNGALLOOR PANCHAYATH USING VISUAL MODFLOW
	2	ASSESSMENT OF MUNICIPAL SOLID WASTE MANAGEMENT SYSTEM OF PERINTHALMANNA MUNICIPALITY

Technical Session - 2

Review Panel

Chairman : Dr. Kasthurba A.K, Professor, Department of Architecture, NIT Calicut

Members : Dr. Bharati Raj J , Assistant Professor, Department of Civil Engineering, NSSCE Palakkad
Mrs. Jeeja Menon , Assistant Professor, Department of Civil Engineering, MEAEC Perinthalmanna

Time	SI No	Paper Details
From 3.30 PM onwards	3	STUDY ON OFFSHORE SAND USE AS PART OF THE SUBSTITUTION OF RIVER SAND AND M SAND
	4	SELF HEALING CONCRETE - A COMPARATIVE STUDY
	5	BEHAVIOUR OF STEEL TUBE COLUMNS FILLED WITH STEEL SLAG CONCRETE
	6	STUDY ON BEHAVIOUR OF FIBRE REINFORCED CONCRETE USING BINDING WIRE
	7	PARTIAL REPLACEMENT OF FINE AGGREGATE BY PULVERIZED PLASTIC IN CEMENT CONCRETE
	8	DETERMINATION OF OPTIMUM PARAMETERS OF POROUS CONCRETE FOR ADEQUATE STRENGTH AND PERMEABILITY
	9	HEALING AND SURVIVAL OF HIGH STRENGTH BACTERIAL CONCRETE IN SALINE WATER
	10	VIBRATION STUDY OF LAMINATED COMPOSITE BOX SECTIONS
	11	BEHAVIOUR OF COLD FORMED STEEL SEMI-OVAL

		HOLLOW SECTION UNDER AXIAL AND ECCENTRIC LOADING BEHAVIOUR OF COLD FORMED STEEL SEMI-OVAL HOLLOW SECTION UNDER AXIAL AND ECCENTRIC LOADING
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Schedule		
RACER'20		
National Conference on Recent Advancements in Civil Engineering Research - 2020		
Department of Civil Engineering , MEA Engineering College Perinthalmanna - 679325		
Day 3 : 19 - 08 - 2020 Wednesday		
Platform for conference : Google Meet		
Invited Lecture : 2.30 PM to 3.00 PM		
Invited Lecture - 4		
Speaker : Mr. Chandrapatla Achyuta Ramalinga Swamy, Engineering Consultant, L&T IEL, Chennai		
Technical Session - 3		
Review Panel		
Chairman :	Dr. Darsana O, Assistant Professor , Department of Civil Engineering, NIT Thiruchirappalli	
Members :	Mr. Chandrapatla Achyuta Ramalinga Swamy, Engineering Consultant, L&T IEL, Chennai Mrs. Aseema Jemshy V.K, Department of Civil Engineering, MEAEC Perinthalmanna	
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	13	METHODOLOGY FOR PASSENGERS DELAY COST ESTIMATION AT SIGNALISED INTERSECTION
	14	HOUSING TO EMPOWER SLUM RESIDENTS
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Review Panel		
Chairman :	Dr. Bharati Raj J , Assistant Professor, Department of Civil Engineering, NSSCE Palakkad	
Members :	Mrs. Jeeja Menon , Assistant Professor, Department of Civil Engineering, MEAEC Perinthalmanna Mr Abdul Raouf , Assistant Professor, Department of Civil Engineering, MEAEC Perinthalmanna	
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	16	LIFE CYCLE ANALYSIS - AN ANALYSIS OF INPUT, OUTPUT AND POWER CONSUMPTION FOR SMALL SCALE

		COMPRESSED STABILIZED SOIL BLOCK PRODUCTION
	17	EXPERIMENTAL INVESTIGATION - CROTALARIA FIBRE REINFORCED CONCRETE
	18	COST COMPARATIVE STUDY OF CONVENTIONAL AND COST-EFFECTIVE CONSTRUCTION MATERIALS
	19	SISAL FIBRE REINFORCED GYPSUM BOARDS AS PARTITION WALLS
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Review Panel		
Chairman :	Mr. Noushad K, Department of Civil Engineering, MEAEC Perinthalmanna	
Members :	Mr. Muhammed Anees K, Department of Civil Engineering, MEAEC Perinthalmanna	
	Mr. Abdullah Abdul Salam , Department of Civil Engineering, MEAEC Perinthalmanna	
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P2	Assessment of Municipal Solid Waste Management System of Perinthalmanna Municipality
P3	Study On Offshore Sand Use As Part Of The Substitution Of River Sand And M Sand
P4	Self-healing concrete - A comparative study
P5	Behaviour Of Steel Tube Columns Filled With Steel Slag Concrete
P6	Study on Behaviour of Fibre Reinforced Concrete using Binding Wire
P7	Partial Replacement Of Fine Aggregate By Pulverized Plastic In Cement Concrete
P8	Determination Of Optimum Parameters Of Porous Concrete For Adequate Strength And Permeability
P9	Healing and survival of high strength bacterial concrete in saline water
P10	Vibration Study of Laminated Composite Box Sections
P11	Behaviour Of Cold Formed Steel Semi-Oval Hollow Section Under Axial And Eccentric Loading
P12	Anti-Stripping Roads With Modified Bituminous Mixture
P13	Methodology for Passengers Delay cost Estimation at Signalised intersection
P14	Housing to empower slum residents
P15	Numerical Investigation And Structural Performance Of Hollow Flanged Corrugated Web Tapered Slender Columns
P16	Life Cycle Analysis - An analysis of input, output and power consumption for small scale compressed Stabilized Soil Block production
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P18	Cost Comparative Study Of Conventional And Cost-Effective Construction Materials
P19	Sisal Fibre Reinforced Gypsum Boards as Partition Walls
P20	Study on Performance of Polystyrene Building Blocks
P21	Waste Foundry Sand And Rubber Tyre As Substitutes For Aggregates In Concrete
P22	A Numerical Approach to Lateral Earth Pressure on Plane and Circular Retaining Walls
P23	Comparative Study On Sand Bed Reinforced With Flex Cell And Pet Bottle Cell
P24	Soil Stabilization Using Lime And Sugarcane Bagasse Ash
P25	Soil Stabilization Using Jute Fibre And Bamboo Leaf Ash



TECHNICAL SESSION 1

GROUNDWATER FLOW MODELLING OF KADUNGALLOOR PANCHAYATH USING VISUAL MODFLOW

Vinaya Murali ¹, Nivedya Mohan², Sandesh Sundar B³, Marvin Mathew Thomas ⁴

¹Student, ²Student, ³Student, ⁴Student, Federal Institute Of Science And Technology

Abstract: Groundwater is the water which occupies the voids in the saturated zone of earth's crust (rocks). The uncertainty about the occurrence, distribution and quality aspect of groundwater and the energy requirement for its withdrawal impose restriction on exploitation of groundwater. Sustainable management and planning of the groundwater resources become essential and urgent given the impact of the global climate change. Groundwater model has become an essential tool for hydro geologists to perform various tasks including the assessment and prediction of groundwater, the detection of groundwater pollution etc. The aim of this study is to develop a 3D groundwater model of Kadungalloor Panchayath using Visual MODFLOW, to calibrate the model using suitable boundary and initial conditions and to predict the future possible groundwater fluctuations in the area. The model involved a transient-state hydrogeological simulation of the two-layered aquifer. The model domain was delineated based on digital elevation model extracted from digital elevation model of Ernakulam district. Aquifer parameters were assigned based on given data by CGWB, which were then adjusted during the model calibration. The main recharge mechanism considered was direct recharge from rainfall and the recharge was assumed to be 10% of the rainfall values obtained from IMD. The model was calibrated to water levels during 2010 to 2016. The overall model results are comparable with the observation well data. The model was validated to water levels during 2017 to 2019. The variation of predicted water level with respect to time was almost same with that of variation of water level in the field. Thus, the model is suitable to be used for future groundwater flow predictions. The groundwater flow prediction for the year 2030 was done for three scenarios and the results were presented.

Keywords: Visual MODFLOW, CGWB, IMD.

ASSESSMENT OF MUNICIPAL SOLID WASTE MANAGEMENT SYSTEM OF PERINTHALMANNA MUNICIPALITY

Dr. Hema Nalini A.V¹, Mohammed Navas C.P², Hiba Nourin V.P³, Amina Minnath M⁴, Fathima Nasrin M⁵

¹Professor, MEA Engineering College

²Student, ³Student, ⁴Student, ⁵Student, MEA Engineering College

Abstract: Municipal Solid Waste Management is one among the fundamental and essential services provided by municipal authorities in the country. The existing system of the municipal solid waste management of Perinthalmanna Municipality has been studied to assess its performance and the conformity to the regulations. Investigation was conducted about the prevailing process of collection, processing and disposal of the municipal solid waste by taking sample response survey among the people and the authorities who are managing the system. The study revealed that solid waste management in Perinthalmanna Municipality needs upgradation as it is not conforming to the MSWM rules. The suggested strategy is integrated solid waste management system or upgrading the existing system.

Keywords: Municipal solid waste management, MSWM rules, integrated solid waste management.



TECHNICAL SESSION 2

STUDY ON OFFSHORE SAND USE AS PART OF THE SUBSTITUTION OF RIVER SAND AND M SAND

Neethu S¹, Dr. D Tensing²

¹Researcher, Karunya Institute Of Technology And Sciences, Coimbatore

¹Professor, Karunya Institute Of Technology And Sciences, Coimbatore

Abstract: The purpose of the study is to test the physical, chemical and structural characteristics of dredged offshore sand and to evaluate the extent of partial use as a replacement for river sand and M sand. For testing the physical and chemical properties, experiments like Grading, determination of Chlorides, Shell content and Organic matters were done. For analysing the Structural properties various experiments like Sieve analysis, Gap grading, determinations of Compressive strength, Flexural strength, Rapid chloride penetration test (RCPT), Water absorption test and Alkalinity test were done. The amount of chloride, shell content, organic content were as per the standards. The compressive strength and flexural strength of concrete with graded sand were found to be comparable to that of concrete with River sand or M Sand. The RCPT results show that the average current passing through the off shore sand was within the range specified by ASTM for conventional concrete. Water absorption of concrete specimens cast with offshore sand was less, compared to specimens cast with graded offshore sand. The alkalinity of all the concrete specimens with graded offshore sand was within the permissible limits. Offshore sand can be used for making concrete when partially replaced with river sand or M Sand.

Keywords: Sieve analysis, Gap grading, Compressive strength, Flexural strength, Rapid chloride penetration test (RCPT), Water absorption test and Alkalinity test, ASTM

SELF HEALING CONCRETE – A COMPARATIVE STUDY

Jiya P Jiju¹, Jimsha C S², Diya K Shafar³

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Abstract: The main limitation of concrete, the world's largest building material, is the unavoidable cracking developed due to its exposure towards moisture and chemicals. It is hard to maintain design life of a structure, taking into consideration, the effects such as weathering, bending, cracking and water leakage which may be the aftereffects of human mistakes, unskilled labour and incorrect handling. Major reasons behind cracking are excess moisture, rapid drying of concrete and the corrosion of steel reinforcement. To deal with all this a remedial product named self-healing concrete or bacterial concrete can be suggested. This product is the result of a biological reaction between unreacted limestone and calcium based nutrient with the help of an acid producing bacteria like "Bacillus", which act as a catalyst to heal the cracks appeared on the concrete. This kind of bacteria is capable to exist in a dormant cell for over 200 years even in dry condition. Since the cost involved for maintenance and repair of concrete structures are usually high, it is beneficial to go with this biotechnological approach to reduce incidence of cracks on concrete infrastructure. In this paper, the performance of bacterial concrete, with respect to the parameters such as compressive strength, flexural strength, steel reinforcement corrosion and freeze and thaw attacks, is analysed and compared with that of the ordinary concrete. Self-healing concrete increases compressive strength, flexural strength and split tensile strength by the bonding between fibre and bacteria.

Keywords: Crack in concrete, Self-healing concrete, Compressive strength, Flexural strength, Limestone, Bacillus.

BEHAVIOUR OF STEEL TUBE COLUMNS FILLED WITH STEEL SLAG CONCRETE

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Abstract: Concrete-filled Steel tube (CFST) columns consist of a steel tube filled with concrete. The concrete core adds stiffness and compressive strength to the tubular column and reduces the potential for inward local buckling. Conversely, the steel tube acts as longitudinal and lateral reinforcement for the concrete core helping it to resist tension, bending moment and shear and providing confinement for the concrete. Concrete-filled steel tube (CFST) columns combine the advantages of ductility, generally associated with steel structures, with the stiffness of a concrete structural system. Due to the benefit of composite action of the two materials, the CFST columns provide excellent seismic event resistant structural properties such as high strength, high ductility and large energy absorption capacity. Also, circular hollow sections possess many advantages over open sections, including aesthetic appearance and economy in terms of material costs. Steel slag is a by-product of molten iron processing, and different types of steel slag are formed depending on a specific type or grade of steel and the furnace used during steel production. Steel slag when incorporated in concrete attains more strength. This property can be accompanied in CFST columns. Thus the strength of the CFST column can be increased.

Keywords: Concrete-filled steel tube, Steel slag, Composite column, Grade of Concrete.

STUDY ON BEHAVIOUR OF FIBRE REINFORCED CONCRETE USING BINDING WIRE

Jazeel Shah P¹, Ahamed Zahal², Fathima Femi P.K³, Fathima Nihala P.K⁴, Mohammed Safar⁵

¹Assistant Professor, MEA Engineering College

²Student, ³Student, ⁴Student, ⁵Student, MEA Engineering College

Abstract: Concrete is most generally utilized building material on planet. Concrete possesses a very low tensile strength, limited ductility and little resistance to cracking. Fibre Reinforced Concrete (FRC) is a composite material consists of cement based matrix along with uniform or random distribution of short discrete fibres, which can be steel fibres, nylons, polyethylene etc. Various types of fibre reinforced concrete are being used against plain concrete due to their higher flexural strength, better tensile strength, modulus of rupture and crack resistance. The application of irregular arrangement of fibres to concrete altogether upgrades its essential characteristics. In this project we study the effects of addition of binding wires on the compressive strength, flexural strength and split tensile strength of concrete experimentally. Different quantities of binding wires are added to the concrete to find out the optimum quantities of binding wires in which the FRC with binding wires is more effective in terms of strength and crack resistance capacity. Tests were conducted to study the flexural, compressive strength and split tensile strength of steel fibre reinforced concrete with varying diameter of steel binding wire.

Keywords: Fibre Reinforced Concrete (FRC).

PARTIAL REPLACEMENT OF FINE AGGREGATE BY PULVERIZED PLASTIC IN CEMENT CONCRETE

Nusfa Karuvattil¹, Fathimath Shimna Sherin P², Dilsha Sherin T³, Anshaal Rahman E⁴, Rinoos P⁵

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²Student, ³Student, ⁴Student, ⁵Student, MEA Engineering College

Abstract: Solid waste management is one of the major environmental concerns in the world. With the scarcity of space for land filling and due to its ever increasing cost. Waste utilization has become an attractive alternative to disposal. Reuse of bulky waste is considered the best environmental alternative for solving the problem of disposal. One such waste is plastics which could be used in various application. The project presents a detailed study about the effect of waste and recycled plastics on the fresh and hardened properties of concrete. Fine aggregate used in cement concrete is replaced by fine crushed plastics. The various test to be conducted on concrete are compression test, split tensile strength, flexural strength etc. High density Poly Ethylene is the Plastic used for replacing fine aggregate. Paint bottles are being crushed to obtain the HDPE .M20 grade concrete is chosen for the investigation. In this investigation we made a comparative study of compressive strength and tensile strength of both conventional concrete and concrete containing plastic at 28 days. Methodology of the project is the systematic, theoretical analysis of the methods applied to a field of study. It include literature review, collection of materials, mix proportion, casting of specimens, curing of specimens, testing of specimens, analysis and discussion of test results, comparison with plain concrete, conclusions etc.

Keywords: High density Poly Ethylene(HDPE).

DETERMINATION OF OPTIMUM PARAMETERS OF POROUS CONCRETE FOR ADEQUATE STRENGTH AND PERMEABILITY

Kripa K M¹, Divya Das K G², Priyanka Thachat³,

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²student, ³student, Ahalia School Of Engineering And Technology

Abstract: Pervious concrete is a special type of concrete, which consists of cement, coarse aggregate, water, and if required, admixtures and other cementitious materials. As there is no fine aggregate used in the concrete mix, the void content is more, which allows the water to flow through its body. So, the pervious concrete is also called permeable concrete or porous concrete. There is a lot of research work going on in the field of pervious concrete. The compressive strength of pervious concrete is less when compared to conventional concrete due to its porosity and voids. Hence the usage of pervious concrete is limited even though it has a lot of advantages. If the compressive strength and flexural strength of pervious concrete are increased, then it can be used for a greater number of applications. For now, the usage of pervious concrete is mostly limited to light traffic roads only. If the properties are improved, then it can be used for medium and heavy traffic rigid pavement also.. The project focuses on improving the strength characteristics of pervious concrete without compromising much on permeability so that it can be used in sidewalks, for low-traffic volume roads, and for parking areas. The compressive strength was studied on two different types of pervious concrete, namely pervious concrete obtained by addition of fly ash and nano silica and pervious concrete obtained by partial replacement of coarse aggregate with pumice aggregate. The application of these concrete in the above-mentioned areas will help reduce the amount of stagnant water during heavy rains and thus eliminate the risk of floods. In the present world, where flooding is a major disaster, we hope to reduce the percentage of risk by using the pervious concrete pavement.

Keywords: Permeability, Pervious concrete.

HEALING AND SURVIVAL OF HIGH STRENGTH BACTERIAL CONCRETE IN SALINE WATER (CONSTRUCTION & BUILDING MATERIALS)

Shahla M¹, Shahid T², Syamili A³, Akshay V⁴, Azmil Bani K⁵

¹Student ²Student ³Student ⁴Student Sreepathy Institute of Management And Technology

⁵Assistant Professor, , Sreepathy Institute of Management And Technology

Abstract: Main problem associated with concrete structures is its cracking. Utilizing biological processes to modify engineering properties of building material have recently emerged by various researches. By the confluence of microbiology, geochemistry and civil engineering, we can develop methods that will enhance concrete structures in various properties. Here, one of such technique named as bacterial concrete is introduced. It's a special type of concrete which has some bacteria in it, which is capable of healing the cracks itself. It's done by the process of Microbiologically Induced Calcite Precipitation (MICP). MICP is a good binder for protecting various building materials and to heal the cracks occurred. MICP in concrete structures uses bacteria from Bacillus family. Most promising among these is Bacillus subtilis, which is ecofriendly and can survive inside concrete structures for around 200 years. Bacillus subtilis and Calcium chloride is added equally to the mix with water used for mixing concrete. When crack occurs in concrete structures, moisture enters the crack and bacteria become free of its dormant state. Subsequently, bacteria start to feed on Calcium chloride and precipitate Calcium carbonate and it fills the crack and heal it. An overview of MICP in bacterial concrete is presented here experimentally, and comparison is done between conventional and bacterial concrete for strength parameters and durability. Curing of concrete is done both in normal and saline water. Survival of bacteria, ability to heal cracks, and variation in strength parameters in saline water is examined.

Keywords: Microbiologically Induced Calcite Precipitation (MICP).

VIBRATION STUDY OF LAMINATED COMPOSITE BOX SECTIONS

Clydin P A¹, Nithin Mohan²

¹Assistant Professor, Adi Shankara Institute of Engineering and Technology,

²Assistant Professor, Vidya Academy of science & Technology

Abstract: Laminated composites consist of Fibres in a matrix material. Their thin and light weight character makes them efficient for a wide range of applications. However, this thin configuration creates a challenge as they become prone to damage due to vibrations. Orthotropic stiffness is a design parameter that helps to reduce this tendency. In this paper, an attempt has been made to study vibration behavior of laminated composite box sections. The variation of orthotropic stiffness parameter with natural frequency for different width to depth ratios is studied. Finite element analysis was carried out using ANSYS 15.

Keywords: Orthotropic stiffness, ANSYS 15.

BEHAVIOUR OF COLD FORMED STEEL SEMI-OVAL HOLLOW SECTION UNDER AXIAL AND ECCENTRIC LOADING

Abhishek Sebastian¹, Jalva Mehar P P²

¹Student, ²Student, AWH Engineering College

Abstract: Cold form steel section is the common term for steel section shaped by cold working processes carried out near room temperatures, such as rolling, pressing, stamping, bending, etc. They are increasingly used these days in structural applications due to their inherent high strength to weight ratio. Light weight steel construction plays an important role in industrial section due to their ease of transportation, reduced dead load, economy, etc. Generally hollow structural elements consist of circular and square cross-sectioned members with same geometrical properties in either of the principal axes to resist the predominant axial force in compression members and tubular sections with rectangular cross section with different geometrical properties in either axes are designed to carry the bending moment. Owing to the development of cold formed sections, tubular members of different kinds of cross-section can be easily fabricated as desired. This paper describes the study conducted on cold formed steel semi oval hollow section (SOHS) and square hollow section (SHS) under axial and eccentric loading. Two SOHS of different dimension and one SHS were compressed under various loading condition in order to investigate the stress-strain relationship of each section. This also includes Validation of the behaviour of SOHS stub columns by Ansys 16.1, which was experimentally done by Ben Young. Et.al (2018). The applicability and reliability of the current design rules for the cold-formed steel compact SOHS and SHS were assessed in the study. Based on the test results, best section was selected by comparing the ultimate strength of the three specimens.

Keywords: Cold form steel section, semi oval hollow section(SOHS) , square hollow section (SHS), eccentric loading, Ansys 16.1.



TECHNICAL SESSION 3

ANTI-STRIPPING ROADS WITH MODIFIED BITUMINOUS MIXTURE

Neeraja M¹, Shiyana P², Akhila Das³, Abhinav J⁴

¹Student, ²Student, ³Student, ⁴Student, Ahalia School of Engineering and Technology

Abstract: Flexible pavements are vulnerable to many permanent deformation and failures. Among many failures and distresses, stripping is a major and very important distress observed in a flexible pavement. Water causes loss of adhesion at the bitumen– aggregate interface and results in destruction of the bond between aggregate particles and bitumen. This premature failure of adhesion is commonly referred to as stripping in flexible pavements. The strength is impaired since the mixture ceases to act as a coherent structural unit. Loss of adhesion renders cohesive resistance of the interstitial bitumen body useless. Water may enter the interface through diffusion across bitumen films and access directly in partially coated aggregate. Water can cause stripping in five different mechanisms such as detachment, displacement, spontaneous emulsification, pore pressure, and hydraulic scour. Anti-strip additives may minimize the severity of stripping based on their properties and workability. The goal of this project is to introduce an anti-stripping agent and an optimum percentage of this additive in hot bitumen mix to improve their workability and adhesion between bitumen and aggregate. The result showed that the addition of 12% anti- stripping agent on bitumen mix gives an optimum value, thereby improving the adhesion between aggregate and bitumen.

Keywords: anti- stripping agent ,Flexible pavements, bitumen, spontaneous emulsification, pore pressure, hydraulic scour.

FOR PASSENGERS DELAY COST ESTIMATION AT SIGNALISED INTERSECTION

Muneera CP¹, Krishnamurthy Karuppanagounder²

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Abstract: Growing economy in any country may witness a rise in demand for transport infrastructure and services and may deteriorate the performances of an existing transport sector. Therefore, the sector has to keep pace with rising demand by providing a proper solution with viable financial inflow, and that accounts the estimation of the internal and external cost of transport facilities. The aim of this paper is to develop a generalized methodology for an external cost specifically passengers delay cost at signalised intersection incorporating operational, traffic flow and passengers characteristics. Factors including delay, number of vehicles, passenger occupancy, and value of travel time of different vehicle types are considered in this external cost estimation study. This methodology was demonstrated by step-by-step procedure for delay cost assessment at signalised intersection under heterogeneous traffic conditions. The delay and number of vehicles in each approach are considered separately for estimation. Value of travel time is the key factor that uses to converts engineering measure into the economic cost. Models are developed for the value of travel time by including socio-demographic and trip characteristics of travellers. Annual delay cost for each approach in a signalized intersection is estimated. This new methodology gives an insight into the passenger's delay cost estimation at the signalised intersection under different traffic conditions with the influencing factors. Passenger delay cost estimation at signalised intersection inputs to cost-benefit analysis, and it can be used to provide optimal relief measure.

Keyword: Delay cost; Value of travel time; Signalised intersection; heterogeneous traffic.

HOUSING TO EMPOWER SLUM RESIDENTS

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Abstract: Rapid urbanization has brought alarming unmanageable, inevitable and persistent problems of slums in almost every city of the world. Slums form and grow in different parts of the world for many different reasons. Causes include rapid rural-to-urban migration, economic stagnation and depression, high unemployment, poverty, informal economy, forced or manipulated ghettoization, poor planning, politics, natural disasters and social conflicts. The slums are a major hurdle in city expansion. And the slum rehabilitation works are really sensitive in nature and this can only be achieved by viewing it from the perspective of the slum dwellers. Our project aims at rehabilitating the slum dwellers in their own lands in vertical structures and thereby making a major portion of the slum vacant for future city expansion. The rehabilitation of slums has different aspects. It includes social, environmental and design challenges. Social aspects include reluctance of slum dwellers to move away from their land, the slum dwellers losing their livelihood, integration of these people into the rest of the society etc. Environmental aspects include disturbance to the environment due to the rehabilitation works. Design challenges include various challenges faces during the development, relocation and maintenance of the structures to which the slum dwellers are to be relocated.

Keywords: Urbanization, Rehabilitation.



TECHNICAL SESSION 4

NUMERICAL INVESTIGATION AND STRUCTURAL PERFORMANCE OF HOLLOW FLANGED CORRUGATED WEB TAPERED SLENDER COLUMNS

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Abstract: This research aims to develop numerical investigation and structural performance of hollow flanged corrugated web tapered slender columns. Tapered steel member offers a better cross section utilization along the member, which makes them an interesting and more economical alternative to prismatic ones. In this paper the investigation is carried on I section with the combination of hollow flange and corrugated web. Hollow flange sections are cold formed & welded from either hot rolled, cold rolled or stainless steel. Hollow flanges have different shape & size. Non prismatic columns are whose cross section is not constant along its entire length. Corrugated sections are high strength fabricated steel sections. A tapered column in a building system provides the widest possible span without the need for interior supports. They are more economical on larger clear span designs than straight column framing. Tapered steel member offers a better cross section utilization along the member, which makes them an interesting and more economical alternative to prismatic ones. Firstly, non-prismatic columns with different tapering conditions are investigated under axial loading. Out of best tapered ratio, investigating non prismatic column with flat flange effects. From the best width of flange, investigation for various shapes of hollow flanges. After that investigating the effect of double web in this column. Finally, lateral load resisting capacity of non-prismatic column is investigated. Finally push over analysis is carried out with the single storey frame for the different factor's ductility performance, strength factor etc. Above objectives are done for axial loading condition to check the performance of strength, critical buckling load and stiffness of the column.

Keywords: Push over analysis.

LIFE CYCLE ANALYSIS - AN ANALYSIS OF INPUT, OUTPUT AND POWER CONSUMPTION FOR SMALL SCALE COMPRESSED STABILIZED SOIL BLOCK PRODUCTION

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Abstract: Unfired, hydraulically compressed Stabilized Soil Blocks (SSB) manufactured using natural binders are supposed to be a sustainable option for the coming days. From raw material extraction to the final end-of-life stage of these stabilized blocks, a series of processes are involved. Right from digging or spading of earth to its sacking, loading and unloading, manual power is utilized to a greater detail. Followed by the electricity requirement for stages like oven drying of the soil mixtures during preparation phases. The fuel requirement in the transportation stage and the machine power requirement in the succeeding steps of manufacturing and testing also needs to be regarded. The development of the final product of stabilized soil blocks in a small scale, is the aftermath of a number of such stages. There is power spent on each of them. The cradle to grave analysis of stabilized soil blocks are thoughtfully significant for it's detailed analysis of inputs and outputs. Also, the investigation is supposed to upscale the use of SSB, an environmental friendly solution in construction. Potential evaluation of the block in various levels as part of LCA (Life Cycle Analysis) drives the study.

Keywords: LCA (Life Cycle Analysis).

EXPERIMENTAL INVESTIGATION CROTALARIA FIBRE REINFORCED CONCRETE

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Abstract: Concrete plays a vital role as a construction material in the world. But the use of concrete as a structural material is limited to certain extent by deficiencies like brittleness, poor tensile strength and poor resistance to impact strength, fatigue, low ductility and low durability. Fibre reinforced concrete (FRC) is concrete made primarily of cements, aggregates, and discrete reinforcing fibres. Sunn hemp (*Crotalaria juncea* L.) is one of the earliest and most distinctly named fibres of India. Past research efforts have shown that the lignified fibres produced in the stem of sunn hemp could be utilized in the manufacturing of rugs, carpets, webbing, table, fishing nets, ropes, and more recent efforts have indicated that other potential products can be developed from these fibres. The main objective of our project is to develop Crotalaria Fibre to reinforce concrete composites and to investigate the effect of volume of fibre on the mechanical behaviour of concrete. Crotalaria Fibre reinforced composites would be one of the promising strategies to improve the performance of concrete. Based on the insights gained from test results and analysis of Crotalaria fibre Reinforced Concrete (CFRC) we found CFRC to have comparatively more compressive strength, Tensile strength and flexural strength when compared to conventional concrete mix, and as per preliminary visual observations, the cracking behaviour is reduced when compared.

Keywords: Fibre reinforced concrete (FRC), Crotalaria Fibre Reinforced Concrete (CFRC).

COST COMPARATIVE STUDY OF CONVENTIONAL AND COST-EFFECTIVE CONSTRUCTION MATERIALS

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Abstract: Construction cost in India is increasing at around 50 per cent over the average inflation levels. It has registered increase of up to 15 per cent every year, primarily due to cost of basic building materials such as steel, cement, bricks, timber and other inputs as well as cost of labour. As a result, the cost of construction using conventional building materials is becoming beyond the affordable limits particularly for low-income groups of population as well as a large cross section of the middle -income groups. Therefore, there is a need to adopt cost-effective construction methods either by up-gradation of traditional technologies using local resources or applying modern construction materials and techniques with efficient inputs leading to economic solutions. This has become the most relevant aspect in the context of the large volume of housing to be constructed in both rural and urban areas and the consideration of limitations in the availability of resources such as building materials and finance. In this study cost effectiveness of various innovative materials with conventional materials is studied for a building by designing and cost estimation. Use of Expanded Polystyrene Wall panel and gypsum plastering has been included as the cost-effective materials in place of laterite masonry and cement plastering. Due to the reduced availability and increasing cost, people have been forced to look for alternatives for conventionally used building materials for reducing and optimizing the construction cost. In this study, laterite blocks and cement plastering was compared with its cost-effective alternatives, EPS Wall panel and Gypsum plastering. Structural design and cost estimation were done by using both conventional and cost-effective materials for a proposed building. And a cost-comparative study was done. Even though many studies have discussed the structural integrity of these materials, local community are not convinced about the cost effectiveness. This study was done to state the cost-effectiveness while using these materials.

Keywords: Polystyrene Wall panel.

SISAL FIBRE REINFORCED GYPSUM BOARDS AS PARTITION WALLS

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Abstract: In the modern world the need for high rise buildings and building construction are increasing rapidly. We know the building construction industry is responsible for 7 percentage of global carbon dioxide emission. Also so there is a huge growing requirement of building materials in India due to the existing housing shortage mainly for the low income groups in urban India. In order to overcome the above problems we require innovative energy efficient building material. Sisal fibre is a natural fibre extracted from sisal plants which has many benefits like moth & rot resistant, anti-static, anti-bacterial, dust & mite resistant, is a great heat and sound insulator, regulates environmental moisture and is biodegradable. Gypsum is a good building product which has many benefits like fire resistance, cooling effect, highly finished surface, termite resistant, sound resistant etc. Here this project aims to understand the potential of using sisal fibre as a reinforcing material in gypsum block and understanding the behaviour and character of the finished product. Which is very superior than traditional system in time cost and quality. We know gypsum is a waste product and have many benefits if it can be used for construction purpose. We also know that sisal fibre is a strongest natural fibre, and found abundantly in India. By utilising the benefits of the two we can overcome the weakness of the gypsum and induce quality to the finished product.

Keywords: Sisal Fibre, Biodegradable.

STUDY ON PERFORMANCE OF POLYSTYRENE BUILDING BLOCKS

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Abstract: Traditional burnt bricks, quarry stones, timber, and corrugated iron sheets remain the most commonly used construction materials. The heavy weight of bricks accounts for the great mass of construction and thus causes more vulnerability against earthquake forces. In this study we have tried to reduce the density of masonry material, as well as improve their thermal insulation properties by incorporating Expanded Polystyrene beads in concrete. Polystyrene blocks can be produced by replacing the normal aggregates in concrete or mortar either partially or fully, depending upon the requirements of density and strength levels. The present study covers the use of polystyrene beads to achieve lightweight concrete and hence introducing a light weight building block. The main aim of this study is understanding the properties like water absorption, density and compressive strength of polystyrene blocks and compare the results normal building blocks.

Keywords: Polystyrene, vulnerability.

WASTE FOUNDRY SAND AND RUBBER TYRE AS SUBSTITUTES FOR AGGREGATES IN CONCRETE

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Abstract: From the last few years, various projects had done work in concreting and invent various techniques and methods to produce concrete which has the desired properties. Concrete is one of the most vital and common materials used in the construction field. The current area of research in the concrete was introducing waste foundry sand (WFS) and rubber tyre in the ordinary concrete. Waste foundry sand is the byproduct of metal casting industries, which causes environmental problems because of its improper disposal. Thus, its usage in building material, construction and in other fields is essential for reduction of Environmental problems. This research is carried out to produce an eco-friendly concrete. This paper recommends the effective use of waste foundry sand as a partial replacement for fine aggregate and rubber tyre as a partial replacement for course aggregate in concrete. Ingredients for concrete are cement, course aggregate, Rubber tyre, fine aggregate and waste foundry sand. The aim of this project was to know the behavior and mechanical properties of concrete for its eco-friendly and economical use.

Keywords: Waste foundry sand (WFS).



TECHNICAL SESSION 5

A NUMERICAL APPROACH TO LATERAL EARTH PRESSURE ON PLANE AND CIRCULAR RETAINING WALLS

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Abstract: The earth pressure on retaining wall depends on the state of soil around the wall and the wall displacement. Classical earth pressure theories can be applied to retaining walls with plane surface in plan, represented using plane strain condition. In this paper, lateral strain required for the full mobilization of earth pressures has been verified using PLAXIS-2D software and the effect of modulus of elasticity and Poisson's ratio of soil, on the angle of failure (failure plane) has been analyzed as a parametric study. But the adoption of plane strain earth pressure in the analysis and design of circular retaining structures is conservative and hence the earth pressure for circular retaining walls is less than that of the wall with plane strain condition. This conservative nature is due to the soil arching phenomenon, in which the development of tangential stress makes the soil stretch outward. For circular deep excavations, lateral earth pressure at non-limit state is more useful because the wall displacement is limited, and stresses are transferred by soil arching. Hence in this paper, tangential stress coefficient (λ) is considered in the slip line method, instead of the Haar - von Karman hypothesis, in which the tangential stress (σ_θ) and major principal stress (σ_1) are considered to be equal. The tangential stress factor is significant to define this non-limit state of lateral earth pressure. Here, a numerical analysis is done to determine the tangential stress coefficient, by modeling it as an axi-symmetric problem. Behavior of this stress reduction coefficient with various soil parameters are also analyzed and presented in this paper. It was identified that the stress coefficient is directly proportional to the shear parameters of soil, and inversely proportional to normalized displacement, unit weight of the backfill and surcharge soil.

Keywords: Plane strain condition, Axi-symmetric condition, Circular retaining wall, Slip line method, Soil arching, Tangential stress coefficient, PLAXIS-2D..

COMPARATIVE STUDY ON SAND BED REINFORCED WITH FLEX CELL AND PET BOTTLE CELL

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Abstract: Development of the infrastructure is the most important need in present time. Due to space constrains many times construction takes place on poor soil. So improvement of soil is the most important one. Soil reinforcement is one of the most popular ground improvement techniques. Here we are using reinforcement as Flex cell and Pet bottle cell and also collect soil as sandy soil. In this project we have studied the penetration response of soil reinforced with PET bottle cell and Flex cell. PET bottle cells and Flex cell are made in the form of a geo cell. First of all we test the soil having a density by load test and the results are recorded. Then test conducted on unreinforced sand and then tests are conducted in soil with PET bottle cells and Flex cell placed in a single layer and then in double layer at different depths with different spacing. From there, we observed the soil strength are improved due to reinforcement of soil. The result depend on depth and spacing of reinforcement.

Keywords: PET bottle cells, Flex cell.

SOIL STABILIZATION USING LIME AND SUGARCANE BAGASSE ASH

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Abstract: Soil stabilization is the process of changing soil properties to improve strength and durability. Chemical stabilization is one of the most common methods used for the improvement of engineering properties of problematic soil. Over the last few decades, lime has been used as a chemical stabilizer. At this era of energy utilization and resource depletion, there is an emerging trend in the utilization of waste materials as soil stabilizers. Sugarcane bagasse ash is the burned product of sugarcane bagasse, comprising a high percentage of silica content. It is a pozzolanic material which has the potential to be used as a soil stabilizer. In this project, the potential of sugarcane bagasse ash as a soil stabilizer is evaluated and compared with the stabilization effectiveness of lime. On stabilization using sugarcane bagasse ash, it is observed that there is an increase of 183% in unconfined compressive strength and a decrease of 9.4% in plasticity index when compared to that of virgin soil. This clearly indicates that sugarcane bagasse ash is an effective soil stabilizer. On comparison, it is observed that sugarcane bagasse ash is not effective as lime in stabilizing which shows that there is an increase of 264% in unconfined compressive strength and a decrease of 7% in plasticity index. It is concluded that sugarcane bagasse ash is an eco-friendly stabilizer which can be used to develop sustainable building units like compressed stabilized earth blocks.

Keywords: Pozzolanic material, Stabilisation, Plasticity index

SOIL STABILIZATION USING JUTE FIBRE AND BAMBOO LEAF ASH

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Abstract: The soil is the most important material used in different field of civil engineering. Soil stabilisation is the process of improving the engineering performance of soil. The soil is used for mainly in construction, pavement, foundation works etc. The required soil available for these purposes may not possess adequate strength for the above works. This will certainly affect the stability of the structure. The earth is consisted of various types of soils. Clay soil is one of the fine grained natural rock or soil material that consist one or more clay minerals with traces of organic matter and traces of metals. The clay soil is fine grained, slow to drain, quickly harden and difficult to use in unstable condition since it has fine particles. The different stabilizing materials are using including fly ash , lime, rice husk ash, quarry dust, granite powder etc. In this project jute Fibre and bamboo leaf ash will use to stabilise the soil. This experiment is conducted for fine grained soil in paddy field at valamboor roads in Chunkam-Pattikkad junction in Perinthalmanna Malappuram district, Where the soil has undergone differential settlement. This experimental study mainly focuses on the effect of jute and bamboo leaf ash in the soil. The jute Fibre is collected from local market in Calicut and has diameter of 0.2mm and cut in to 20mmlength for conducting the experiment, Which is generally available in the threaded form. Bamboo leaf ash is a waste material formed from the burning of bamboo leaves, which is collected from Vengoor near MEA engineering college. The fallen dry leaves were collected and spread on the ground and were manually burned in to ash. It is determined by different soil testing methods with the addition of various percentage of above materials that is 0.5%,1%,1.5%and 2%of the soil and the results is noted. This may help to improve the strength of soil by reducing environmental problems and contribute to the economy.

Keywords: Soil stabilisation.

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