



**International Conference on
Civil Engineering Trends and
Challenges for Sustainability
(CTCS 2019)**

(Under the Aegis of ICETE 2019 - A Multi Conference Platform)

May 23-24, 2019 | N.M.A.M.I.T., Nitte



Publishing Partners

 **NITTE** | **N.M.A.M. INSTITUTE OF TECHNOLOGY**
EDUCATION TRUST (An Autonomous Institution affiliated to VTU, Belagavi)
(ISO 9001:2015 Certified), Accredited with 'A' Grade by NAAC

About the Institute

Nitte Mahalinga Adyanthaya Memorial Institute of Technology (N.M.A.M.I.T.), Affiliated to VTU, Belagavi, is an Autonomous Institution offering UG, PG and Doctoral Programmes. The institute is a unit of Nitte Education Trust, Mangalore. The institute currently offers 7 - UG programmes, 11-M.Tech programmes in Engineering, MBA and MCA programmes. All UG Programmes are accredited by **National Board of Accreditation** (NBA), New Delhi and is a ISO 9001:2015 certified Institution. It has been recognized as a 'Lead Institution' under the World Bank Funded TEQIP programme (both Phase I & II) and also accredited with National Assessment and Accreditation Council (NAAC), New Delhi with 'A' Grade. The Institute is in the band width of 100-150 in National Institutional Ranking Framework (NIRF) ranking - 2018, Government of India.

About the Department

The Civil Engineering Department was started in 1987 with a UG Programme with an intake of 60. Annual Intake has been increased to 120 from the academic year 2012-13. M.Tech programme in Construction Technology was started in 2010 with an intake of 18 and M.Tech in Structural Engineering in the year 2017 with an intake of 24. The department is also recognized as a Research Centre under VTU, Belagavi offering M.Sc. (Engg.) and Ph.D. programmes. Presently 10 research scholars are pursuing their Ph.D. in the Department. In addition to this, the Department Students Association like OCEAN, IE(I), ISTE organizes seminars, workshops, educational tours, design competitions etc for civil engineering students. The department has taken up Karnataka State Council for Science & Technology (KSCST) and Nitte Deemed to be University funded research projects. The Department undertakes the consultancy and third party inspection from Government and private agencies. The department is recognized as ISRO-IIRS Outreach Center.

Civil Engineering Department is also working on development of Masonry Blocks and Paver Blocks using Industrial Waste Materials under Karnataka New Age Incubation Centre, N.M.A.M.I.T. funded by Dept. of IT, BT, S & T, Govt. of Karnataka. The department has been accredited by NBA for 3 years.

About the Conference

N.M.A.M. Institute of Technology is organizing International Conference on Emerging Trends in Engineering (ICETE 2019) on May 23 & 24, 2019, which is the 9th International Conference since 2011. For the year 2019, in order to focus on the specific issues associated with various Engineering disciplines, the idea of a Multi Conference Platform had been mooted.

INTERNATIONAL CONFERENCE ON EMERGING TRENDS IN ENGINEERING (ICETE 2019) - A MULTI CONFERENCE PLATFORM, will be a collection of several International Conferences with the themes specific to various engineering streams. Besides, there will be an opportunity for students and research scholars of various branches of Engineering & Technology, and industrial professionals to deliberate, present and discuss research papers.

Keynote Speaker

Dr. Mukesh Kashyap

Senior Lecturer (Construction Management)
School of Architecture Design and the Built Environment
Nottingham Trent University, Nottingham, Nottinghamshire, UK

Invited Speakers

Dr. G L Sivakumar Babu

Professor, Department of Civil Engineering,
Indian Institute of Science, Bengaluru.

Dr. Puttaraju

Principal,
SJB Institute of Technology, Bengaluru.

Er. Nagesh Puttaswamy

AGM, Regional Head Technical Services,
UltraTech Cement Ltd., Bengaluru.

Theme of the Conference

This year, CTCS 2019 is a part of the Multi Conference which will be a collection of several themes specific to different engineering streams organized under a single umbrella of ICETE 2019 - A Multi Conference Platform.

The theme of the conference is sustainable construction of Structures with new trends and challenges. The four main areas of paper submission are;

Construction and Structural Engineering

Risk Analysis, Safety and Security, Building Materials, Seismic Analysis of Structures, Concrete, Steel & Timber Structures, Composite Structures, Structural Health and Monitoring, Coastal Engineering, Masonry Structures, Offshore structures, Impact on climate change, Affordable Construction and Viability of Public-Private Partnership in Infrastructure Development.

Geotechnical Engineering & Transportation Engineering

Transportation system & Planning, Reinforced Earth Structures, Ground Improvement Techniques, Soil Dynamics, Stability of Earth Retaining Structures, Shallow & Deep Foundations, Rock Engineering & Tunneling, Analytical and Numerical modeling in Geomechanics, Analysis, Soil Conservation, Mitigation and Management of Geo hazards.

Environmental Engineering and Water Resource Engineering

Hydraulics and Water Resources Engineering, Waste Management, Reuse & Recycle technology, Heating, Ventilation and Air Conditioning, Water Conservation -Artificial recharge of ground water, Rain water Harvesting, Estimation of water resources, Interlinking of rivers and Interbasin water management.

Surveying and Geographical Information Systems

Applications of RS & GIS in Civil Engineering such as Satellite Image Analysis and Aerial photogrammetry, Infrastructure Management, Weather Monitoring and Effects of Climate Change.

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- Dr. Nitendar Palankar, Associate Professor, KLS GIT, Belagavi
- Dr. Sanjeev Sangami, Associate Professor, JCE, Belagavi

Important Dates

Submission of Full length manuscript	: 16 Mar 2019
Notification of acceptance	: 31 Mar 2019
Submission of Camera-ready manuscript	: 10 Apr 2019
Last date for registration	: 01 May 2019

Conference Location – Nitte

The Institute is located on the Padubidri-Karkala State Highway (SH01) which is 10 km away from Karkala, well connected with Mangalore (60 KM) and Udupi/Manipal (45 KM) through NH66 & NH169. The participants can alight at Mangalore or Udupi Railway Stations/Bus Terminals or Mangalore Airport to reach the Institute.



Message by Principal

I am very happy to note that the Department of Civil Engineering at NMAM Institute of Technology, Nitte is organizing an International Conference on “Civil Engineering Trends and Challenges for Sustainability (CTCS 2019)” under the broad umbrella of Multi Conference titled “International Conference on Emerging Trends in Engineering (ICETE2019)”. I am sure that the organizers of the Conference have tried their level best in making CTCS2019 a grand success.

Any Conference of this sort gives a platform for the researchers and faculty members to network with each other and exchange ideas. I understand that CTCS2019 has more than 110 papers accepted for oral presentation. These presented papers will once again be reviewed by the Guest Editors of the ICE and Springer journal of relevant theme and finally selected papers will appear in the said Journals. I wish all the paper presenters all the very best.

Wishing the Conference every success.

Prof. Niranjan N.Chiplunkar
Principal, NMAMIT-Nitte



Message from Vice Principal and Dean (Acad.)

NMAMIT started its first International Conference on Emerging Trends in Engineering (ICETE) from 2011 with an intention to provide platform for Post Graduation and Research Scholars of Engineering & Technology and Industry Professionals to deliberate, explore and contribute their research findings. Since eight years, this conference attracted many researchers with scholarly contributions.

Under this platform, I am very happy to know that Department of Civil Engineering, NMAMIT, Nitte is organizing International Conference on “Civil Engineering Trends and Challenges for Sustainability” (CTCS-2019) which is scheduled on 23rd & 24th May, 2019. The main theme of the conference is sustainable construction of Structures with new trends & challenges. There will be an opportunity for PG students and research scholars to deliberate, present and discuss various issues of Civil Engineering Construction. I came to know that department received a very good response from India & abroad and 120+ papers were selected for presentation after critical review. I am also happy to hear that during the Conference Eminent Key note speakers from reputed organizations & Industries as well as from foreign universities will share their experiences. I appreciate the effort taken by Program Coordinator Dr. Arun Kumar Bhat of CTCS-2019 and his team in making this Conference a truly International Conference with high quality standard technical papers.

In summary, the members of the program committee have put all efforts to make this conference, truly an International one with quality papers on board. I congratulate all members of program committee for their effort and hard work. I wish the program every success.

A handwritten signature in blue ink, appearing to be 'I. R. Mithanthaya', written over a horizontal line.

**Dr. I. R. Mithanthaya
Vice Principal & Dean (Academics)
N.M.A.M.I.T. Nitte**



NITTE
EDUCATION TRUST

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Vice Principal & Controller of Examinations

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Date: 21-5-2019

Message



I am pleased to know that the Department of Civil Engineering, N.M.A.M. Institute of Technology, Nitte is organizing a Two-Day International Conference on “**Civil Engineering Trends and Challenges for Sustainability (CTCS 2019)**” under the aegis of ICETE-2019: International Conference on Emerging Trends in Engineering on 23rd and 24th May, 2019.

I congratulate the organizers of CTCS-2019 for providing a platform to bring together researchers and practitioners from academia and industry to focus on recent systems and techniques in the broad field of Civil Engineering. I am sure the conference will be an incentive for the participants from various levels and will be useful and informative for all.

I convey my best wishes for the success of the conference.

Dr. Shrinivasa Rao B R



Message by Dean (R&D)

The ICETE conference series has changed its shape to become a multi conference with five conferences being run parallel.

CTCS 2019, the International conference of Civil Engineering department is planning to bring out the compendium of abstracts containing information about large number of papers received for presentation. It is a great effort on the part of conveners and I am appreciative of the fact.

It is worthwhile to note that with too much of specialization in every branch of engineering it is meaningless to have single conference catering to all. This ICETE 2019 multi-conference is the big step in the right direction; what with so many experts and speakers available at hand with participants and researchers.

I congratulate the editors and the editorial team for coming out with this compendium and wish conveners and office bearers of CTCS 2019 all the best.

Dr. Sudesh Bekal

Dean (R&D)/Convener ICETE 2019 Multi-Conference



Message from HOD

The department of civil engineering is organising International conference on Civil Engineering Trends and Challenges for sustainability (CTCS 2019) under the aegis of multi international conference ICETE-2019. This is the proud moment for the department to organise such a conference for the first time independently. I am happy to note that more than 120 papers are being presented in the conference and the selected papers will be published either in ICE or Springer nature. I congratulate Dr.Arun Kumar Bhat, the convener of CTCS 2019 and the entire team for their excellent work.

The department has a faculty strength of 32 with 7-professors,1-associate professor and 24-assitant professors. There are 10-Ph.D holders and 10 members are pursuing their Ph.D. The department has wide spectrum of specialisation covering almost all areas of specialisation.

I wish the conference every success.

Dr.Udayakumar G

Head of the Department and
Program Chair-CTCS 2019



Message from Convener of CTCS 2019

The department of civil engineering is organizing International Conference on Civil Engineering Trends and Challenges for sustainability (CTCS 2019) with a focus on the specific issues associated with various Civil Engineering streams. This is a multi-Conference under the aegis of ICETE. The CTCS will be an opportunity for students and research scholars of various streams of Civil Engineering and consulting professionals to deliberate, present and discuss research papers.

The theme of the conference is sustainable construction of Structures with new trends and challenges. The four main areas of paper submission are;

- Construction and Structural Engineering.
- Geotechnical Engineering & Transportation Engineering.
- Environmental Engineering and Water Resource Engineering.
- Surveying and Geographical Information Systems.

The Conference has received 151 papers from across the country of which 122 papers were selected for presentation. The reviewed, presented and selected papers will be published in either of the Proceedings of Institution of Civil Engineers (ICE) or Proceedings of CTCS in Springer Nature

Dr. Arun Kumar Bhat
Professor in Civil Engineering
Convener - CTCS 2019

About ICETE-2019

The 9th International Conference on Emerging Trends in Engineering (ICETE-2019 A multi conference platform) will be held on 23rd & 24th May 2019 at NMAM Institute of Technology, Nitte, Karnataka. The idea of multi conference platform has been mooted in order to focus on the specific issues associated with various Engineering fields.

NMAM Institute of Technology, Nitte has been organizing International Conference on Emerging Trends in Engineering (ICETE) annually since 2011. ICETE aimed to provide a proper platform for Research scholars, Post Graduate students of Engineering & Technology and Industry professionals to deliberate, explore and contribute their research findings and to discuss the latest developments in the field of Engineering & Technology. Invited technical talks by eminent personalities from IIT and Foreign Universities on current topics of relevance, in different streams of engineering were also organized to help the participants in up-gradation of their knowledge about the recent advances in Engineering & Technology.

This year, **ICETE-2019 - A Multi Conference Platform** will be held as a collection of several International Conferences with themes specific to different engineering streams organized under a single umbrella. Following is the list of various International Conferences under **ICETE-2019 - A Multi Conference Platform**.

About NMAMIT

NMAM Institute of Technology, Nitte, was established in 1986. The college is affiliated to the Visvesvaraya Technological University, Belagavi and is recognised by the All India Council for Technical Education, New Delhi. Institute is accredited by National Assessment & Accreditation Council [NAAC] **with 'A' grade with a CGPA of 3.11 out of 4 till 20th October 2022**. Seven UG Programs ie. BE (Civil), BE (E&E) , BE (BT) , BE (Mech), BE (CS) , BE (IS) and BE (EC) are accredited by NBA, New Delhi under Tier - I category till 30th June 2021. Institute is certified to the ISO 9001-2015 standards for quality education by NVT Quality Certifications (ANAB accredited). The institution has been granted Academic Autonomy under the Visvesvaraya Technological University from 2007-08. The annual intake of students is 1080 for UG and 518 for PG, with over 5000 students studying in the campus.

NMAM Institute of Technology, Nitte, offers Undergraduate programme in seven disciplines of Engineering viz: Civil Engineering, Electrical and Electronics Engineering, Electronics and Communication Engineering, Computer Science and Engineering, Information Science and Engineering and Bio-Technology. The specialization in Postgraduate (M.Tech.,) programme include Construction Technology, Structural Engineering, Machine Design, Energy System Engineering, Power Electronics, Digital Electronics and Communication, VLSI Design & Embedded Systems, Computer Science & Engineering, Computer Network Engineering, Software Engineering and Industrial Biotechnology. All the departments have been recognized as research centers for offering M.Sc. (Engg) & Ph.D programmes under VTU. The Institute also offers Postgraduation and Research programmes in Computer Applications and Business management along with Ph.D. programmes in Basic Science and Mathematics.

The Principal of NMMAIT, Prof. (Dr.) Niranjan N Chiplunkar, holds a doctorate in Computer Science & Engineering from the University of Mysuru and has over 30 years of teaching experience. He was bestowed with the “Excellent Achievement” award by the Centre for International Cooperation on Computerization (CICC), Govt. of Japan (2002) and Bharateeya Vidya Bhavan’s “Best Engineering College Principal” award by ISTE New Delhi (2014)

NMAMIT has established a Research and Innovation Centre (RIC) with 8,000 sq. ft. of laboratory space to promote research and innovation. It houses the research facilities like, Centre for Tool Based Micromachining Research, Centre for Condition Monitoring Research, Centre for Advanced Machining Research, Centre for Research on Vibration Isolation System, Centre for System Design, Fabrication and Testing, Centre for I.C Engine Research, Centre for High Performance Computing, Biofuel Information and Demonstration Centre, Centre for Innovation in Biofuel Production. A **New Start Up Eco Space** with 7000sq.ft area is coming up and will be ready by end of December 2018, which will have co-working space and all the infrastructural facilities that will allow young incubators to start their ventures. The mentorship and the help to get the financial support will be extended through this facility.

The Department of Science and Technology (DST), Govt. of India established the Entrepreneurship Development Cell (EDC) at NMAMIT in 2004 to conduct training programs to promote development of business ventures/small scale industries/micro enterprises and promote employment opportunities in the region as well as to create entrepreneurial culture in institutions and colleges in and around Nitte. Students are encouraged to start their own ventures and all necessary help and guidance is given. A Vocational Training Centre has been established at NMAMIT in association with the Directorate of Industries and Commerce, Bengaluru with the objective of enhancing the employability of uneducated youth by providing required training. Karnataka Biotechnology & Information Technology Services (KBITS), an autonomous organization established under the Department of Information Technology & Biotechnology, Govt. of Karnataka, has selected NMAMIT as one of the first Nine engineering colleges for 'Karnataka New Age Incubation Network'.

The college has a MoU with Penn State University, Harrisburg, USA and Ritsumeikan University, Japan for faculty and student exchange programs, with respect to research and projects. Department of Biotechnology has an understanding with National University of Singapore Professors for training their students in the advanced areas.

CONFERENCE ABSTRACTS

(CTCS-2019)

Estimation of burden rock movement with the energy distribution – case study

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Abstract—In an opencast mine, Blasting can be considered as the most important activity. Proper usage of explosive energy to displace burden can result in considerable savings to operations, which normally depend on mechanical means for material removal. Optimization of explosive energy in blast design is achieved with the effective utilization of explosive energy in a blasthole. The occurrence of a blast is so rapid that the naked eye cannot detect the process. A high-speed video camera can provide the progress of blast in millisecond time scale needed to analyze the happenings in the blast. The present paper aims to assess the performance of a blast with respect to the energy distributed around a blasthole and burden rock movement.

Keywords—*Blast performance; Energy distribution; Burden rock movement; High speed camera*

Coupled dynamic analysis of Spar-type floating wind turbine under different environmental conditions

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Abstract— The present study deals with the coupled hydrodynamic analysis of 5-MW offshore spar-type floating wind turbine under different environmental conditions using time domain aero-servo-hydro-elastic code along with the wave load response simulation. The Response Amplitude Operator (RAO) of the spar-type floating wind turbine in all 6-DoF are predicted, compared and analyzed for different conditions of wind speed and wave height. The responses are obtained from the FAST code and the studies are performed to understand the stability of the structure under the environmental forces. The platform forces and moments are also obtained and the transfer functions for these responses are evaluated using aero- servo-hydro-elastic simulation.

Keywords: Spar-type floating platform; FAST; Floating offshore wind turbine; Response Amplitude Operator (RAO); Environmental conditions.

Numerical Investigation of Spar-type Floating Wind Turbine Combined with Wave Energy Converter

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Abstract — The present study deals with the coupled dynamic analysis of 5MW offshore floating wind turbine supported by spar platform combined with heave-type large point absorber wave energy converter system to study the motion behaviour of combined concept under operational conditions using time domain aero-servo-hydro-elastic code along with the wave load response simulation. The responses in all 6-DoF are predicted, compared and analysed for different wind speed and wave height. The responses are obtained from the FAST and the studies are performed to understand the stability of the structure. The platform forces and moments are also obtained and the transfer functions for these responses are evaluated using aero-servo-hydro-elastic simulation.

Keywords— *Combined energy platform; FAST; Floating offshore wind*

Performance Evaluation of Electrocoagulation Technique for Dairy Wastewater Treatment Using Aluminium Electrodes in Monopolar connection

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Abstract— The dairy business is a standout amongst the most contaminating of industries, not just regarding volume of profluent generated, but likewise in terms of its qualities as well. Dairy effluents break down quickly and exhaust the broke down oxygen dimension of the getting bodies. Dairy effluents contain dissolvable organics. The motivation behind this examination was to explore the impact of parameters, for example, connected voltage, detention time on electrocoagulation process for dairy wastewater treatment utilizing aluminium electrodes. It is seen that the expulsion effectiveness of BOD, COD, TDS, Nitrates, phosphates and oil and oil expanded with increment in the connected voltage. The outcomes show that electro coagulation is proficient and watched evacuation efficiencies are 78.51%,81.08%,75%,93%,90.28% and 75% of BOD, COD, TDS, Nitrates, Phosphate and oil and oil individually for 75 minutes of treatment under a consistent voltage of 15V. The analyses exhibited the adequacy of electrocoagulation method for the treatment of journal wastewater.

Keywords— Dairy wastewater, Aluminium electrodes, Electro coagulation, DC power supply.

Mechanical properties of circular and square steel hollow pipes under tension

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Abstract— In most of the steel structures steel pipes are used for the construction. The steel pipes are used as per the different requirements for example as compression member and flexural member in small structures. After certain period steel pipes loses its strength due to many reasons like earthquake, rusting, shakes by machine etc. in that case structure required the repairing of the pipes. There is lot of research work going on the rehabilitation of old steel structures. For any type of research testing of the material of pipes is required. There is standard procedure to calculate the tensile test for the material of steel pipe. This paper explains the methodology of material testing of steel structures. Paper includes the preparation of the test pieces of circular and square both steel pipes used. For testing YST 240 and IS 360 steel pipes are used. In this test sample pieces from the pipes are cut. With the use of universal testing machine test pieces are tested under tensile loading. The results are compared to the standard values which are approximately same. The paper also includes the graphical representation and calculation related to tests.

Keywords— hollow steel pipes, tensile test, mechanical properties

ANALYSIS OF RCC STRUCTURES SUBJECTED TO SPATIAL BLAST LOADING

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Abstract—The principle of building design is to achieve the assigned objectives under the prescribed demand. Cases of large-scale damages to structures due to unpredictable, higher levels loading, arising out of environmental loading; blast loading is one of them. The purpose of this research is to calculate blast parameters by analytical approach and obtain the pressure variation on different faces of building using IS:4991-1968. Three explosion weights (100 kg , 500 kg & 1000 kg) are exploded in three different standoff distances (15m , 30m & 45m) & at 0m , 6m & 12m vertical in air. Blast parameters & pressure variation on different faces of building are calculated for different explosive weights & respective distances.

Keywords—Explosion, terrorist attack, blast parameter, spatial blast loading

Anaerobic co-digestion of herbicide 2,4-dichlorophenoxyacetic acid with starch and post treatment in aerobic reactor and identification of dominant bacteria

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Abstract—This study was conducted to investigate the new method comprising of sequential anaerobic followed by aerobic batch reactor treatment for 2,4-dichlorophenoxyacetic acid (2,4-D). The various parameters influencing on the anaerobic digestion like pH, temperature, oxidation reduction potential (ORP) have been monitored during the 60 days study period. pH range of 6.5 – 7.2, temperature greater than 31.4 oC and ORP values of between -250 to -300 have reported better reactor performance with high 2,4-D removal and biogas gas production. The complete biotransformation of 2,4-D in the anaerobic reactor indicated by disappearance of intensity peak in the high performance liquid chromatograph (HPLC) report, high biogas production of 12 – 18 % than control and COD removal efficiency of 99 %. Dominant bacterial community in the sludge was identified using SEM images. The results of this study indicate that anaerobic reactor and aerobic post treatment method can make the treatment highly efficient.

Keywords— 2,4-d; anaerobic co-digestion; aerobic mineralization; biotransformation

Performances of surface circular footings on unreinforced and reinforced flyash beds subjected to static loads

H. C. Muddaraju

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Abstract— A large number of reinforced soil structures have been constructed throughout the world. Compared with the traditional gravity soil structures, Geosynthetics reinforced soil structures have better engineering characteristics such as light deadweight, beautiful shape, construction convenience etc. Especially on soft grounds, the better performances would be obtained in virtue of their light deadweight. Characteristics of the filling materials and their interface friction properties with the geosynthetics directly influence the performances of the geosynthetics reinforced structures. A filling material of geosynthetics reinforced soil structures should have the engineering properties such as, good mechanical properties which include the strength and rigidity, better interface friction property with the geosynthetics and should better be lightweight. The use of waste materials as fill for reinforced soil structures is desirable from an environmental as well as economic point of view. Coal based thermal power stations produce massive quantities of coal ash. There are mainly two types of ashes which are produced by burning the coal. The lighter one that goes up the chimney and collected either by mechanical or by electrostatic precipitator, is known as Flyash. The other fraction which contains coarser materials and is collected at the bottom of the furnace, is known as bottom ash. Flyash forms almost 90 % of total coal ash and poses serious environmental problems. The use of stabilized flyash as a light weight fill in construction is common. The material can also be used in reinforced soil structures. Flyash is produced in millions of tons and the environmentally acceptable disposal of this material has become an increasing concern. Keeping this point in view the researchers started making use of flyash in construction works. Quality construction materials are not readily available in many locations and prove costly to transport over long distances. Hence, over the last few years, environmental and economic issues have stimulated interest in development of alternative materials that can fulfil design specifications. The use of flyash as backfill material fulfils the requirements and efficient draining. When flyash is provided with reinforcement it solves two problems. i.e., elimination of solid waste problem on one hand and provision of a needed construction material on other. The laboratory experimental results reported by various researchers and the field reports where flyash is being used as a backfill has proved beyond doubt that fly ash is an effective alternate for the backfill. Guided by this in the present investigation it is aimed to study the effectiveness of reinforced flyash beds under monotonic loads. Laboratory monotonic load experiments are conducted on reinforced flyash beds by varying the reinforcement parameters and the loading pattern.

Keywords— Reinforced fly ash bed, Static loads, Bearing capacity ratio, settlement ratio, geogrid, circular footing,

Effectiveness of Base Isolation using Single Friction Pendulum in Plan Irregular Structures

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Abstract— Base isolation is found to be a very efficient earthquake resistant construction method. When base isolation is introduced, the transfer of large amount of inertia forces are prevented by the moving action of an isolator during an earthquake. The application of base isolator in regular buildings is done from long before, but the usage and effectiveness of base isolation in irregular buildings is a topic which needs more research. In this study, Single Friction Pendulum isolator is used to isolate the buildings and the effectiveness of isolators is discussed in regular as well as plan irregular buildings. Modal analysis and Time History analysis using Chi-Chi earthquake accelerogram data is done. Time period obtained from modal analysis and the results of time history analysis such as, base shear, storey acceleration and storey drift of regular as well as plan irregular buildings are compared. The time period is found to increase significantly and base shear, acceleration and storey drift are decreased significantly with the application of single friction pendulum isolator. Also the effectiveness of isolator got reduced with the introduction of irregularity in the structure.

Keywords—base isolation, single friction pendulum isolator, modal analysis, time history analysis, accelerogram.

Removal of Heavy Metals from Synthetic Mine Drainage in Lab-Scale Constructed Wetlands

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Abstract—The most toxic pollutants in mine drainage are heavy metals. The JOGMEC Company are using a waste water treatment plant which is highly expensive to maintain. As for that reason they have thought of using Constructed wetland method for the removal of heavy metals form mine drainage. For this project, they have asked KANSO CO. LTD. along with Dr. Satoshi Soda and his team to conduct initial survey, which includes lab-scale analysis for removal of heavy metals. Synthetic mine drainage in lab-scale is to be treated using constructed wetland in a sequence batch to assess heavy metal removal efficiencies. This projects main intention is to reduce the cost for the maintenance of the treatment plant and to obtain the higher efficiency for removal of heavy metals.

Keywords—*Constructed wetlands (CWs), synthetic mine drainage, heavy metals.*

Removal of Toxic Metals from Synthetic Water Using Arecanut Peel as an Adsorbent

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ABSTRACT-Environmental issues have become serious social concerns of a global scale. Among these issues, the impact of water pollution is getting more serious because it is closely related to the health and lives of human beings. The removal or breakdown of toxic metals from wastewater is an important and integral part of any industrial chemical process.

Much attention has been made towards adsorbent materials to be used in heavy metal removal from polluted water and various techniques are applied such as chemical, physical and biological techniques. This study was designed for using less expensive and much frequently available materials (mango peels, Neem leaves & coconut husk) to remove iron, Lead, copper and cadmium from water. Current data show that all adsorbents used are capable of removing Lead acetate and Cadmium sulphate at significant capacity by using Arecanut peel as an adsorbant. Experiments were carried out by varying the parameters like initial metal concentration, contact time, pH, adsorbent dosage and grades of adsorbents.

Keywords: Heavy metals, Adsorption, Removal Efficiency, Contact time, pH, adsorbent dosage.

Investigation of Swelling behaviour on expansive soil using Limestone calcined clay cement

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Abstract—In this paper an investigation is carried out to study the effect of a new ternary binder limestone calcined clay cement (LC3) in reducing the swelling characteristics of expansive soil as an alternative to cement stabilization. One-dimensional oedometer and modified free swell index (MFSI) tests were performed to examine the changes in the swelling behavior of soil mixed with different percentages binder LC3 (i.e. 4%, 6% and 8%). It was found that addition of 8% binder reduced swelling potential up to 90%. Besides, swelling pressure of the expansive soil reduced up to 66%. Empirical relations were developed to predict the swelling characteristics with the increase in binder content using exponential decay model with $R^2 = 0.99$. Moreover, the time swell behavior of treated and untreated soils was observed to be hyperbolic curves which were used to predict the maximum swelling potential. The observations show that inclusion of binder at 8% replacement has a significant influence on swelling and cementation structure of (LC3) stabilized soil. The binder used in this study (LC3) has been found to be effective and economic in stabilization of expansive soils with lesser CO₂ emissions during its manufacturing process.

Keywords—Supplementary cementitious materials, black cotton soil, swelling, limestone calcined clay cement.

Temporal Crop Monitoring with Sentinel-1 SAR Data

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Abstract—Spatial and temporal analysis of crops and other land surface features is the major application of present spaceborne sensors. Among most of the spaceborne sensors, Synthetic Aperture Radar (SAR) is having the advantage of all-weather capability with low frequency bands. SAR data is useful for decompositions, crop classifications etc. In this study, paddy fields are classified using Sentinel-1 ground range detection Synthetic Aperture Radar data with the combination of vertical polarization with the horizontal receiver (VV and VH) is selected for the temporal variation analysis and classification analysis of paddy fields along with the plantations. Multi-temporal classification analysis is done using random forest classifier, and correlation obtained is 0.78 and 0.45 in VH and VV polarization respectively, and the error rate shows significant variation in both the polarizations i.e., 0.05 and 0.25 (in VH and VV polarizations respectively), which indicates more error rate in VV polarization band. In this study area, VH polarization shows better classification and correlation compared to VV polarization due to double bounce effect of urban features, paddy and plantation at the stem elongation and booting stage in VV polarization.

Keywords—Synthetic Aperture Radar (SAR) data, multi-temporal analysis, crop classification

Trend Analysis of Monthly, Seasonal and Annual Rainfall in Kundapur and Vittal Regions in the State of Karnataka

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Abstract—Global warming can be attributed to the increasing variability of climatic conditions such as rainfall, temperature, evaporation and other parameters in recent years. Trend analysis of these parameters helps reduce the uncertainty of the parameters and facilitates prediction with a certain amount of assurance. The study performs trend analysis of 57 years (1960-2016) of rainfall data of Kundapur region and 40 years (1971-2011) of rainfall data of Vittal region in the state of Karnataka using Mann- Kendall’s method and Sen Slope Estimator at 5% significant level. The analysis was conducted on an annual, seasonal and monthly basis. The results revealed a downward significant trend in the rainfall in the monsoon season in Vittal and no significant trends in rainfall were observed on an annual basis in both Kundapur and Vittal.

Keywords— Trend, Precipitation, Rainfall, non-parametric test, Mann-Kendall, Sen’s Slope, climate change, Karnataka

Minor Losses Due to Pipe Fittings

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Abstract— In this paper “Minor losses due to various pipe fittings” a detailed study is made on head loss of two different pipe materials with various fittings such as elbow, sudden enlargement, and sudden contraction. Loses are caused due to various fittings and they can be determined by experimental set up and further solved with the help of Bernoulli’s equation. We have determined the loss coefficient K due to different fittings and different pipe material. The loss of co efficient is determined from the experimental setup as it allows easy integration of minor loses into the Darcy Weisbach equation.

Keywords— Pipe flow, Pipe material, various fitting and Loss co- efficient

DEFLUORIDATION OF GROUNDWATER USING ELECTRO- COAGULATION FOLLOWED BY ADSORPTION

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Abstract: The present investigation aims at removing excess fluoride from spiked ground water to the BIS prescribed drinking water standards of 1.0 to 1.5 mgL⁻¹ using Electrochemical Coagulation (EC) followed by adsorption. A set of batch EC experiments were conducted for varied initial F concentration, varied cell voltage by keeping a constant ET of 60 min. The optimum operating conditions were determined by running a series of batch experiments employing 6 number of electrodes at F₀ = 5, 10, 15, 20 and 25 mgL⁻¹. The varying cell voltage of 8, 12, 18, and 24V were used. Batch EC studies revealed that, the highest treatment efficiency was obtained for the largest current input i.e. 24V. Fluoride concentration of 15 mgL⁻¹ was found to be the optimum initial concentration with respect to maximum fluoride and solids removal. These optimum operating conditions were incorporated in the continuous treatment processes carried out at different flow rates and different depths of sand. It was observed from the continuous studies that with the increase in flow rate and there was decrease in the fluoride removal efficiency. Increase in the depth of sand increases fluoride removal rate as the surface area available for adsorption will be more. Flow Rate of 4lph and Depth of Sand as 45 cm showed maximum fluoride removal efficiency of 94.6%.

Keywords: Electrocoagulation(EC), Electrocoagulation time (ET), Cell voltage (V), Fluoride(F), Adsorption

Simulation & Control of a Biological Wastewater Treatment Process

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Abstract— Wastewater is that water which has picked up various contaminants during its utilization in domestic, commercial or industrial applications. Since these days water source is undergoing deficit and to save the environment ecosystem the treatment of the used water (wastewater) is very crucial. Any wastewater treatment plant that treats wastewater from both municipality and industries having soluble organic impurities, have Physical, chemical and biological zone or stages of treatment except in few objective specific plants. Among these three stages, biological treatment conquers an integral and important part of any treatment plant. The main reason for this would be due to economic advantages, interms of operating cost as well as capital cost, when biological treatment is compared with other stages. A single stage biological wastewater treatment layout with dynamic control model is examined in this study. Manipulation of two sensitive variables that are substrate feed concentration and influent flow rate were performed according to deviation in the exit substrate concentration. Mathematical models for Biomass, Substrate and Oxygen concentration of aeration tank, and three levels of Biomass concentration model for settling tank were formulated and investigated for their impact on process control with a time delay function. To overcome the disturbance for implementing the feedback control system, the resulting model constitutes a simple input-output structure. Extensive simulation results reveal the high predictive quality of the linearized mathematical model. The study on two formulated unstable transfer function revealed the benefits of having a PID controller. This paper serves as a reference for future improvements in developing new advanced control techniques for wastewater treatment field that aims in abiding the stringent effluent quality standards.

Keywords—Wastewater Treatment, Activated Sludge Process, Control Engineering.

Comparative study on OPC and PPC composites with foundry sand as partial replacement for fine aggregate- An experimental approach

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Abstract— For the last few decades, there is an enormous increase in the construction activities. In respect of these, there are many factors which have to be considered in order to make the construction project an ideal one. At present, due to simultaneous awareness increase on environment, energy and natural resources, increasing attention should be paid to the utilization of industrial by products in construction industry. Scarcity of natural resources, low bearing capacity of soils, economic design of structural elements, necessity of high raised buildings, disposal problems etc. are the main crunches which the construction industry is encountering at present. The paper focuses on the performance of concrete, where the fine aggregate is partially replaced with foundry sand. The experimental work has been carried out in different stages. M25 grade of concrete mix is chosen for the present study.

On fresh concrete workability tests such as slump, compaction factor and V-B tests were conducted and on hardened concrete compression test is conducted in accordance with BIS specifications. An attempt has been made to compare the results with that of the conventional concrete and also between concrete made with 43 Grade Ordinary Portland Cement Concrete and Portland Pozzolanic Cement Concrete. From the result of the present investigation it is evident that the performance of concrete with 20% partial replacement of fine aggregate with foundry sand is better than that observed for conventional concrete. Further it is observed that PPC concrete is performing better than OPC concrete at all levels of replacement.

Keywords— *construction, energy, compaction, Pozzolanic, foundry Sand .*

Experimental study on Partial replacement of cement and sand in concrete by ETP sludge

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Abstract—A speedy growth of urbanization and industrialization causes various environmental problems due to improper management of waste materials. The waste produced by textile industry is known as Sludge from Effluent Treatment Plant (ETP). In this project the ETP sludge is used as partial replacement for cement & fine aggregate in concrete. This experimental investigation is carried out to evaluate the compressive strength of concrete. The textile mill sludge is partially replaced for Cement & fine aggregate in M20 grade of concrete. The concrete cubes of size 150X150X150 mm were casted with ETP sludge and compressive strength values of the cube is determined for 7 days and 28 days for different percentage of sludge in concrete. The concrete cylinders are casted and the split tension values are also determined.

Keywords: ETP Sludge, Compressive Strength, Compressive Strength, Split Tensile Strength

DEVELOPMENT OF SELF COMPACTING CONCRETE USING FLY ASH

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Abstract— This paper presents the utilisation of flyash in developing self-compacting concrete mixes (SCC). Since SCC mixes requires very high powder content, flyash is used as a filler material and high range of superplasticizer Glenium B233 is used to improve the workability and Glenium Stream-2 VMA is used to enhance the cohesiveness of the SCC mix. In this study the mechanical properties of M30 grade self-compacting concrete containing both GGBS and foundry sand as partial replacements for cement and M-sand respectively are studied. The mix proportion for M25 SCC mix containing Cement, Natural river sand, Coarse aggregates Fly ash as a filler material, Super-plasticizer and VMA is obtained by Nan Su method. In the design mix flyash is replaced for cement upto 30%. The workability in terms of slump flow and V-funnel tests are carried out on all SCC mixes. Further, the mechanical properties of all SCC mixes in terms of Compressive, Split-tensile and Flexural strengths are determined at 7 and 28 days. The results indicate that SCC mix with 25% replacement of cement with flyash shows better results.

Keywords— Self compacting concrete, Modified Nan Su method, VMA, V-Funnel.

Impacts of dams on sediment yield and coastal processes using SWAT and DSAS tools

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Abstract— Soil erosion is considered as one of the major causes of land degradation and reservoir sedimentation. Therefore, modelling of runoff and sediment yield at the catchment level is necessary. In this study, an attempt was made to simulate runoff and sediment yield of hydrologically similar basins of Kali River and Aghanashini river which joins west coast of India. A conceptual, continuous time and semi-distributed, SWAT2012 (Soil and water assessment tool) model was selected for the modelling purpose. For the last two decades, Kali river basin experienced a very high rate of soil erosion due to various developmental activities in the basin. Therefore, it is essential to identify the soil loss within the basin. There are five dams constructed across the Kali river basin for various purposes. Presence of these reservoirs regulates stream flow and thus sediment load in the basin. However, the free movement of water across the Aghanashini river catchment leads to the unobstructed passage of sediments to the river mouth, as the catchment is not disturbed by the reservoir. This study deals with the impacts of the dams on streamflow, sediment load and the response of shoreline. DSAS (Digital shoreline analysis system) tool was used to analyze the shoreline changes. Simulated and observed values of runoff are compared, and calibration and validation were done for the basins using SWAT CUP. Analysis of calibration and validation results shows that the model has a good performance. Therefore, the SWAT model can be used to conduct further studies in these study areas. Sediment yield obtained at the catchment outlet was 1.07t/ha/year and 4.58t/ha/year for Kali and Aghanasini basins respectively. Less amount of sediment load in the Kali basin indicate the influence of reservoir operation on

streamflow and sediment yield. The shoreline analysis of both the basins concluded that Devbagh beach connecting with Kali river estuary is under erosion and Aghanashini beach is under naturally nourished condition.

Keywords— SWAT model, Streamflow, Sediment yield, Reservoir operation

Generation of Intensity Duration Frequency curve using daily rainfall data for Aghnashini river watershed, Uttara Kannada

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Abstract— Analysis of quantity of rainfall is needed for planning process and design process of various water resource projects. Intensity-duration-frequency (IDF) curves are used to analyze quantity of rainfall of different duration (t) and return periods (T). The study is carried out in Aghnashini river watershed which is located at 74°18'15.95"-74°55'22.84" E longitude and 14°15'26.21"-14°37'17.65" N latitude covering an area of 1400.47 sq.km and elevation ranges from zero meters to 784 meters above MSL. The river originates in Sirsi and flow towards West and reaches Arabian sea at Kumta of Uttara Kannada, Karnataka state. The daily rainfall data of nine stations collected from Directorate of Economics & Statistics Bengaluru for years 1998 to 2016 was gone through and 24-hour maximum annual rainfall data was extracted. Indian Meteorological Department (IMD) proposed formula is used to estimate rainfall values for various shorter duration such as 0.083, 0.167, 0.25, 0.5, 1, 2, 12, 24- hours. Probability distribution is used to estimate maximum annual rainfall values for various duration (t) and return periods (T) and Chi-Square test is carried out to check best probability distribution. Chi-Square test shows that Normal distribution is best fit to calculate rainfall intensity (mm/hr) for six stations (Balale, Nilkundi, Sirsi, Hittalahally, Tyagali, Katagal), Log-Pearson type III probability distribution is best fit for two stations (Bandal, Siddapur) and Log-Normal distribution for one station i.e., Kumta in Uttara Kannada.

Keywords— IDF curves, Aghnashini River, IMD, Chi-Square test, Normal distribution, Log-Pearson type III, Log-Normal

Review Paper on Behaviour of Cold-formed Steel sections under Axial Compression

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Abstract— Steel is used in construction industry due to its hardness and tensile strength. Cold-formed steel is type of steel which is manufactured at lower temperature. Cold form steel become more popular in twentieth century in civil engineering field as it possesses high strength to weight ratio and post-buckling strength. Research in Cold-formed steel have increased considerably in past few years. Researchers have been working to develop Direct Strength Method to replace Conventional Effective Width Method which is more tedious and less accurate. In This paper we have studied various methods adopted for estimation axial load carrying capacity of cold-formed steel channel, angle and Z sections by various researchers.

Keywords— Cold-formed steel, Channel Section, Angle Section, Z section, Effective Width Method, Direct Strength Method.

ANALYSIS OF ANCHORAGE ZONE STRESSES IN POST-TENSIONED CONCRETE GIRDERS

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Abstract— Application of pre-stressed concrete for the construction of civil engineering structures especially bridges has increased tremendously. In the pre-stressed post-tensioned concrete structures, anchorage zone is the critical area of concrete ahead of the anchorage device. During application and diffusion of the pre-stressing force in a post-tensioned girder tensile bursting stresses are developed at some distance ahead of the anchorage device in a region known as the general zone. This stresses often leads to serviceability problems and congestion of reinforcement at the anchorage zone. In this paper, a rectangular end block of 600 x 600 mm, with a bearing plate size of 214 x 214 mm, subjected to a concrete pre-stressing force of 2204 kN was analyzed using the methods like elastic method, deep beam analogy, Strut and Tie model approach, finite element analysis and also using the codal provisions specified in IRC: 18 and British code BS: 8110. From the analysis of 2-D finite analysis, it was observed that the variation of bursting stress in the end block is parabolic in nature. It was observed that with increase in eccentricity of bearing plate, there was a decrease in bursting tensile stress, whereas the value of spalling tensile stresses increases drastically. However, with increase in the size of the bearing plate, both the spalling and bursting stresses decrease considerably. It was also found that the grade of concrete has negligible effect on the distribution of bursting tensile stress. The finite element analysis of anchorage zone with multiple anchors indicates that spalling stresses are more critical than the bursting stresses for the design of anchorage zone.

Keywords—pre-stressed concrete, anchorage zone, bursting tensile stress, spalling tensile stress

Assessing the Impact of Sea Level Rise on Dakshina Kannada Coast using RS and GIS

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Abstract— The rising sea levels increases the risk of flooding and causes considerable damage to coastal cities. The potentially inundated areas are analysed along Dakshinakannada coast in Karantaka. SRTM DEM is used for elevation and sentinel-2 data for preparing LU/LC map of seven classes. The flooded maps are produced for each of 1-5m sea level rise and also for 10m SLR. The drowned areas for 5m and 10m rise of water are 7.9 km² and 20.6 km². The degree of inundation of each LU/LC class is computed for 10m SLR scenario. Forests is the most effected class of land cover. Moreover, the most affected regions are beaches, estuaries, coastal plains and flood plains. The results obtained can be considered as primary reference by the local government for planning any further developmental activities along the coast.

Keywords—Sea level rise, Coastal flooding, Inundation, Land use/Land cover.

Strength Characteristics of Fly Ash Stabilized Silty Sand for Subgrade Application

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Abstract—Subgrade is an important component in the pavement structure. Ultimately, the stress due to self-weight of the pavement structure and traffic is transferred to the soil subgrade below. The performance and durability of pavement depends on the type of subgrade soil and its engineering properties. On site, while during construction the engineer is exposed to different types of soils and among them, some soils are considered problematic owing to their engineering properties and behavior under adverse conditions. Whenever, the problematic soils are encountered and it is unavoidable, it is essential to improve the mechanical properties of the soil. Stabilization is one of the methods of ground improvement techniques. In this present study, stabilization of one such problematic silty soil is carried out using class-C fly ash. A series of compaction, UCS and CBR tests were carried out. The fly ash dosage was varied from 0% to 25% with an increment of 5% and curing period of 3, 7, 14 and 28 days were considered. It is observed that the addition of fly ash resulted in increased UCS with an increase in fly ash content and curing period irrespective of the test condition. CBR of the fly ash stabilized soil increased from less than 2% to 11% over varying fly ash dosage. Overall, fly ash stabilization makes it possible to use unsuitable soil for subgrade application with modification and also, this technique addresses the issue of fly ash disposal providing eco-friendly environment.

Keywords—Silty soil, Class - C fly ash, UCS, CBR, Flexible pavement

Natural fibre reinforced soil block as a sustainable building material

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Abstract— Earth has been used in the construction of ancient houses for thousand years together with other natural materials such as wood and stone. The present study is conducted to determine the effectiveness of using different natural fibers that are abundantly available and cost effective along with a stabilising agent for improving the strength of earth block and also to find a proportion that gives maximum improvement in strength of the block by comparing them with unreinforced earth blocks which can give an economical and sustainable alternative building material. The natural fibres that are used in this study are straw and pandan leaves. Compressive strength and water absorption of fiber reinforced earth blocks by varying the percentages of fibers along with 8% cement was obtained. Laboratory results obtained positively suggest that inclusion of these natural fibre in earth block yielded a satisfying result.

Keywords - natural fiber, earth block, straw, pandan leaves, cement, water absorption and compressive strength.

TERRAZYME - A BIOENZYME SOIL STABILIZER SOLUTION FOR OPTIMUM PAVEMENT DESIGN

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Abstract— The Pavement is a structure, which is laid to support the wheel load and to spread the load stress to a wider area on the top of soil subgrade. The process of changing the physical, chemical, and biological property of a natural soil, in order to improve their tensile strength, bearing capacity and overall performance, by using controlled compaction, proportioning, in addition of suitable stabilizer and admixture is known as stabilization of soil. The major application of soil stabilization is in the field of pavement set up over a weak subgrade soil. It is very much essential to improve its strength, bearing capacity and performance to a level higher than the existing condition. By modifying the subgrade soil properties, the economy can be achieved in pavement construction by having reduced upper crust thickness. The main objective of this work is to have an economical pavement design. In this study the type of soil used is silty sand (SM), and for stabilization of soil TerraZyme was used. After stabilizing the soil by using TerraZyme there was a marked improvement in compaction property, California Bearing Ratio (CBR) value, Unconfined Compressive Strength (UCS) value, Cohesion value and angle of intersection. The pavement thickness was designed by using IRC:37-2018, after stabilization of soil the thickness of pavement was reduced.

Keywords— Subgrade, Stabilization, TerraZyme, California Bearing Ratio, Unconfined compressive strength.

Flow duration curve modeling for sub-catchments of upper Cauvery basin

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Abstract — Planning, design and control of water resource systems desires reliable and longer duration runoff series. Establishing rainfall-runoff relationship is very significant in hydrological modeling, varying from its simple form (unit hydrograph) to complex models (dynamic flow equations). Models are generally used as utility in various areas of water resource development, assessing the available resources and determining the impact of external interference (such as land-use change or construction of hydraulic structures). In the present study the modeling of flow duration curve has been carried; probability of exceedance and percentage of reliable flow for the catchments were calculated. Stream flows from Kudige, K. M. Vadi, Akkihebbal catchments of Upper Cauvery basin, Karnataka, India was considered. The statistical tests were conducted to determine the performances. The result shows that the modeled flows were almost equal to the observed flow for Kudige and Akkihebbal sub-catchments; minimum difference was observed for K. M Vadi sub-catchment (between 10% to 90 % exceedance probabilities).

Keywords—*Flow Duration Curve, Exceedance of Probability, Streamflow modeling, Reliable flow, Modeling.*

Seismic Analysis of braced And Unbraced Steel Frame Structure Using Shake Table

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Abstract— This paper explores Effects of dynamic analysis on the prototype bracing and without bracing steel structure. The modern growing world trend inclination towards earthquake resistant structures. The braced frame can resist large amount of lateral force and have reduce lateral deflection. The (G+4) storied prototype with and without Bracing Steel Structure was modelled and tested with help of shake Table. To study experimental analysis and to study the parametric change due to bracing and without bracing steel structure. In experimental analysis various seismic properties as like, Acceleration Velocity, Displacement, Drift, Drift ratio, and other seismic properties.

Keywords— Dynamic analysis, Shake table, bracing and without bracing steel structure model.

Identification of potential sources affecting fine particulate matter concentration in Delhi, India

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Abstract— The seasonal air transport pathways and the potential sources contributing to air pollution in Delhi for the period March 2015 to February 2016 have been identified with the help of PM_{2.5} data (particulate matter with diameter less than 2.5 micrometers), Potential source contribution function (PSCF), cluster analysis and concentration weighted trajectory (CWT) method. The local sources are identified with the help of conditional probability function (CPF). The presence of re-circulating air masses has shown that the major contributors to air pollution in winter seasons are the local sources and the neighboring states of Haryana and Punjab. North westerly flows can be observed throughout the year and are highest in the winter season and comparatively lower in the monsoon season. PSCF values greater than 0.7 and CWT values greater than 110 $\mu\text{g m}^{-3}$ are observed within the state in the winter season. Haryana and some parts of Uttar Pradesh also have higher PSCF values. The frequency of occurrence of long distance pathways are less in all the seasons in Delhi. The influence of the dust pathways from the Thar desert areas can be seen in the monsoon season. Slower moving north westerly and south westerly flows are associated with high concentration values and indicate high pollution along the pathways. Higher CPF values occur in the north eastern direction. Therefore the industrial sites, traffic congestion and emission from vehicles in the roads connecting Delhi and Uttar Pradesh has high influence in the rise in pollution levels.

Keywords—transport pathways, potential sources, PSCF, CWT, CPF, PM_{2.5}

Evaluation of CHIRPS satellite rainfall data-sets over Kerala, India

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Abstract— Climate Hazard Group Infrared Precipitation with station data (CHIRPS) is one of the latest high-resolution quasi-global satellite-based rainfall datasets. It is available in daily, pentadal and monthly time scale from the year 1981 to present. In the present study performance of the CHIRPS product is evaluated over the Kerala state on a monthly time scale. For the evaluation of this Climate Hazard group product rain gauge data from sixty-seven-gauge stations which are distributed all over Kerala was used. Validation statistics such as mean absolute error (MAE), multiplicative bias (Mbias), Nash Sutcliffe efficiency (NSE) and coefficient of determination (R²) were used for the evaluation. The results show that the efficiency of this satellite rainfall estimate is very high with an overall NSE value of 0.72. the accuracy of CHIRPS data was very high mainly in the low-lying areas of Kerala i.e. at the coastal areas and it was found to be decreasing when in approaches towards the Western Ghats. Overall CHIRPS product is good enough for use in water resource applications in Kerala.

Keywords—precipitation, satellite-based rainfall data, CHIRPS, evaluation

FLOOD INUNDATION MAPPING AND FLOOD HAZARD MAPPING USING GIS TECHNIQUES AND HEC-RAS MODE

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Abstract— Flood is the most common hydrologic event frequently experienced in India. The states of Kerala, UP, West Bengal, Karnataka and Assam were the mainly affected by flood in 2018. In Kodagu, the southern district of Karnataka, many people have been affected by heavy rains. Landslides in hilly terrain and flooding has worsened the lives of people and led to the destruction of 800 homes, 240 bridges collapsed, road networks of 2225 km damaged and 65 government buildings affected. The cost of rebuilding road infrastructure and buildings is approximately Rs.3000 crores. While developing flood mitigation measures, flood inundation maps are an essential component, which will be useful for the planning stage. The mapping is expected to estimate the prone flood zone based on river flood pulse stage without performing additional simulations, and quantification of the flood risk with respect to different vulnerability parameters giving a clear picture of the planning stage. These are going to be achieved by both 1D hydrodynamic models and GIS environment. This study gives an insight about how unscientific development activities may increase the negative impacts of natural disasters. It can support the planners to correctly identify the non-vulnerable places while rebuilding the damaged infrastructure. This can help people to resettle permanently in a safer place, so that they will not be affected in the case of future disasters. Depending on the severity of the water levels, we can identify the area for construction of prospective hydraulic structures for flood protection.

Keywords— *hydrodynamic, flood risk, flood inundation.*

Performance evaluation of Stone Mastic Asphalt incorporating Sugarcane Bagasse Ash

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Abstract— Stone Mastic Asphalt (SMA) is a gap graded asphalt mix consisting of high coarse aggregate content and rich mastic (asphalt and filler) content. The stone to stone contact between coarse aggregates results in higher rut resistance compared to other asphalt concrete mixtures. The rich mastic in the SMA Mix leads to increased durability and higher resistance to moisture damage. Due to higher asphalt content and stabilizing additive used in the production of SMA Mix leads to increase in production cost which is one of the major disadvantage. This research evaluated the performance characteristics of SMA incorporating Sugarcane bagasse ash (SBA) as a filler material and to study the cost effectiveness. Four mixtures with different proportions of SBA used to assess the performance of the SMA. Mix 1 consisted of 2.5% SBA, Mix 2 consisted of 5% SBA, Mix 3 comprised of 7.5% SBA and Mix 4 consisted of 10% SBA by total weight of the mix. The resistance to moisture damage of Mix 1 and Mix 2 were within the allowable limit and indirect tensile strength of Mix 1 and Mix 2 were higher compared to conventional mixes. Decreased drainage of bitumen for SMA mixtures without fibres containing SBA were observed. The results obtained show that the mix containing up to 5% SBA exhibited superior performance when compared to conventional mixes.

Keywords— *Stone Mastic Asphalt, Sugarcane Bagasse Ash, Indirect Tensile Strength, Draindown.*

A case study on implementation of Lean in Precast construction

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Abstract--The implementation of lean construction principles in precast casting is achievable when applied in a strategic way. Lean construction focuses on improving productivity and providing value to the customer. This paper aims to know the factors which influences the schedule of the precast project. It aims to suggest a change in process in the casting yard, by instigating “Lean tools & principles” to improve daily productivity in precast casting yard. A lean tool by name “Value Stream Mapping” is put forward to consider, to bring changes in the casting yard, mainly for casting box girders. Value Stream Mapping is a diagrammatic tool, which results in creating Current State Map of the casting yard showing each process, which lags the work to attain daily target. It identifies Value added and Nonvalue added activities, which causes delay in the work is identified. Lean tools are proposed, in order to reduce non-Value added activities, this change in the process and result obtained is seen by observing TAKT time, lead time. A Future State Map is drawn from the changes put forward in the Current State Map. From Value Stream Mapping(VSM), lead time was reduced from 11 days to 9 days, Non-Value added activity time from 7 hours to 1 hour 15 Minutes.

A Monte Carlo Simulation model is generated to get the probability of certainty of results in field.

VSM in improving the process from beginning to end by bringing down percentage of non-Value added activities which is resulting in delay in the work. This assists in attaining daily target in casting yard & improves daily productivity.

Key words: Lean construction, Precast technology, Value Stream Mapping.

THE IMPACT OF BUILDABILITY FACTORS ON FORMWORK IN RESIDENTIAL BUILDING CONSTRUCTION

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ABSTRACT-Improving productivity, increasing output for the same inputs, has been a longstanding concern of the Construction Industry. The different approaches to improving labour productivity in formwork will be briefly explained. The influence of the buildability elements on formwork labour out of key in situ reinforced concrete factors such as foundations, walls, columns, beams and slabs are yet to be gritty and quantified. The key results of several questionnaire surveys will be presented and the major deterrent to improve buildability and by which buildability problems are being overcome are identified.

Key words: formwork, labour productivity, buildability factors, construction industry, concrete elements

Influence of STP treated and reed bed treated domestic wastewater on properties of mortar and concrete mixes

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Abstract—Polishing pond with gravel bed was constructed and planted with *Canna generalis* plants for treating the effluent from conventional domestic wastewater treatment plant. Raw sewage, treated effluent from S T P (Sewage Treatment Plant) and effluent from polishing pond were taken for analysis. Standard consistency, Early setting time and Compressive strength of cement, Slump and Compressive strength of concrete were determined using normal tap water, treated effluent and polished effluent. From analysis of effluents, it is seen that, characteristic values obtained for various parameters (for all wastewater types) are well within the acceptable limits as per water quality standards of BIS (Bureau of Indian Standards) for construction practice. There is clear reduction in normal consistency and initial setting time values for treated effluent and polished effluent as compared to normal tap water. An increment of 29% in 3 day compressive strength of cement has been observed for combination of polished water casting-fresh water curing as compared to fresh water casting and curing. For 7 and 21 days of curing, treated water casting-fresh water curing combination gives an increment of 16% and 11% in compressive strength as compared to fresh water casting and curing respectively. For increase in w/c ratio's lower slump values have been observed for treated water and polished water as compared to fresh water but except for w/c ratio of 0.6 for polished water. With 0.6 w/c ratio for polished water, little higher value of slump has been noticed when compared to fresh water. Though 7 days compressive strength of concrete for polished water casting-fresh water curing is 40% more than fresh water casting-fresh water curing, the 28 days strength for both of these cases are almost same. It is observed that for longer duration of curing of 90 days, all combinations are giving almost same compressive strength of concrete. Cubes casted with treated water, cured with fresh water shows slower development of strength at early ages, but for 90 days of curing shows higher strength than fresh water casting-fresh water curing.

Keywords— *reed bed, sewage treatment plant, wastewater, Canna generalis, mortar and concrete*

Hydrological Modeling of stream flow over Netravathi river basin

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Abstract— Riverine resources which are the basis of life are being transformed through urbanization. This has to be analyzed effectively in order to rejuvenate riverine ecosystems. The effects of land use dynamics are a factor to be analyzed and by using Hydrological modeling which is adopted in this study aids for the same. Soil & Water Assessment Tool (SWAT), is used as an effective tool in modeling the river basin due to its ability to quantify the alternate input data provided to the model. 14 year daily data was simulated in the model provided the warm-up period for the model is 2 years. Coefficient of determination value of 0.74 and Nash-Sutcliffe Efficiency (NSE) to be 0.71 was obtained from the analysis, indicates the simulated values fall within a good range. The parameters which influence most are found to be curve number, available water capacity in the soil, groundwater delay, Manning's n, plant uptake compensation. The fitted range was obtained and this was used to increase the accuracy in SWAT Calibration and Uncertainty Procedures (SWAT-CUP). Sequential Uncertainty Fitting ver.2 (SUFI2) was found to be effective because of its uncertainty consideration criteria, it accounts for all uncertainties that may occur in the mode. Hydrological modeling of a river basin can help us to assess the impact of alternative input data on the stream flow.

Keywords—SWAT, Hydrological, Modeling, Netravathi, Stream flow

Crop Suitability Analysis for Kabini Command Area Using RS and GIS Techniques- A Multi Criteria Approach

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Abstract - Water and land are the finite natural resources to be utilised for their optimum productivity. The management of these resources for sustainable development is the need of the hour. The modern techniques such as Remote Sensing (RS) and Geographic Information System (GIS) are used for creation of digital data base of different thematic maps require to assess the land suitability for different crops based on the land suitability. The suitability of land is assessed considering the cropping system, for optimizing the use of piece of land for a specific use (FAO, 1976). The suitability is a function of crop requirements and land characteristics and it is a measure of how well the qualities of land unit match the requirements of particular form of land use. The study area chosen is Kabini Command spreads in Mysuru and Chamarajnaraga districts. It is geographically located between 76° 12' 0'' E and 77° 12' 0'' E longitude and 11° 58' 0'' N and 12° 16' 0'' N with an area of 707.284 km² and is covered in Survey of India (SOI) Toposheet numbers 57H04, 57H03, 57D16, 58E01, 58A13, 57D12, 57D08, 58A05 and 58A01 on 1:50000 scale. RS and GIS techniques are used to delineate the command area, watersheds within the command and preparation of different thematic maps. Analytic Hierarchy Process (AHP), RS and GIS have shown as an efficient tools to derive the crop suitability within the command area.

Keywords - Land suitability, Analytic Hierarchy Process (AHP), Remote sensing, GIS, Thematic maps.

Performance Evaluation of Deep beams using Self-compacting concrete mixes

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Abstract — The current research aims at studying the behaviour of reinforced deep beams made of SCC mixes with different shear span to depth ratios. SCC mixes of M-30 grade were proportioned using 12.5mm downsize jelly and river sand as coarse aggregate and fine aggregate. The deep beams were designed as per IS 456:2000. All the trial mixes were subjected to different flow ability tests in order evaluate their selfcompacting property of concrete as per the EFNARC guidelines. Test results concluded that the failure observed was primarily due to shear and the diagonal cracks were formed till the support starting from the loading point, due to diagonal compression.

Keywords— *Reinforced Deep beams, Self-compacting concrete, shear span to depth ratio.*

Comparitive study between chemical admixtures and bacterial admixtures in concrete

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Abstract—Materials scientists, chemists, engineers, and manufacturers’ technical representatives have helped the concrete industry to improve our ability to control work times, workability, strength, and durability of Portland cement concrete by adding some supplementary substances named admixtures. The function of each admixture focuses on a specific need, and each has been developed independently of the others. Some admixtures already have chemistry that affect more than one property of concrete, and some have simply been combined for ease of addition during the batching process. To better understand recommended usage for various application of these chemicals ad mixture in concrete, the present study is planned to be obtained more specific information in this direction. In this project an attempt is made to study the effect different admixtures such as Accelerator, retarders, water reducers and workability modifiers on the properties of the concrete are studied. Optimum Content of the admixtures to be used to achieve the specified properties requirements is also studied. Concet construction solution is the leading construction chemical company, which delivers a wide range of products in admixtures, water proofing and roofing solution. In this project various product of the Concet is used. Later to determine biological healing bacterial admixtures prepared using bacillus subtilis was used.

Keywords—*accelerators, water reducers, Bacillus subtilis, compressive strength, split tension.*

Seismic Analysis of Open Ground Storey Building with Different Plan Configuration and Elevation Symmetry

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Abstract— The configuration and symmetry of the building plays a major role under lateral loads in the building. This paper contains the study on seismic behavior of Open Ground Storey (OGS) Building with different combination of plan configuration and elevation symmetry. Further, comparative study on results obtained from Response spectrum analysis are carried out. Modelling is done as per the guideline given in Indian earthquake code IS 1893:2002 and 2016 by using CYPECAD-2018 analysis software. The applicability of code provisions has been checked in this study.

Keywords— *Open Ground Storey, Plan configuration, Elevation symmetry, Response spectrum method.*

EXPERIMENTAL INVESTIGATION ON THE EFFECT OF POLYURETHANE FOAM ON BLACK COTTON SOIL

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Abstract— Throughout the evolution of the human society, the one thing that each person has looked up to is the facilities that are available which includes basic infrastructure, roads etc. When it comes to construction, the durability and quality are important factors. For a stable structure to be constructed the most essential requirement is the presence of a stable base. In the earlier time, when there was no suitable soil beneath the structure, soil replacement used to be carried out. In some places, the method of soil replacement cannot be adopted and hence stabilization of the soil by either physical or chemical methods is carried out. When it comes to soil stabilization the main aim is to stabilize the soil with minimum cost and causing less harm to the environment. The present study focuses on the investigation of effect of polyurethane foam on weak sub-grade soils. Mainly this study involves stabilization of black cotton (BC) soil as it is declared as problematic soil as construction on this soil is very difficult. The study takes place by the addition of liquid polyurethane foam in different percentage by mass of the soil and index and engineering properties along with CBR and Unconfined Compression Strength tests are carried out. The study also furnishes the optimum percentage of polyurethane foam to be added for effective stabilization. It is observed that the strength of black cotton soil can be improved when treated with liquid polyurethane foam. It has been observed that soaked CBR values increased after treatment with liquid polyurethane foam.

Keywords—Black Cotton Soil, Liquid Polyurethane Foam, Stabilization, CBR, Unconfined Compression Strength test

A Parametric Study on SoilStructure Interaction of RC Building with different Base Conditions

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Abstract—Soil-structure interaction refers to the effects of supporting soil medium on the motion of structure and its subsequent response during earthquakes. Multi-storey buildings could have multiple basements for varied functions viz., automobile parking, boiler system, air-con system, electrical distribution system, and cable tv distribution purpose. This study involves soil structure interaction analysis of a multi-storey building with multiple basements supported on stratified soil medium. The building has 10 floors above the ground and 2 below. Response spectrum analysis has been performed on the structure assuming fixed base, flexible base due to homogenous soil and flexible base due to nonhomogenous or layered soil beneath the foundation using finite element software SAP 2000. Soil properties are included in building model by continuum approach to perform soil structure interaction analysis. Seismic response of multi-storey building viz., lateral displacement, storey drift and modal time period are studied for Indian seismic zone V as per I.S. 18932002. Presence of non-homogeneous soil beneath foundation of multi-storey structures with basements increases the seismic response of the structure significantly compared to homogeneous soil beneath foundation

Keywords—*Soil Structure Interaction; Basement Floors; SAP 2000; Non Homogeneous Soil Strata*

Strength Characteristics of Concrete Specimens using Arecanut Husk Ash

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Abstract—Usage of ashes as a partial replacement to the cement in concrete is getting popular in construction industry. Industrial ashes are successfully being used in the field. In the present study, Proportion of 5%, 10%, 15% and 20% by the weight of cement are opted as replacement percentages for AHA. The paper discusses the strength characteristics of concrete due to the partial replacement of cement with Arecanut Husk Ash and finding the optimum percentage of replacement.

Keywords— *Arecanut Husk Ash, Strength Characteristics, optimum percentage*

A Study on the Effect of Plan Irregularities in the Dynamic Analysis of a Multistorey Structure

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Abstract—Dynamic analysis is a must for the structures with plan irregularities which are situated in earthquake prone areas. The behavior of regular and irregular shaped structures varies in properties when subjected to seismic force. This study aims at comparing the dynamic response of structures. It involves the modelling of rectangular shape, L shape, C shape and I shape structure with a dimension of 30m x 21m having different area and bay size. The method used for dynamic analysis is response spectrum. The area of the structure may vary but the dimensions remains fixed. ETABS 2016 software was used to model and design the structure. Post analysis of the structure it was found that L shaped structure was found to be weak when compared with other regular and irregular shaped structures.

Keywords—dynamic analysis, plan irregularity, re-entrant corner, response spectrum, mode shapes

HIGH RESOLUTION MAPPING OF SOIL PROPERTIES USING AVIRIS-NG HYPERSPECTRAL REMOTE SENSING DATA - A CASE STUDY OVER LATERITIC SOILS IN MANGALORE, INDIA

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Abstract— Quick and accurate mapping of properties of soil is considered to be critical for agriculture and environment management. Rapid assessment of soil properties is a daunting task in monitoring the environment. The conventional field sampling is a laborious as well as time consuming job. The conventional methods is restricted to a specific region but there is a need to analyses the soil properties at landscape levels. Hence, this study emphasizes on hyperspectral remote sensing which in some extent helps in rapid assessment of the properties. The Hyperspectral data used for the study is AVIRIS-NG data. The study explored the potential of AVIRIS-NG Hyperspectral data in mapping soil properties which were analyzed by in-situ laboratory methods and compared with them by geostatistical method of spatial interpolation. Hence the method adopted for this purpose is the study on spatial variability of soil properties by using Kriging Interpolation technique. Also, a review study is carried out on the Visible and Near Infrared Analysis (VNIRA), Multiple Regression Analysis approach and Spectral Angle Mapper supervised Classification technique on the high resolution AVIRIS-NG Hyperspectral data, which will yield as an empirical model for predicting the soil property in question from both wet chemistry and spectral information of a representative set of samples and classifies the data accordingly. (Abstract)

Keywords— *Remote Sensing, Hyperspectral, VNIRA, Spectral Angle Mapper Classification, Kriging*

Study on Effects of Hooked End Steel Fiber Reinforced Concrete

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Abstract— With the growing interest in the use of fibre reinforced concrete in the construction industry, attempts have been made to clarify its performance have become important. This study investigates the effect of steel fibre reinforced concrete. Generally steel fiber are used for mitigate the cracks width and enhancing in the concrete member strength. In this, present investigation the study is carried out using steel fiber as reinforcement in concrete (hooked end). In this investigation, properties such as workability of concrete, compressive strength, split tensile strength and flexural strength of the different percentage (0%, 0.5%, 1%, 1.5%, 2%) of steel fiber were carried. From the experimental investigation results it is noted that, by the inclusion of the steel fiber (hooked end) ductility of concrete improved by increasing fiber percentage in concrete. Increase in load absorption capacity, mitigation of cracks in concrete member and enhance in flexural capacity of concrete.

Keywords— *Steel Fibre, workability, flexural capacity, ductility, fiber reinforced concrete*

A Statistical Approach for Comparison of Secondary Precipitation Products

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Abstract— Meteorological data retrieving is the fundamental process for any hydrological research. Precipitation data collection from some constrained territories like high slant geography and inaccessible areas are exceptionally troublesome. Setting the rain gauges is a matter of expense and timely maintenance. To overcome these issues, satellite sensors producing high spatial and temporal resolution datasets can be utilized in the studies involving precipitation component. These satellite products are affected by biases, and hence there is a need for calibration and verification by using ground observation data based on the statistical coefficients. In this study, the most accessible satellite data products, i.e., CHIRPS, PERSIANN-CDR and TRMM are employed to check the accuracies against IMD gridded data for the year’s 2000 to 2012 using a statistical approach. Selecting the data product having a high coefficient of correlation and low PBias are utmost necessary. The current study was performed based on Catchment to Catchment (C-C) method by comparing IMD gridded data with satellite datasets obtained from Google Earth Engine. The results can highlight the data product which can conquer the issue of data inaccessibility in the investigation territory and can be utilized as reference precipitation dataset for different hydrological applications.

Keywords—*Satellite Products, Precipitation, Statistical Coefficients, Catchment to Catchment*

SEISMIC BEHAVIOUR AND COMPARISION OF DIFFERENT SLAB SYSTEM DIAGRID STRUCTURE

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Abstract— Diagrid system for tall building has evolved as efficient system in terms of lateral stiffness. In this study an attempt has been made to study the seismic response of diagrid structure with different slab system (conventional slab i.e. with beam and flat slab) by using response spectrum analysis. The models studied are square in plan with aspect ratio H/B (where H is the total height and B is the width of structure) as 3.1. Five different diagrid angles 41°, 50°, 56°, 61° and 64° are considered. Earthquake analysis is carried out according to IS 1893:2002(Part-1). Based on the study the efficiency of slab system and optimum diagrid angle is presented in terms of story displacement and storey shear.

Keywords—: *Seismic Analysis, diagrid, optimum angle, displacement and shear.*

Graphene oxide incorporated concrete for Rigid Pavement application

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Abstract— Nanomaterials are currently one of the trending research topics in material science. Due to larger surface area, size, aspect ratios and superior mechanical properties, the nanomaterials can be beneficial in hydration process and nano pore filling activities. Graphene oxide is one such nanomaterial with one its side in nanoscale and other two sides are in larger scale. Because of the presence of oxygen functionalities, the Graphene oxide can be easily dispersed in the aqueous solution when compared to other nanomaterials. Due to increase in traffic condition and environmental impacts, the pavements are not performing up to the design life. The current investigation is about the use of Graphene oxide as cement additive and checking its suitability for the pavement application. In this study, polycarboxylate based superplasticizer is used to improve the adhesion and dispersion property of the Graphene oxide. The graphene oxide is added in the dosages like 0.05%, 0.1%, 0.15% and 0.2% by weight of cement. Number of tests has been conducted to analyze the impact of additive. The workability of Graphene oxide concrete gradually decreases with the increase in its dosage and the loss of workability is not so significant. The mechanical properties of concrete like compressive, flexural and tensile strength are greatly increased with the addition of 0.15% Graphene oxide, which is found out to be optimum dosage. The percentage increase in flexural strength is more than the percentage increase in compressive strength at 7 and 28 days. The percentage improve in early strength is more when compared to later percentage improve. SEM images show, with the presence of Graphene oxide, there is a formation of dense microstructure. The overall test result shows that Graphene oxide can be used in pavement quality concrete.

Keywords— *Nanomaterials, Graphene, Graphene oxide, Oxygen functionalities, Dispersion properties, Pavements*

Identification of Best-Fit Probability Distribution and Modelling Short Duration Intensity Duration Frequency Curves – Mangalore City

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Abstract: Frequency analysis is performed in this study, to identify the most suitable model which could predict extreme events like rainfall and flood. It aims in defining the most suitable probability distribution model for annual maxima series of chosen four stations in Mangalore City. Statistical analysis such as Generalized Extreme Value (GEV), Log-Normal, and Log- Pearson, was applied, and parameters of these distributions were assessed. The predicted values using these distributions subjected to the goodness of fit test using the Kolmogorov-Smirnov test, Anderson-Darling test, and Chi-squared test. Generalized Extreme Value distribution gave the best-fit model and thus, used for deriving the Intensity Duration Frequency (IDF) curves for Mangalore City. IDF curves using empirical equation and GEV distribution were compared, and GEV distribution IDF curves give higher rainfall intensities.

Keywords: Probability distribution; Goodness of fit; Generalized Extreme Value (GEV); Intensity Duration Frequency (IDF) curves

Prediction of Effect of Geometrical Parameters in Trough Shape Folded Plate Roof Using ANN Modelling

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Abstract- Finite element method is a numerical technique used to obtain approximate solutions to the problems with boundary values. It is simply a technique used in solving problems which has partial differential equations and boundary conditions. This method gives approximate results at each and every discrete number of points over the domain. A consistent model is to be developed for easier, faster and less expensive structural development. In this regard, Artificial Neural Network can have high possibilities as these networks are universal approximators that can carry out any uninterrupted mapping and can provide general mechanisms for building models from data whose input-output relationship is highly nonlinear. In this paper, the behavior of trough shape folded plate roof is studied in terms of displacement and stresses for different boundary conditions using the software SAP-2000 (v-20) by varying geometrical parameters (thickness, bay width and height of FPR) and to extract the information on the importance of the input parameter on the prediction of output results using Artificial Neural Network model.

*Keywords—*Artificial Neural Network, Finite Element Analysis, Folded Plate Roof, Garson Algorithm

Prediction of Influence of Geometrical Parameters in an Elliptical Paraboloid Shell Roof Using ANN

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Abstract—In the analysis of various engineering problems, Finite Element Method (FEM) is considered as one of the significant tools and has been broadly used in many fields. Employing this method aids in simulating the deformable complex objects comprising material and structural properties and determines the model’s response to definite loading conditions. For an easier, quicker and less expensive analysis of structures, a consistent model has to be developed. However, many techniques optimize the system performance; the intelligent method design is a valuable technique in optimizing the efficiency of such systems. One of the emerging intelligence techniques is Artificial Neural Network (ANN) which is used in modelling, simulation and system organization. To solve complex and nonlinear problems ANN tool is faster and more precise as compared to other conventional techniques. The present work is carried out to predict the behaviour of Elliptical Paraboloid Shell (EPS) roof based on the output obtained from an ANN model. The results show that the ANN technique works faster and predicts the output with less error and is an appropriate method to model the performance of shell roof structure. The influence of the geometrical parameters of the shell in the prediction of deflection has been studied.

Keywords— *Artificial Neural Network Modelling, Finite Element Method, Shell Roof, Simulation, Garson’s Algorithm.*

Effectiveness of SHE Program Implementation at Construction Site

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Abstract- Safety is one of the most important aspect in a human’s life. It helps us to stay away from various hazards and injuring one’s self. The need for safety at a construction site is very high. Most number of deaths recorded each year are due to unsafe acts. It is not only safety against one’s life but also safe acts towards the health of the labour and the surrounding environment. There are various organisations that provide laws and guidelines which the companies can follow in regard to SHE (Safety Health and Environment). Everything around us is a potential risk to our lives. Risk assessment is an important factor which helps in reducing the various accidents, fatalities, illnesses. This helps in enhancing the well-being of employees. The main cause of accidents is credited to failure of workers to obey instructions, carelessness of workers and not using the required PPE’s. The objectives in this paper assess effectiveness of the SHE programs implemented at construction sites. The Occupational Safety and Health Act was passed in 1970 to protect employees by stating that employers have a legal obligation to provide their employees with a safe working environment and safety protection in construction area [1].

Keywords- Safety, Health, Environment, Hazards, Accidents, Labour, Construction

Analysis of RC Irregular Building According to Different Seismic Design Codes

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Abstract. This paper addresses the analysis of irregular multistoried RC frame building according to different seismic design codes. A RC multi-story building are subjected to most dangerous earthquake, the main reason for failure of RC buildings is irregularity in its plan dimensions. This paper presents analysis of irregular building using different seismic design codes. Building is compared in terms of structural displacement, drifts and story shear. And also focuses on three seismic design codes India (IS 1893), U.S. (ASCE 7) and Europe (EC8). Irregular L-shape 10-story buildings are analyzed using the Equivalent Static Load method (ESL).

*Keywords—*Seismic analysis, building codes, irregular plan, Equivalent static analysis, ETABS

Development of Mobile Application for Computing SBC of Soil and Design of Shallow Foundation

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Abstract— This paper focuses on the development of an android based mobile-application by the name ‘Ground IQ’ for foundation works in the field of civil engineering. The first stage involves manual calculation of Safe Bearing Capacity of Soil based on codal provisions of IS-2720 and equations developed by Terzaghi (1943). Here, Safe Bearing Capacity is computed by IS Code Method (1981) which is again developed from Terzaghi’s method. Its value is compared with that which is obtained as a result from the application developed. In the second stage, the computed SBC is used to design footing or foundation on the site from where the soil sample is collected. The design can be then compared with that obtained from the application developed and checked for accuracy. The IDE (Integrated Development Environment) or the platform used for the development of this application is Android Studio which supports Java programming language for coding.

Keywords— *SBC, footing, reinforcement details, Java, Android Studio, XML.*

IMPACT OF WATERSHED DEVELOPMENT PROGRAMME ON GROUNDWATER RECHARGE A CASE STUDY OF ITAGI WATERSHED KARATAKA, INDIA

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Abstract- Watershed Development Programs (WDP) started in India basically as soil and water conservation programs, as a policy response to the increasing environmental crisis and nonsustainability of agriculture especially in the dry land / semiarid regions. One of the main objectives of WDP is to augment the groundwater recharge. It is acknowledged from many of the studies that impact of soil and water conservation interventions on groundwater recharge was quite perceptible in almost all watersheds. In the present study area of Itagi watershed the various soil and water conservation structures such as contour bunds, check dams, farm ponds, recharge pits, earthen checks, rubble checks etc., were constructed in an area of 4636 hectares (ha) under Sujala watershed development programme, during the year 2004. The total implementation cost of these structures is Rs. 35.66 million which includes administrative cost to the tune of Rs. 1.981 million. It is observed that the annual natural groundwater recharge in the study area is about 9.6% of annual rainfall. After implementation of watershed development programme it is found that the groundwater recharge is about 21.38%. Also it is noticed that after the watershed development programme the yields of the wells were improved and brought more area under irrigation and crop diversification.

Keywords: watershed, groundwater, conservation, recharge, yield of the wells

Monitoring Land Use and Land Cover Changes in Coastal Karnataka

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Abstract— The dynamics of land use/ land cover can be studied by using digital change detection techniques which are highly significant for the evaluation and development of management strategies in a region. The environmental and hydrological processes prevailing in the area can be interpreted only by analyzing the alterations in past and present land use land cover classes. In view of this, the present study is executed to analyze the typical land use change in the coastal region over the three decades by analyzing historical and current LU/LC (Land Use Land Cover) datasets. Landsat 5 and Landsat 8 satellite datasets were considered for change detection analysis using unsupervised classification method. K-means algorithm, a widely used unsupervised classification technique was adopted in this study to classify coastal region of Karnataka for the years 1990 and 2019. The level-ii classification was performed on LU/LC raster datasets (Landsat 5 and 8) which segregated the entire study area into ten classes namely agricultural land, barren land, built-up area, water, forest, fallow or cultivated land, scrub forest, sandy area, swampy forest and wetlands. This study encapsulated that, about 40% of the study area was occupied by water body followed by forestry with a percentage of around 30%. Major changes were observed in the barren land and scrub forest between 1990 and 2019, where the barren land was replaced by scrub forest in 2019. The accuracy assessment is performed to analyze the efficiency of the algorithm and the precision of the classified image which showed an accuracy of 81% in 1990 and 84% in 2019 demonstrating the ability of an algorithm to classify reliably.

Keywords— LU/LC Classification, Change Detection, K-Means Algorithm,

PERFORMANCE OF ALKALI ACTIVATED MORTAR MIXES CONTAINING INDUSTRIAL WASTE MATERIALS AS BINDERS

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Abstract—The current study is aimed at to determine the optimum mix parameters for developing the mortar blocks using Red Mud (RM), Cement Kiln Dust (CKD) and Silica Fume as binder. In the present study, an attempt is made to prepare alkali activated mixes containing Red Mud (RM), Cement Kiln Dust (CKD) and Silica Fume as binder. Various strength properties of mortar blocks at different time intervals (days) were investigated. From the results, it was found that the compressive strength of red mud blocks improved with the addition of higher contents cement kiln dust and silica fume. The mixes with red mud as sole binder and with lower contents of CKD and silica fume displayed higher water absorption and total porosity. The UPV values mixes showed better performance with increasing contents of silica fume and CKD. The resistance to abrasion was found to be better for mixes which contained higher proportions of CKD and silica fume respectively. All the mixes displayed sufficient strength and durability performance to suit the requirement of bricks based on the type or class of bricks.

Keywords—*Eco-friendly Mortar, Industrial waste, Mechanical properties, durability.*

Design and Fabrication of Low Cost Water Purification unit

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Abstract— As day by day the development takes place the effect on environment is also increasing, due to this the natural resources such as water which is essential for human survival is getting polluted. To provide a safe portable drinking water to people it is necessary to use water purifiers, especially for rural population. Therefore, in this research the ability of silica, activated carbon was investigated in removal of turbidity, total hardness, total dissolved solids, chloride and electrical conductivity. As a result, activated carbon can remove turbidity, electrical conductivity and total dissolved solids very efficient, while silica is more appropriate in removal of chloride, total hardness. According to the results, if we use these adsorbents separately it will be insufficient for the removal of parameters. To increase the efficiency for filter unit it is proposed that combination of these cartridges should be used.

Keywords—Water, Activated Carbon, Silica

Water Level Retrieval and Water Body Mapping: A Case Study of Nagarjuna Sagar Reservoir

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Abstract— Satellite radar altimetry is exclusively designed for the oceanographic studies such as wind speed, sea surface level, tide height, and volumetric changes. In spite of the fact that the satellite radar altimetry is predominantly intended for oceanographic studies and ice sheet monitoring these days, the utilization of altimetry information is reached out to think about water dimension of inland water bodies like reservoirs, rivers and so on. This study covers the use of SRAL (SENTINEL-3 Ku/C Radar Altimeter) for the monitoring water level of Nagarjuna Sagar reservoir located in Telangana state, India. Satellite altimetry works on the principle of Range Measurement that is the measure of the travel time of microwave pulse from emission to receiving which is interrupted by many atmospheric conditions which cause a disturbance in travel time of microwave pulse which is to be adjusted to get corrected depth of water level. The SRAL information is handled utilizing BRAT (Broadview Radar Altimetry Toolbox) programming. The consistency of derived water level is compared using field data, all the depths are with in error range of one meter. Water body mapping is carried out utilizing cloud-free data of Landsat-8 from January 2016 to March 2019 which showed a gradual decrease in water level from November to May.

Keywords— *SRAL, Inland water body, Water level, Water spread area*

Delay in Construction Due to Logistic Factors– A Case Study on Mumbai High Rise Buildings

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Abstract—Construction logistics is a multi-disciplinary approach which strives to guarantee at the right time, cost and quality activities such as material supply and handling, schedule control, site infrastructure and equipment location, site physical flow management, traffic arrangements on and around the construction site and information related to all physical and services flow. The main task of an integrated logistics system is to provide just in time deliveries when needed to eliminate most of the materials handling and storage on site, to shorten time of project completion by eliminating reasons of work stoppage and to minimize the local negative external effects. This Research work aims to identify the factors that affect the efficiency of logistics of a site and causes delay to the project. Then these factors will be ranked based on likelihood of their occurrence and degree of their severity using statistical techniques. Then effects of such critical factors on project will also to be discussed.

Keywords —*Logistics, critical factors, delay, rank, occurrence, severity, rank, effects, statistical techniques.*

Removal of 2,4-D Herbicide from Water by Electro-coagulation using Copper electrodes

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Abstract— Herbicide poses a serious threat to living organisms owing to their non-biodegradability and toxicity. Among all, 2,4-D is one of the EDC (Endocrine disrupting compounds), which is used to kill the weeds in the crop field. During heavy rainfall, the residual 2,4-D join the surface water body and thereby increasing the toxicity level. Hence in this study, electro coagulation (EC) using copper electrodes was applied to remove the 2,4-D in water. The electro coagulation has several advantages, which include ease of operation and the scope for automation. Here, the effect of three factors, viz. pH, time, and 2,4-D concentration on the removal percentage were studied. In pH 5,7 and 9 with 2 electrodes configuration, the 2,4-D concentration removal was 35, 47 and 82% respectively. Whereas for 4 electrodes, the removal efficiency was 52, 82 and 99% respectively. The maximum 2, 4-D the removal was observed with pH of 9 in 50 minutes. Higher the initial concentration, lesser the removal efficiency was observed.

Keywords- Electro coagulation, Agriculture runoff, Herbicides, 2,4-D.

ESTIMATION OF RUNOFF USING RS AND GIS FOR VRISHABHAVATHI WATERSHED BY SCS-CN METHOD

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Abstract- Runoff is one of the most important hydrologic variables used in most of the water resources applications. Prediction of quantity and rate of runoff from land surface into streams and rivers is difficult and time consuming to obtain for an ungauged watersheds. However, this information is needed in dealing with watershed development and management. In the present study, an attempt has been made to estimate runoff using Remote Sensing (RS) and Geographic Information System (GIS) techniques. The study area chosen is Vrishabhavathi watershed which is a tributary to river Arkavathi. The watershed is having an area of 378.15 km² and is covered on Survey of India (SOI) toposheet numbers 57G/12, 57H/5, 57H/6 57H/9. The watershed is delineated using SOI topomaps and Shuttle Radar Topography Mission (SRTM) DEM data. Different thematic maps such as Land use/land cover (LULC), soil. etc., are obtained from Karnataka State Remote Sensing and Application Centre (KSRSAC), Bengaluru. The USDA SCS curve number method has been used to estimate the daily runoff. Runoff for the Vrishabhavathi watershed is estimated from daily rainfall of 19 years (1998 to 2016). The rainfall data collected from Department of Statistics and Economics, Bengaluru reveals that the watershed has received the maximum rainfall of 1209.66 mm recorded in 2015 and minimum rainfall of 460.06mm in 2012. The correlation coefficient has shown positive correlation between the rainfall and the runoff.

Keywords- Remote sensing, GIS, Runoff estimation, SCSCN method.

Stabilization of Contaminated Soil by Geo-polymers and Bio-enzymes: A review

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Abstract—As a growing third world country, India is developing in terms of its infrastructure. It is a well-known fact that infrastructure of any country symbolizes its economic growth. There is a growing need of finding the alternative materials for the construction activities along with utilizing the already existing materials by modifying its property to suit the requirements. This paper reviews such an engineering approach towards changing the properties of contaminated soil and stabilizing it by using geopolymers as well as naturally found soil enzymes.

Keywords:- Geo-polymers, Enzymes, Contaminated soil.

Effect of Landfill Leachate on Performance of Subgrade Soil

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Abstract— Leachate is a hazardous liquid which percolates through the landfills and extracts dissolved and suspended hazardous matter from it. Large quantities of municipal solid waste which consist of chemical, industrial and biomedical wastes are received by dump yards, which creates environmental problems such as pollution of soil and groundwater. In the present study, the laboratory test was conducted on both contaminated and uncontaminated (collected soil sample from college campus) lateritic soil to determine the effect of landfill leachate on the performance of subgrade soil. The contaminated soil samples were prepared by mixing the soils with MSW leachate in the increments of 0%, 5%, 10% and 20% by weight. Finally, all subgrade soil properties were analyzed. For contaminated soil, Atterberg’s limits increase with the increase in the leachate content. The MDD is maximum till 10%, and after that, it is decreased. The results showed that the MSW leachate affects the compaction characteristics, shear strength and atterberg’s limits of the lateritic soil.

Keywords- Leachate, Lateritic soil, Compaction characteristics, Atterberg’s limits, CBR

STUDY OF BEHAVIOUR OF HIGH RISE BUILDINGS WITH DIAGRID SYSTEMS

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Abstract— High rise structures are growing speedily around the world. The unique geometric arrangement of the system provides the efficiency of structure and beauty capabilities, the new structural system with diagrid has been used extensively for the recent high buildings. The diagrid is an arrangement of triangulated beams; it has a straight or curved and horizontal ring system which makes the combined structural system for skyscrapers. Diagrid structure uses fewer materials than traditional structural systems with orthogonal members. The efficiency of diagrid system reduces number of inner columns so that the design of the plan gets more flexibility. This research study aims to explore the applicability of diagrid systems in high rise buildings, over conventional construction systems. A square plan 32m × 32m dimensions is taken to study of behaviour of high rise building with a diagrid system. All structural members like beams, columns, etc. are analyzed considering all load combinations as per IS 800:2007. Similarly, analysis of G+40, G+60 and G+80 storied structures with diagrid system is taken to comparison of the results for parameters like storey shear, storey drift and storey displacement are also represented in paper. For modeling and analysis purpose, ETABS software is used.

Keywords— High rise buildings, Diagrid systems, Gravity & lateral load resistance, ETABS 2017.

Measurement and Analysis of Noise Levels in the Sensitive Areas of Mysuru City, India

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Abstract—Due to the particular characteristics of hospitals, the hospital buildings are highly sensitive to environmental noise. However, they are usually located close or within urban agglomerations and in particular main roads. Hence, hospitals are, in many cases, exposed to high levels of environmental noise. In this study of comprehensive one-month research project, traffic and community noise levels were measured and monitored at five sensitive areas (near hospitals) in its spatialtemporal aspect, at the city of Mysuru, Karnataka. Noise measurements were taken at different peak sessions in morning and evening, for duration of one hour. Observed noise values were analyzed and compared with the recommended permissible limits (40-50 dB) as stated by the Central Pollution Control Board (CPCB). The measured values exceeded the CPCB noise limits prescribed for sensitive areas. This paper presents an analogy of obtained noise readings with the national CPCB standards for silent zones.

Keywords— *Noise Levels, Dosimeter, Sensitive Areas, CPCB*

Impact of Rainfall on Land Use And Land Cover Analysis

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Abstract—In the present paper the study emphasizes on providing suitable water conservation measures to study area as it is a drought prone area. The rainfall is uneven and nonuniform it poses a severe water scarcity problem in the region as agriculture is the main occupation of the people. Hence a proper water conservation practice would solve the water problem. Thus, the paper presents the importance of land use and landcover changes analysis prior to locating the water conservation structures. The NDVI method and unsupervised classification technique using Landsat images of different years of the same date is used for the study. The analysis is carried out taking Thiessen average rainfall from the different raingauge stations were studied. Thus, in the paper feasibility assessment for the catchment area has been conducted using the change detection analysis before planning and development of the watershed.

Keywords—watershed planning, NDVI, land use and cover change, rainfall, satellite images

Constructive Scope on Implementation of Copper Slag as Replacement for Natural Fine Aggregate- An Overview

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Abstract— This paper communicates organised work on copper slag drawn from scientific literature which comprises of evaluation of physical and chemical characteristics, mechanical and durability properties in the marine environment. Analysis of test data derived from previously available sources reveals that copper slag having similar basic characteristics is an acceptable alternative material to river sand to produce concrete of all grades. The lesser water absorption property of copper slag is very significant peculiarity which attributes to develop high strength in concrete. The behavior of concrete produced using copper slag to the concrete made corresponding to sand component shows identical behavior in the fresh and hardened state. As an aggregate copper slag has an ability to be replaced with fine aggregate thereby the advance progress in the concrete technology will revolutionise the mixture of different conventional ingredients to uplift the expected properties of concrete to renew its definition. Hence alternative materials to be used as fine aggregate will reduce the burden on the environment which is being extensively investigated all over the world looking to the significant requirements, quality, and properties which has been a global consensus on the materials.

Keywords— *Concrete, Copper slag, Replacement with sand, Review, Waste, Mechanical properties*

Assessment on performance of Steel slag and Processed Granulated Blast furnace Slag as an alternative for fine aggregate-An assertive review

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Abstract— Sand has always been an integral part of construction in our civilization. It has been the most easily available and acceptable source for the same. However, the depletion of river sand availability has started looking at the alternatives including some industrial by-products. One of them is slag obtained from manufacture/refining of metals which would help in the utilization of industrial waste and conservation of natural resources to have a sustainable construction. This paper provides the gist of organized overview involving the evaluation of physical and chemical characteristics, assessment of mechanical and durability properties for the effective utilization of steel slag and processed granulated blast furnace slag (PGBS) that could be modeled from previous researches related to the study. The basic properties of steel slag and PGBS exhibit requisite properties like river sand which is an indication for a possible alternative material to the conventional aggregate. The multiple processing of slag has its influence on strength, durability, and workability of concrete. These recent innovations have made the slag economically viable and environmentally friendly, also profitable salvaging of processed by-product.

Keywords— *sustainable construction, steel slag, PGBS*

An experimental study on self remediating bacterial concrete

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Abstract - The bacterial concrete is a self remediation biomaterial under favorable conditions. Bacteria can precipitate calcite in concrete or form a layer of calcite precipitation plays an important role in remediation of the plastic shrinkage micro cracks thereby increasing the long term structural integrity and durability of concrete. This study investigates the impact on compressive strength of concrete by addition of aerobic microorganism such as bacillus subtilis and bacillus Megaterium, which microbiologically induce the mineral precipitation. The bacteria were incorporated into the 100mm concrete cube in different concentrations in two stages formerly by curing in distilled water and later by curing in peptone based nutrient medium. The results show the positive impact on compressive strength of concrete cubes with an increase in the strength of 30% with bacillus megaterium. The strength enhancement is due to the precipitation of calcite within the pores which in turn improves the pore structure of the concrete. The study also revealed the importance of culture media, type of micro organism and cell concentration on the strength properties of bio concrete. However there was no much improvement in strength by curing in nutrient medium.

Keywords- Bacterial Concrete, Remediation, Self Healing

An Experimental Investigation on suitability of ground water for construction practice

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Abstract— This study provides the suitability of groundwater of a village named Bolor of Dakshina Kannada District, Mangalore for construction practice in the monsoon season and dry season. So, M20 grade concrete cubes with water cement ratio of 0.45 is being casted from the 15 groundwater samples of different region of the locality to find compressive strength at 7 and 28 days for both wet season and dry season. For calculating the water quality of 15 groundwater samples various parameters like pH, alkalinity, chloride, iron, hardness etc are compared with Indian Standard Drinking water specification IS: 10500-2012. It involves comparison of strength characteristics of groundwater and potable water.

Keywords— *Water Analysis, Permissible limit, ground water, compressive strength.*

Rainfall Trend Analysis in Coastal Region of Karnataka

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Abstract— Climate can be defined as the weather conditions or the weather patterns that is present in the particular geographical area for a very lengthy period. It can be assessed by the important factors like temperature, humidity, wind, precipitation. The climate of the region also depends on the latitude, terrain, water bodies etc. Coastal Karnataka receives an average rainfall, of 3456mm, at summer the temperature lies between 33.5- 40 degree Celsius and the minimum temperature of 23.3- 27.9 degree Celsius. Tropical monsoon climate covers whole coastal places of Karnataka and other nearby places too. Rainfall time series is divided into four periods. This region has a very hot climate with extreme rainfall in monsoon season i.e., June to September. These drastic changes in the climate severely affects the various activities throughout the coastal area of Karnataka. Understanding the variability of climate in the region is essential. In this study the variation in the climate for a period of 1984-2017 is observed and investigated and changes in the trend in the grid points can be noticed. Mann Kendall trend test is applied for the precipitation to find trend patterns and the magnitude of the trend is determined by the Sen’s slope estimator. Increase in trend was found in the Grid point 3 and Grid point 4.

Keywords— *Rainfall, Trend Analysis, Mann Kendall, Coastal area.*

Sorptivity as a Durability Index for Service Life Prediction of Self-Compacting Concrete

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Abstract—Durability of concrete is assessed by its Permeation to know long term performance and sustainability. Water ingress is the major factor for deterioration of concrete and there is always an urge to find a simple and reliable way to measure the material properties of concrete which can be related to durability. Water sorptivity is a useful single material property which can be one of the measures of durability useful in service life planning and prediction, especially in severe environmental conditions.

This paper presents the results of the comparative study of sorptivity of Self-Compacting Concrete (SCC) with conventionally vibrated concrete (CVC). SCC has its own unique advantage over CVC due to its characteristics of higher powder per se paste with higher flow and better lubrication of the aggregate with reduced inter particle friction and superior densification of microstructure. SCC mixes were developed for the paste contents of 0.38, 0.41 and 0.43 with fly ash as the filler for different cement contents ranging from 300 to 450 kg/m³. The study shows better performance by SCC in terms of capillary absorption. The sorptivity value decreased as the volume of paste increased. The use of higher paste content in SCC can make the concrete robust with better densification of the microstructure, improving the durability and making the concrete more sustainable with improved long term performance. The sorptivity based on secondary absorption can be effectively used as a durability index to predict the time duration required for the ingress of water to penetrate the concrete, which has practical significance.

Keywords : Self-Compacting Concrete, Sorptivity, Volume of paste, Service life.

A STUDY ON SHORE LINE DYNAMICS DURING AND POST-CONSTRUCTION OF BREAK WATERS IN KASARAGOD FISHING HARBOUR

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Abstract— Coast belonging to one particular stretch happens to be versatile because of its dynamicity. This dynamicity is accounted because of both natural and manmade activities. Hence, it is necessary to monitor any fragile coastal stretch’s dynamicity in a temporal basis. In this study, an attempt is made to study the dynamicity of coastal morphology using geospatial and numerical approach. Shore-line on both sides of kasaragod river firth, laterally karnataka coast of the India, has modified following construction of break waters for fishing harbor. The break waters were constructed between 2010 and 2015 after which a severe change is observed in shore-line. Construction flaws were reported as a result of which strong waves were formed leading to the difficulty in launching boats into the sea. Coastal morphology needs to be further analysed to propose a more scientific and lasting solution. Shore-line is extracted from field surveyed data (supplied by Department of Harbour Engineering, Kerala). To ensure the forecast End Point Rate (EPR) and Linear Regression Rate (LRR) for shore-line data Digital shore-line analysis (DSAS) technique was applied and compiled for upto 2017 in response to the construction of a pair of breakwaters at river inlet.

Keywords—*Breakwaters, Costal morphology, Shore-line transformation, DSAS.*

STRENGTHENING OF RCC SLAB BY USING PRESTRESSED CARBON FIBRE REINFORCED POLYMER LAMINATE

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Abstract— The use of composite materials is more in repairing and retrofitting of concrete structures in the last few years, so that many of concrete structures would be strengthened by these materials. One of these applications are Carbon Fibre Reinforced Polymer (CFRP) material used in fortifying and retrofitting of strengthened solid structures. The primary explanation behind this is it is conceivable to get a decent reinforcing impact with a generally less work exertion. It is additionally conceivable to complete a reinforcing work without changing the appearance or measurements of the structure.

Keywords— *CFRP, Flexural strength, Reinforced concrete slab, Epoxy adhesive, Deflection, Prestressed.*

Assessment of Meteorological Drought Return Periods Over A Temporal Rainfall Change

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Abstract—The purpose of the present study is to examine the homogeneity of rainfall and bivariate frequency analysis of drought considering change points in annual precipitation time series. Pettitt's test was applied for annual precipitation series at different grid locations over the Ghataprabha river basin. Meteorological drought is identified using the Standardized Precipitation Index (SPI) at a time scale of three months for the time period before the change point, after the change point and also considering the entire time period of 1950 to 2013. The joint distribution of drought properties is simulated using three families of Archimedean copulas, namely, Clayton, GumbelHougaard and Frank. Based on the results of goodness-of-fit statistics it was found that the Gumbel-Hougaard copula better represents bivariate drought properties when compared with other copulas. The joint distribution obtained from the copula is considered for computing joint return periods. The study gives valuable insight into drought risk management on a regional scale.

Keywords—change point, return period, meteorological droughts, spi, copula, pettitt test

A Study on Morphodynamic Nature of Muthalapozhi Harbour Using Geospatial Approach

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Abstract— The coast is a dynamic zone where the atmosphere, ocean, and land interact. The dynamicity is accounted because of both natural and anthropogenic activities. Hence it is important to monitor the dynamicity of any fragile coastal stretch in a temporal basis. An attempt to study the dynamicity of coastal morphology using geospatial approach is made in this study. Shoreline on both sides of Muthalapozhi tidal inlet, which is located along the southwest coast of India, was modified after the construction of breakwaters for a fishing harbour. The fishing harbour work was initiated in 2002. Severe erosion at the immediate north of the breakwater and choking of harbour mouth due to spit formation was observed. The construction of modified breakwaters began in 2013, after resolving the deficiencies in the first phase. Construction flaws were again reported, resulting in the formation of strong waves leading to several boat accidents. Coastal morphology needs to be further analysed to propose a more scientific and lasting solution. End Point Rate (EPR) and Linear Regression Rate (LRR) are calculated in response to the construction. Shorelines were extracted from field surveyed data provided by Harbour Engineering Department. Average erosion rate on the Northern and Southern side of inlet before and after the construction of breakwater is obtained by the analysis of this data.

Keywords— *Muthalapozhiharbour ; Shoreline change ; DSAS ; End Point Rate ; Linear Regression Rate ;*

Hydrogeochemical Evaluation of Saline water Ingression along Belma Microwatershed, Dakshina Kannada District, Karnataka

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Abstract— Saline water ingression and the salinity hazards of the fertile lands in the micro watersheds near and far off the main river channel in the coastal district of Dakshina Kannada is a grave problem resulted due to the haphazard land and water management and excessive use of groundwater for the wet crop cultivation in this area. The current study aims to analyze the hydrogeochemical characteristics of water resources in a micro-watershed on the approach of Nethravathi River mouth to assess the surface and groundwater quality for domestic and agricultural purposes and the extent of their contamination. About twenty one water quality parameters and various ion concentration viz: temperature, pH, Turbidity, TDS, EC, Ca-H, Mg-H, TH, DO, BOD, Cl⁻, F⁻, SO₄²⁻, NO₃⁻, CO₃²⁻, HCO₃⁻, Fe, Ca²⁺, Mg²⁺, Na⁺ and K⁺ were analyzed to delineate the extend of saline water ingression. The result analysis shows enough evidences of saline water ingression in the study area. It is very much necessary to have a sustainable integrated micro watershed development approach through proper planning and management practice for the reclamation of this fertile micro-watershed from its salinity hazard and to go for any other development activities.

Keywords— *Belma; Microwatershed; Hydro geochemistry; saline water ingression coastal Karnataka.*

STUDIES ON CONCRETE AND PAVER BLOCKS PROPORTIONED BY RECYCLED CONCRETE AGGREGATES

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ABSTRACT: Major reason for increase in Construction and Demolition Waste (CDW) is due to construction, rehabilitation and demolition of civil engineering structures. CDW includes ceramic, masonry, bricks, concrete, glass, timber, steel, soil etc. The Department of Ministry of Environment, Forest and Climate Change notified the construction and demolition waste management rules. Based on survey data by the department shows that about 530 million tons of construction and demolition waste is generated annually. Hence concrete waste utilization as a partial replacement of fine and coarse aggregates may avoid illegal dumping and landfill. Present work is focused on utilization criteria of crushed concrete aggregates gained from CDW, in the production of concrete and paver blocks. This paper presents the properties of recycled fine and coarse aggregates of crushed concrete, sourced from local dump site. The recycled fine and coarse aggregates is used in part replacement with manufactured sand for various proportions 10, 20, 30 and 40% (by weight) for proportioning concrete and paver blocks. Blocks were cast at commercial manufacturing plant, Bengaluru, using commercial grade concrete and paver blocks casting machine which is used in mass production. Durability and Strength parameters of concrete and paver blocks are promising and found feasible to use. It was noticed that there is improvement in strength at a replacement level 30% of Recycled Fine Aggregate (RFA) and 20% of Recycled Coarse Aggregate (RCA) in blocks, however strength loss at higher replacement level was very minimum. Microstructure analysis has revealed the factors governing strength in blocks prepared by recycled aggregates. Costs of blocks manufactured using recycled aggregates are more economical in large scale production.

Keywords: *Crushed concrete waste, Recycled fine aggregate, Recycled coarse aggregate, Concrete blocks, Paver blocks, Micro structural analysis, Cost saving.*

An Overview on Assessment of Workability of Concrete Mixes in Indian Scenario

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ABSTRACT: Concrete is one of the major components of a structure, particularly a multistoried structure, where it account for 30 to 50% of the total cost. The concrete workability has a direct control on productivity also ease to do work associated with concrete to the structure as a whole. In this context assessment of concrete workability assumes relevance. In countries like India, in sequence to characterize the different concrete mixes based on the workability value there will be some of the conventional workability test methods available. Practicing engineers, research institutes and laboratories measure the workability based on conventional test methods and proportion mixes based on obtained results only. Even though the concrete industries are upgrading day by day, the slump cone test has remain unchanged. The slump cone test is suited only for medium range workability assessment i.e. slump ranging between 25mm to 100mm. The Vee-Bee test method is suited only for low to medium workability of concrete mixes. Compacting factor test method is commonly applied as a role of friction between hoppers sides and concrete; however this test may not replicate the actual on site working conditions. However workability of concrete is measured separately for normal conventional concrete mixes and special concrete mixes using several devices manufactured by other codal provisions and guidelines. Measuring workability of Self-Compacting Concrete (SCC) is completely reliant on only EFNARC Guidelines in countries like India, since there are no BIS codal provisions available to assess workability. There is a strong need to develop one such apparatus which can measure workability of normal, special and SCC mixes. Present paper describes various opportunities in developing a simple device which is cost effective and less complexity in handling. Such device may help to evaluate workability of in-situ mixes and suiting the requirement of laboratory conditions, also trouble-free to measure workability of all kind of concrete mixes.

Key Words: Workability, Conventional Concrete mixes, Self Compacting Concrete, Apparatus

FEASIBILITY STUDIES BY USING LIGHT EXPANDED CLAY AGGREGATE AS PARTIAL REPLACEMENT FOR FINE AGGREGATE IN SELF COMPACTING CONCRETE

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Abstract- Self-Compacting Concrete (SCC) is a highly flow-able concrete which flows by its own weight and attains the compaction energy without influence of external vibrations, the areas at which flowing of concrete with in the thick reinforcement is a major issue such as; beam-columns joints, retaining walls, bridge abutments, piers and etc., to overcome this difficulty SCC was developed in Japan during 1980's. At present, scarcity of natural aggregate was a serious issue, to fix this various research were carried out and evidenced that usage of alternate materials as partial replacement for fine, coarse aggregate and even cement also resulted in producing sustainable concrete; with this overview, an attempt is made to design SCC mixes using Nan-Su's method by incorporating European Federation of National Associations Representing for Concrete (EFNARC) guidelines and to evaluate the effect of light expanded clay aggregates (LECA) on fresh and hardened properties of SCC mixes with varying percentage of fine aggregate content i.e., 10%, 20%, and 30%. The outcomes of this investigation are, SCC with 10 percentage replacement of LECA is feasible solution for future construction work and for sustainable development.

Keywords: SCC; LECA; EFNARC

Performance Based Economic Evaluation of Retrofitted Slabs with Different FRP’s and different Configurations

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Abstract— Restoring the strength and performance of the structural element has become the current topic of the research study. It is also been observed well established strengthening techniques are available for beams and columns such as section enlargement, jacketing, external bonding, near surface mounted techniques etc., whereas the available strengthening methods for the slabs are limited. The saturation of carbon fiber reinforced polymers or commonly known as CFRP composites and glass fiber reinforced polymer commonly called GFRP composites, encourages the research activity for the product development of an alternative material to be used in structural retrofitting and rehabilitation of structures. Most importantly materials which are economically viable are very much required for the developing country like India. Polypropylene fibers, which are very much used in the industries like mining, agriculture, fabric industries, sports, hospitals and chemical industries and find a limited applications in construction industry.

The economic analysis of the wrapping material was calculated based on the cost of the material, area of wrapping and strength achieved was considered during the analysis it was found that the percentage increase in the ultimate strength of the strengthened slabs using the plus and square wrapping configurations was in the range of 2.9% to 6.4%.

Keywords— *Strengthening, fibers, rehabilitation, wrapping*

Comparative Study on Behavior of CFST and CES Columns Using ABAQUS Software

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Abstract— The composite construction has always been the area of interest for structural engineers as the use of two or more material to make one structural member have always proved to be beneficial. The concrete filled steel tubes (CFST) and concrete encased steel (CES) columns are gaining popularity and have been adopted for the construction of high rise buildings. In the present work CFST columns, CES columns were analyzed which subjected to axial compression is loading. The columns are assumed to be having Fixed- free end and the loads are applied on the loading plate for even distribution of loads. The circular, square and rectangular shapes of columns are considered. CFST columns were considered for varying steel tube thickness 3mm, 5mm and 7mm and the I-section selected is ISMB 100 for CES columns. CFST and CES columns were analyzed separately. The behavior of these columns and their ductility is studied. The analysis is carried out using the finite element software ABAQUS. The modeling and meshing is done in the software and analyzed and the loads versus deformation graphs are plotted for each column. The ductility factor and load carrying capacity for all the CES and CFST columns are compared. The circular CFST column with 7mm tube thickness is found to be the better one in terms of ductility and load carrying capacity.

Keywords—CFST, CES, Ductility Factor, Axial Deformation, Load carrying capacity, Tube thickness, ABAQUS

An Experimental study on Concrete with partial replacement of cement by fly ash and natural aggregates by recycled aggregates

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Abstract - This paper represents an experimental study on concrete blocks with partially replacing natural aggregates by recycled aggregates and cement by fly ash. The use of waste materials such as construction and demolition waste and fly ash is attaining a lot of importance in the present society as it helps to cut down the waste accumulation and also scale down the space required for disposal. We have determined the properties of recycled concrete based on the strength criteria by replacing 15%, 30% and 45% of natural aggregates by recycled aggregates and 10% cement by fly ash for all the trial mixes. The research was carried out by a compressive strength test for the moulds at 7, 14 and 28 days and tensile strength test for the moulds at 28 days respectively. From the results, the studies were able to obtain an economical and eco-friendly concrete block with fairly high strength compared to the conventional blocks.

Keywords—*recycled aggregate, fly ash, economical, ecofriendly*

Time Invariant Reliability Analysis of RC T-Beam Bridge Girder– Limit State of Strength in Flexure

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Abstract—The purpose of structural design is to fix the dimensions of a structural member, to safely withstand the loads anticipated during its life cycle and to serve the intended purpose satisfactorily throughout its service life in the environment it is built for. The main aim of present work is to determine the probability of satisfactory performance of flanged reinforced concrete beams in limit state of strength in flexure. For this purpose, two methods namely simulation approach and analytical approach has been made use of. For the study purpose, standard T- beam bridge cross sections for different spans as recommended by MORTH has been made use of. The typical load combinations as specified in IRC: 62017 is considered. Also, the special vehicle load which was introduced in recent code IRC: 6-2017 is also considered to check the performance of bridge beams against limit state of strength in flexure. The various basic random variables are assumed to be statistically independent normal and nonnormal random variables. The moment of resistance is found to follow normal distribution, external moment found to follow Type -1 distribution and the safety margin is found to follow lognormal distribution. The reliability index value tends to decrease with increase in span.

Keywords—reliability index, flexure, probability, T-beam bridge

Overlay Design of Flexible Pavements Using Benkelman Beam

Deflection Method- A Case Study

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Abstract-The development in commercial, residential and industrial areas has led to an increase in traffic load further causing the deterioration of the pavements. To keep the pavements in good serviceable condition, it is necessary to carry out the functional and structural evaluation of the pavement. In the present study the functional and structural evaluation was done by visual observation of the pavement and Benkelman Beam Deflection (BBD) technique respectively on a village road in Nitte and SH 37 in Hosmar, Udupi District. Soil subgrade samples were collected from both the sites and soil tests such as compaction and CBR were carried out on the soil subgrade. The Benkelman Beam Deflection data were analyzed. The overlay design was selected based on the characteristic deflection and design traffic obtained for the respective pavements.

Keywords—*Functional evaluation, Structural evaluation, Flexible pavement, BBD technique, overlay*

An Experimental study of interlocks by partial replacement of coarse aggregate by E-waste and cement by fly ash

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Abstract- Under this paper, a study on concrete interlocks by partially replaced coarse aggregate with E-waste and cement by fly ash has been carried out. The E-waste is recycled and used as a construction material. Determination of recycled concrete interlock based on the strength criteria by replacing 10%, 20% and 30% of natural aggregates by Electronic waste and 10% of cement by fly ash has been explained in this paper. Tests were conducted for the age of 3, 7, and 28 days. An economical and ecofriendly concrete interlock with fairly high strength interlocks compared to the natural interlocks were obtained from this study.

*Keywords—*E-waste, fly ash, interlocks, eco- friendly, compressive strength

Vulnerability Assessment of Step-back and Set back Buildings on Different Slopes under Earthquake Loading

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Abstract—the seismic responses of structures on sloping areas are fairly different as compared to the flat ground. Stepback and set back structures has geometrical irregularity, hence these structures are more vulnerable to earthquakes on inclined ground. In this paper, an attempt has been made to evaluate the seismic performance of reinforced concrete buildings on flat and sloping ground with sloping angles such as 20°, 30° and 40°. The response spectrum method of analysis has been performed using by ETABS v 17.0.1. The earthquake resistance code IS 1893(Part 1):2016 and IS 13920:2016 has been referred in this study. Results are discussed in terms of base shear, storey drift, storey stiffness, short column effect and overturning moment for the plain and inclined ground with different inclinations. In inclined ground structures under seismic loads, the short column effect is a common problem; hence the discussion of critical issues of step back and set back structures is presented for different slope angles.

Keywords—Step back and set back buildings, stiffness, slope.

Effect of X Bracings on Seismic Response of Set Back and Step Back Buildings on plain and sloping Ground

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Abstract: RC Framed buildings built on hill slopes shows different structural behaviour in comparison to that on the plain ground. The structures on inclined ground attract more shear force in columns and torsional moments due to varying column lengths. This paper reflects on the seismic reaction of structures on the plain and sloping ground with different building configuration such as setback, stepback and setback step-back buildings and also the use of X bracing on the seismic resistance of the structures. The linear dynamic analysis of the structures on inclined and plain surface has been carried out under earthquake loading and the results are recorded. This paper concludes that combination of step-back set back building behaved well against seismic forces and the use of X type of braces in a building built on sloping ground enhanced the resistance against storey displacements, drifts and storey shear in structures.

Keywords: Sloping ground, X braces, Conventional building, setback building, set back step-back building.

ESTIMATION OF ARECANUT CROP EVAPOTRANSPIRATION RATE USING REMOTE SENSING DATA SETS

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Abstract— Arecanut is a plantation crop sustains for decades and its crop water demand varies with the age. For scheduling and management of irrigation water, crop water requirement information is important. To compute the crop water requirement, estimation of evapotranspiration is crucial. The term Evapotranspiration (ET) refers to transport of water into the atmosphere from soil (soil evaporation) and vegetation (transpiration) surfaces. It is a most important component of hydrological balance and also the most difficult factor to quantify. Crop water need is the amount of water required for balancing loss due to evapotranspiration. There are different methods proposed by researchers for the estimation of evapotranspiration. The conventional methods of estimation of evapotranspiration from ground data are tedious. In the last decades, the advancement in remote sensing data provides evapotranspiration estimates in a global scale. The invention of thermal remote sensing has benefitted greatly since it reduces the field data requirement for estimation of ET. It also helps to understand spatial distribution of landmass and different estimates also in estimation of evapotranspiration over a larger extent timely and periodically. In this study to estimate Arecanut crop evapotranspiration Hargreaves Samani, Penman Monteith and Priestly Taylor methods were used and compared. Arecanut crop water evapotranspiration estimated from Landsat 8, MODIS revealed the similar range of values i.e. 3 to 4.45 mm/day. The study area covers an area of 835.3 hectares of Arecanut crop and the gross crop water need is found to be 23059 m³.

Keywords—Arecanut crop, Age based crop water requirement, Classification, Evapotranspiration.

Stabilization Methods For Locally Available Soil-A Review

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Abstract— The method or technique of changing the physical, chemical, and mechanical property of a natural soil, in order to improve their tensile strength, bearing capacity and overall performance, by using controlled compaction, proportioning, in addition of suitable stabilizer and admixture is known as stabilization of soil. The major application of soil stabilization is in the field of pavement subgrade, which is very much essential to improve its strength, bearing capacity and performance to a level better than the existing condition. By modifying the sub-grade properties, the economy can be achieved in pavement construction by having reduced upper crust thickness. The objective of this paper is to review the various papers on the techniques already adopted for improving the engineering properties of soil to be used as a effective subgrade material.

Keywords—*Locally Available soil, Subgrade, CBR, UCS, Stabilization*

Assessment of Solar Power Potential Mapping In Telangana State using GIS

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Abstract— Solar energy replacing conservative nonrenewable energy is being witnessed in often around the world. Solar energy has a massive prospective in a humid country like India [2]. Most parts of the country get around 300 sunshiny days in a year with 8 hours of daily sunlight. Presently, one of the most interesting problem is how to mend the effectiveness of generating solar energy. Before installing solar panels, evaluating where solar panels should be positioned can considerably benefit panel performance. The present study is aimed at carrying out site selection analysis for setting up of solar panel using Geographical Information Systems (GIS). Telangana is a state which ranks fourth in terms of capacity to harness and utilize solar energy. The project is aimed at mapping the areas with high solar energy potential both at macro and micro level. The solar irradiation data (GHI and DNI), land-use data and Digital Elevation Model (DEM) have been used in GIS environment while retaining land-use criteria and topography to omit unsuitable sites for harnessing solar energy[2]. The study carried out concludes that total suitable area of 11520.60 km² at macro analysis for economical and effective harnessing of Solar Power.

Keywords— *Geographic Information Systems, Solar energy potential, site-selection analysis;*

FLOOD FLOW ANALYSIS IN MAHADAYI RIVER BASIN

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Abstract— The purpose of this study is to estimate the river volume by considering the flooding action on the sensitive zones along the Malaprabha river basin. This study is very much essential as the discharge is going to increase by the substitution of extra water from the Mahadayi basin. Hence, the study has been carried out using QGIS and surfer software. The sensitive zones are identified near Naveeltirth dam, Khanapur and Budihal regions. There for the advance flood controlling technique can be adopted to prevent the losses.

Partial Replacement of Fine Aggregate by Ceramic Balls in Concrete

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Abstract—River sands a non-renewable resource is used as a fine aggregate in concrete which is called filler material that fills the voids in concrete. This paper provides outcomes compressive strength of concrete by using a ceramic ball as substitutes of fine aggregate that is compared with nominal mix concrete. Here the ceramic ball is a commercial produced in industries. The report includes a chemical test of the substitute, it is having 73% of silica and 0.7% of alumina. Zone I and Zone II is selected as fineness modulus of sand for calculation of nominal mix design and partial mix design. per the 28 days compressive strength result, 50 replacement of fine aggregate obtain minimum strength in comparison with a nominal strength of concrete, hence this waste material can be used to replace 50% and 100% of fine aggregate in the manufacturing of concrete. The main purpose of this project is to find a way to dispose of the waste product and to reduce the use of sand as fine aggregate in manufacturing of concrete.

Keywords— Compressive strength, Ceramic ball, Concrete

Effect of different Base Isolation Techniques in Multistoried RC Regular and Irregular Building

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Abstract. Base confinement system for a structure is acquainted to decouple the building structure from possible movement incited by the movement of the seismic tremor, keeping the building superstructures from retaining the quake vitality. Base isolator increases the regular time period of the general structure and diminishes its shear increasing speed reaction to the seismic movement. In this explanatory examination, a ten storey Reinforced Concrete (RC) building with Lead elastic bearing, High Damping elastic bearing and Triple contact pendulum framework bearing is acquainted with the structures and correlation is made between fixed base and the base secluded structures. Analysis has been done using FEM Software ETABS 2015. The analysis is performed to check the lateral displacement, inter storey drift, storey shear and storey acceleration. It is found from the investigation that reaction of working to lateral load diminishes while modular period is expanded in both X and Y bearings. Furthermore, the response of the structure can be reduced by the use of High Density Rubber Bearing (HDRB) and Friction Pendulum System (FPS) isolators.

Keywords: Seismic Isolation, LRB, HDRB, TFPB, Dynamic Analysis

Experimental studies on Geosynthetic Vertical Barrier around the Dumpyard

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Abstract— The water sources surrounding the Mangalore dumpyard have been highly contaminated by the leachate percolating to the water bodies as it contains high content of toxic metals like Lead, Mercury, Cadmium, Arsenic etc. The Geo-synthetic Clay liner at the bottom of the dumpyard is worn out and hence there is direct percolation of water into the water bodies. Geo-synthetic membranes is latest and the most effective for containing the contamination. In this paper the use of Geo-synthetic membrane or simply Geo membrane as a filter material for filtering the toxic metals is explained. A miniature model of the dump yard is prepared and Geo membranes were laid around the periphery of the model. Geo membranes like polypropylene of matrix density 500,600,700 have been used and a considerable reduction in contamination percentage has been obtained.

Keywords— *Dumpyard, Geo-synthetics, Vertical Barrier*

Development of Water Filtration Unit Using PVA Based Composite Membrane and Fly Ash

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Abstract— Surface water sources have become highly contaminated due to the presence of undesirable substances making unfit for consumption and other uses. The concentration of impurities can be reduced by several methods. Membrane technology is the latest and the most effective one. In this paper, Glutaraldehyde grafted Chitosan-PVA polymer composite membrane have been synthesized and characterized. Solution casting method has been used to synthesis the membrane. PVA is dissolved in distilled water and then Chitosan powder is added to the solution. Membrane is fabricated and then grafted with Gluaraldehyde. Scanning Electron Microscopy (SEM) was used to characterize the developed composite membrane in terms of morphology and performance. Water optic studies were carried out to study the pore size of membrane. This paper is aimed at developing a simple water filtration unit using adsorbents like coarse aggregate, activated Charcoal sand, and Composite membrane.

Keywords— Chitosan; Membranes; Permeability; PVA; Glutaraldehyde; Characterization; Fly ash; Adsorbents

Compatibility study of soil-cement concrete in soil retaining structures – A Review

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*Abstract-*The post study in the implication of soil cement as a construction material reveals that, it can have a remarkable applications in the civil engineering construction. In this regard a literature survey has been done on various application of soil cement as mortar, masonry wall, in slope protection works, controlling seepages in lakes, water storage reservoirs and ash settling ponds, foundation stabilization and pipe bedding etc. Perusal of literature reveals that very few investigations were done in soil cement – concrete in earth retaining structures. The improvement of locally available soils with cement can provide great advantages, including avoiding the need to borrow volumes of appropriate material and disposing of the local soil in deposits. Replacing of sand with fully or partially with cement in concrete can be the one of the solution to overcome the scarcity of sand in construction. Hence in this paper an attempt has been done to highlight the various studies done in the soil-cement to improve the tensile as well as compressive strength. The study also suggests that soil cement concrete has a remarkable application in earth retaining structures.

Keywords- soil-cement, tensile strength, compressive strength, porosity, mortar, stiffness etc.

Analytical Investigations on Fly ash based SFRSCC Exterior Beam-Column Joint using ANSYS

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Abstract—Failure investigation studies on a large number of buildings exposed to earthquake loads revealed that Beam-Column Joint (BCJ) is one of the critical structural zones in the structure. The response of the structure under the earthquake loads mainly depends on the behavior and performance of the BCJ. It has to be designed and detailed properly to certify safety and serviceability of the structure under various earthquake loads. It has been observed from the literature that the failure mechanism is brittle in nature at BCJ is due to bond and shear failure. Formation and propagation of shear cracks inside the critical zone of BCJ is the onset of progressive shear failure mechanism. Several technique and procedures have been adopted to prolong the onset of progressive shear failure mechanism. Also, the introduction of fibers inside the critical zone of the BCJ proved to be very effective. In the current analytical investigation, an effort has been made to demonstrate the influence of fibers in BCJ using the Steel fibre Reinforced Self Compacting Concrete (SFRSCC) with 0.5% steel fibers and compared over Normal Concrete (NC). Analysis of BCJ was carried out using ANSYS 15.0 program using the stress-strain relationship available from the literature. Load response curves have been plotted to demonstrate a change in the flexural behavior, energy absorption and ductility index are also evaluated. The obtained analytical results are compared with the experimental values and it was observed fibers were effective in SCC compared over NC.

Keywords—*Beam-Column Joint (BCJ), Self-Compacting Concrete (SCC), Stress-Strain Curve, Ductility Index, Energy Absorption*

Comparison of Soil Structure Interaction effect on Regular and Irregular Buildings with Soil Stratum

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Abstract - The purpose of this work is to study the behavior of regular and irregular structures subjected to static loading considering the effect of ‘Soil-Structure Interaction’. In this paper, displacements and differential settlements in buildings with Ground (G), (G+2) and (G+5) floors resting on soft and hard soil layers is presented. Static nonlinear modal analysis is carried out under earthquake loading. The seismic analysis may be easily done using software other than ANSYS. The study reflects that, the lateral deformations depend on soil conditions beneath and cannot be ignored.

Key Words: ANSYS Mechanical APDL, Soil structure interaction, , Regular and Irregular Structures.

Comparative Studies on Flexural Strength of Conventional and Alkali Activated Masonry Elements Designed to Field Mix

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Abstract— Due to degradation and non-availability of the natural resource, a numerous research is under taken to find a sustainable and ecofriendly construction material. One of the way to achieve this is by replacing the major materials of the normal cement concrete, completely or partially with different materials using low cost, easily available industrial byproducts or waste material. Considering all these facts, the present study focus on an alkali activated cement with the complete substitution of conventional cement binder with GGBS, fly ash and glass powder for the production of standard solid masonry blocks of standard size. In the study, locally available quarry dust is used as fine aggregates as a complete substitution of river sand. This investigation is aimed to study the strength aspects such as compressive strength, split tensile strength and flexural strength of the masonry blocks as per IS 2185-1-2005. As per as the results obtained, it is revealed that alkali activated concrete masonry blocks have superior strength aspects when compared to OPC concrete masonry blocks.

Keywords— *GGBS, Fly-ash, Alkali activation, Compressive strength, Tensile strength, Flexural strength*

A Study on Structural Characteristics of Sisal Fibre Reinforced Concrete

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Abstract— Concrete is strong in compression but weak in tension. So we will provide the reinforcement to the concrete. Majorly steel is used as the reinforcement. Many of the researches are in progress to find a substitute to this material. Many investigations proposed artificial fibers. The study focuses on the compressive strength, split tensile strength, performance of the blended concrete containing Na₂CO₃ treated sisal fiber. In this project study of Na₂CO₃ treated sisal fibers for 5 days on the strength parameters normal concrete had been carried out by varying percentages of 0%, 0.5%, 1%, 1.5% and 2% for M30 grade of concrete design by using IS10262-2009. Concrete cubes and cylinder are tested at the age of 7, 14, and 28 days of curing. From the experimental investigations, it has been observed that, the optimum percentage of Na₂CO₃ treated sisal fibre is 1% for M30 grade.

Keywords— *Natural Fiber Reinforced Cement (NFRC), Sisal, Manufactured sand, Sodium carbonate (na₂co₃)*

A REVIEW ON BIODETRIORATION OF CONCRETE

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Abstract— Concrete is one of the strongest construction materials used all over the world. But maintaining durability of concrete has become a challenge in present scenario. Durability is affected by various factors, mainly bio-deterioration. This paper concludes how microorganisms effect different parameters of concrete such as pH, thickness, weight, dimensions, composition etc. How to control the degradation using different alternatives such as fly-ash, corrosion inhibitors, special cements and nanoparticles.

Keywords— concrete, biodeterioration, inhibitors, durability, microorganisms

Composting in small laboratory foster: performance of the compost with and without using seeding material under aerobic condition

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ABSTRACT: In this research work the performance of compost with and without using seeding material under aerobic condition is carried out. The compost without seeding material consists of vegetables: saw dust (4:1) and compost with seeding material consists of vegetables: saw dust: seeding material (cow dung and tertiary sludge) (4:1:1) ratio. In this work 3 large buckets of 15 liters and 3 small buckets of 5 liters capacity are considered and 3 small buckets are kept inside the large buckets. Small drill holes are done at the bottom of the small buckets to allow the leachate to collect at the bottom of the large bucket. The large size buckets are also drilled at the neck in order to maintain proper aerobic condition. In this process aerobic composting condition is considered and passive aeration is done through the drilled holes at top of the large buckets. In this process the emission of methane is not possible due to the maintenance of aerobic condition will result in less pungent smell when compared to anaerobic composting. This aerobic composting is done for 90 days and the parameters like temperature, pH and moisture content is measured at certain intervals. The objectives of this research paper is to study the performance of the aerobic composting of vegetable wastes and saw dust and comparison of rate of composting with and without seeding material like cow dung and tertiary treated sludge. The rate of composting was same in all three containers. The maximum temperature obtained was 44.2°C, C/N ratio of the compost 1, 2 and 3 is 11.30:1, 12.51:1 and 10.93:1 respectively which serves as manure.

Keywords: Aerobic respiration, C/N ratio, seeding material.

Feasibility study on Geotextiles in slope stability - A Critical Review

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Abstract: The natural soil is one of the fundamental materials which play a vital role in the construction activities related to civil engineering. In order to find the serviceability of existing soil structure such as slope, embankment, foundation, etc., the preliminary step is to analyze and design safety factor and parameter affecting the slope stability through STABLE, SEEP/W and SLOPE/W, FEM software. An effective reinforcement approach of slopes can be achieved by using Geotextiles as reinforcement material. In this paper feasibility of using Geotextile in slope stability have results in increasing the factor of safety and provided proper drainage system. Determination of maximum force that can be resisted by Geotextile.

Key word: Geotextile, stability, factor of safety.

**GROUNDWATER MONITORING AND FLUCTUATION MAPPING USING RS
AND GIS TECHNIQUES FOR BENGALURU NORTH TALUK, KARNATAKA,
INDIA.**

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Abstract:-

In the present study the overexploitation of Groundwater leads to problem in water supply and ill effects to human health. Hence global awareness should be given to the community regarding recharge and recycle of water. The modern methods of groundwater monitoring and mapping helps for the recharge and Groundwater table management. The water quality and quantity analysis should be done for the management of sustainability of groundwater, Hence Remote sensing and GIS techniques helpful for the mapping and sustainability of Groundwater recharge and management for Bengaluru North taluk, Karnataka. In this study we analyzed water levels for past 19 years and mapped for every 5 years and analyzed the Groundwater changes and precautionary measures can be taken, Groundwater Level fluctuation changing in the study area during 2001, 2006, 2011, 2016 ,from these maps we identified very good groundwater potential zones and poor groundwater zones, so we suggesting recharge structures for low groundwater potential zones like check dams, nala bunds, percolation ponds for cultivated land and roof top harvesting for urban areas.

Key words: GIS, Mapping, Groundwater table.

**GROUNDWATER QUALITY ANALYSIS OF HARD ROCK TERRAIN IN
BENGALURU NORTH TALUK, KARNATAKA, INDIA.**

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Abstract:

In the present study we Analysed Groundwater quality of Hard rock terrain in Bengaluru North, Karnataka, India. For the present study areas affected by industrialization were selected to measure the quality of groundwater for determining its fitness for domestic use. Bore well samples from each part of the study area were analysed for Physico - chemical variations and quality of groundwater. Comparison of Physico - chemical analysis results with Indian Standard drinking water limits shows that all groundwater samples except few are fit for drinking and irrigation purposes. The average value of pH of five villages is 7.5-8.0 which is within desired limit. However, the pH value is increasing so it may be unfit for the future use. About 50% of Water samples containing chloride in excess of 250mg/l are considered undesirable for drinking purposes which may lead to cardiovascular diseases. The concentration of sulphate for each sample of villages is within desirable limit. Also it is found that 25% of samples containing total hardness more than 300 mg/l which is undesirable. In future there may be threat of decrease in groundwater quality. Public awareness must be created among the citizens about the importance of lakes/tanks and give awareness about importance of quality of Groundwater and surface water.

Keywords: Perennial, Physico-Chemical Characteristics, Monthly variation, Biological variations.

Seismic Analysis of Multistorey Diagrid Steel Structure With Different Diagrid Patterns

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Abstract—The improvement in the growth of the multistoried tall buildings is facilitated due to the advances made in structural systems, IS codes, various equipment, and investigative methods to verify, analyze and design the structure. In recent years the diagrid system has overcome the regular frames and the bracing systems because the diagrid structural system is comparatively very efficient and adaptable in architectural planning; also it modifies the aesthetic view of the building which is highly taken into consideration nowadays. The diagonal columns are arranged to set in particular collocation on the outer periphery of the structure to take the lateral load and gravity load, also it resists the seismic forces. The load carrying capacity of diagonal columns arranged in the particular patterns is more compared to regular vertical columns in a frame system. In this study, the seismic response spectrum analysis of 30 storied diagrid steel structures is done. The seismic response spectrum analysis is done for the building in seismic zone 3. The Indian standard code 800:2007 is used for the design of structural members. The modeling of steel structure having plan area 36mX36m is done in ETABS 2016 software. There are six structural models with different variable geometrical patterns. The building material and steel section properties are the same for all members of structural models. The comparison of seismic response spectrum analysis regarding displacement, story drift, story shears and bending moment is presented in this paper. The conclusions are made on the structural models with superior results for the same properties.

Keywords—*multistory Steel structures, diagrid system, variable diagrid patterns, seismic analysis, ETABS 2016*

A Study on specific gravity and plasticity characteristics of kaolinite-sand ,bentonite-sand mixtures

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Abstract— Index properties aid in identification classification, and assessment of behavior of fine grained soils. Index properties also have an influence on the shear strength, compaction, swelling, bearing capacity and shrinkage characteristics of the fine grained soil.

This paper deals with the assessment of index properties of artificially prepared fine grained soil mixtures (Kaolinite-Sand Mixtures and Bentonite-Sand Mixtures of varying proportions). An attempt to correlate the index properties with natural soil has been made in this study. The studies showed that Atterberg limits of the soil under study can be correlated (with respective clay size) linearly with fair degree of accuracy. These correlations are helpful in predicting the index properties of soils.

Keywords— Grain size distribution, Liquid limit, Plastic Limit, shrinkage Limit .

Parametric study of a precast pre-stressed tall structure subjected to zone III seismic effects

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Abstract— Precast construction is an advanced technology that is being adopted in India in recent times due to its advantage of rapid construction. As the precast components are cast separately, to make structure behave monolithically is a challenge. Tall structures are solution for highly populated countries which has shortage of land. These buildings are to be designed efficiently to carry gravity loads, and to resist wind and seismic forces and to protect the occupants from fire. If the lateral loads are neglected, catastrophic failure occurs. Hence lateral force resisting system plays an important role. The main target of this paper is to study the response of precast pre-stressed tall structure that is located in seismic Zone III and wind zone II with (a) Shear wall (b) Frame and (c) Dual System. Analysis is done by applying wind and seismic loads according to IS codes of practice using existing finite element tool ETABS v16. G+10, G+15 and G+20 storeys with soil type I are taken into consideration. Effects of lateral load resisting system vary with height of building. In this study story drift, deflections, base shear and time period of the structure under consideration were evaluated.

Keywords— Precast, Tall structure, Lateral load resisting system, ETABS

Introduction of project management systems in the construction of M K Apartments

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Abstract—Microsoft Project 2013 is used as a project management tool for the purpose of scheduling the various activities involved in the project and produce a cost estimate for labour and material used for the project, check lists are introduced for various activities involved in the project in order to monitor the quality of the project.

Keywords— Microsoft Project 2013, scheduling, project, activities, labour, material, check lists

Effect of Styrene Butadiene Rubber (SBR) Latex on Compressive strength of High Performance of Concrete made with Artificial Sand

Shabnam Mujawar and Vidya Patil

ABSTRACT -The difference between ordinary concrete and HPC is basically the use of chemical and mineral admixtures. Effect of styrene -butadiene Rubber (SBR) latex on compressive strength and flexural strength of concrete has been studied and also the optimum polymer content for concrete is calculated. This research was carried out to establish the effect of polymer addition on compressive and flexural strength using concrete with mix design of constant water-cement ratio. The mixes ere prepared with styrene-Butadiene Rubber latex cement ratio of 0%, 3%, 5%. In addition of SBR latex in concrete results in enhancement of Compressive strength and Flexural Strength. The dosage of SBR latex needs to be adjusted to maintain required workability of concrete.

KEY WORDS: High performance concrete, Styrene Butadiene Rubber (SBR), Compressive Strength.

Waste Water Treatment and Generation of

Electricity Using Microbial Fuel Cells

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Abstract— Renewable energy will one day be a large portion of global energy production and usage. Microbial fuel cell technology represents a new form of renewable energy by generating electricity from what would otherwise be considered as waste. According to this technology it uses the bacterium already present in wastewater as catalysts for generating electricity by converting organic matter into electricity while simultaneously treating wastewater. Our objective in this study is to create a double chambered MFC by using a clay ware mixed with 20 % montmorillonite as the proton exchange membrane and graphite felt as the electrodes and to compare the COD and PH value of the waste water before and after the experiment to know the extent of waste water treatment. The main attraction of such a setup is that the by product formed after the chemical reaction is no chemical but pure water. MFC technology represents a unique and novel platform to process waste and wastewater sources that allows for energy and resource recovery along with water sanitation in a single configuration.

Keywords—Microbial fuel cells, waste water treatment, energy production.

Green algae and activated carbon as low cost adsorbents for nitrate removal from groundwater

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Abstract— Nitrogen is present in atmosphere and is essential for all living things. However excess nitrate-nitrogen present in water can lead to adverse effects on living beings. In some places, the concentration is more than USEPA standards of 10mg/L nitrate-nitrogen (45mg/l nitrate according to Bureau of Indian Standards) and was mostly due to presence of wastewater disposal sites, landfills and septic/solid disposals. Elevated concentrations of nitrate in surface and ground waters can cause eutrophication of natural water bodies, and in drinking water they can pose a threat to human health, especially to infants by causing ‘blue baby’ syndrome. Various treatments have been found for removing ground nitrate from groundwater. Adsorption technology is an attractive method to remove nitrate from water compared to other technologies in terms of simplicity, cost, design, operation and maintenance, and effectiveness. The use of low cost adsorbents like green algae and activated charcoal has been investigated as a replacement for the current expensive method of removing nitrate. The main objective in this work is to investigate and implement a conceptual layout for an inexpensive and simple system focused on column based study that would treat the ground water such that the nitrate content is reduced to a great extent and brought down to the permissible drinking water standards so that it can safely be used for drinking purposes.

Keywords—nitrate concentration, adsorption, green algae, activated carbon, flow rate, thickness of layers

A study on influence of GGBFS as binder on bond strength behavior of Reinforced concrete

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Abstract:-The performance of Reinforced concrete is primarily depends on the bond strength, is defined as resistance to slipping of the reinforcing steel bars from the concrete. This slipping resistance is predominate mode of failure in the predicting the mechanical performance of RCC, particularly to its failure mode and adhesion between steel reinforcement and concrete. An attempt is made to study the bond strength of structural grade concrete (M35) with high strength steel of 12 mm,14mm and 16mm (Fe500) embedded in the core of concrete. The pull out test was carried out to for various mixes of concrete with a addition of GGFS as partial replacement with cement (10% to 30%). Also, attempt was made to evaluate the resistance for slippage, rupture behaviour and stress distribution for various diameters by using finite element analysis tool. The bond strength improves the consideration of mineral admixture and also seems to improve with diameter of reinforcing bars for GGFS binder based concrete. The microstructure (SEM) is also evident for the minimal voids and densification with addition of GGFS as binder, which enhance the bond strength with a partial replacement of cement.

Keywords - Bond strength, pullout test., Steel concrete interphase, GGBFS, Microstructure.

BAGASSE ASH AND QUARRY DUST AS EFFECTIVE REPLACEMENT IN FLY ASH BRICKS

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Abstract— Bagasse ash is a by-product of the sugar industry. The disposal of this material in an open land is causing environmental problems. This bagasse ash has a high content of silica and possesses pozzolanic properties. Hence it can be used in partial replacement of fly ash by bagasse ash. Fly ash also being a byproduct of thermal power station, its utilization is becoming more compared to its generation. In the study, the fine aggregate (Sand) is completely replaced by quarry dust which also is the byproduct of stone quarries. The aim of this research work is to make green,eco-friendly and economical bricks,which reduce pollution and avoid problem of ash disposal.Trial bricks of dimensions 230 x 100x 70 mm are manufactured with different proportions(0 %, 10 %, 20%, 30%, 40 %, 50%) by replacing fly ash with bagasse ash. Quarry dust is used as a fine aggregate in the study. After experimental investigation, the maximum compressive strength is obtained at 20 % replacement of fly ash by bagasse ash.

Keywords— Fly ash (Class F), Bagasse ash , cost feasibility, Eco friendly bricks

STUDY ON DURABILITY ASPECTS OF SELF COMPACTING MORTAR SUBJECTED TO ACID AND SULPHATE ATTACK

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ABSTRACT

Mortar serves as one of the basis for workability properties of SCC and these properties could be assessed by Self-Compacting Mortar (SCM). In fact, assessing the properties of SCM is an integral part of SCC design. As a new technology product, SCMs are especially preferred for the rehabilitation and repair of reinforced concrete structures. The repair mortar applied to concrete is usually hard to consolidate, and in most cases vibration is not possible. From this point of view, the self compactability of repair mortars may bring consolidate advantages at narrow mould systems such as coating. With the development of new generation plasticizers, it is possible to obtain high filling rates even for complex mould systems.

The present experimental investigation aims to study the durability of SCM with partial replacement of cement by 40% Fly ash and 40% Ground granulated blast furnace slag (GGBFS) powder separately and also replacing the cement by the combination of 20% Fly ash & 20% GGBFS and also replacing cement by combination of 30% Fly ash & 10% GGBFS and 10% Fly ash & 30% GGBFS which amounts to 40% replacement of cement and comparing the properties like compressive strength, flexural strength and difference in weight gain or loss for 7, 28 & 90 days with respect to control SCM before and after immersing the specimen into acid and alkali media. Conclusions are drawn based on the experimental results.

Keywords: Self-Compacting Mortar (SCM), Fly ash, GGBFS, self-compactibility, Compressive Strength, Flexural Strength.

Seismic Structural Appraisal for Typical Structural Systems in High Rise Buildings Including P-Delta Effects

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Abstract — As urbanization increases universal the available land for building is become scarcer and cost of the land becomes higher. Popularity of high rise structure of rigid joint frame systems is increasing day by day to accommodate growing people in metropolitan city. A tall structure should be designed to resist the lateral load like earthquake forces with in the permissible limits set by standards. The process is outlined and evaluated for the estimation of seismic response of high rise reinforced concrete building with different structural systems including P-Delta effect. Linear static analysis can be performed for low rise structure and less earthquake prone areas only. In case of tall buildings it is necessary to consider the nonlinearity, which is generally observed in geometry and materials. In the present study geometric nonlinearity is considered for the analysis. The present study focuses on the seismic analysis of G+30 storey reinforced concrete building with different structural systems. Ten cases and two different analysis are performed evaluate the effectiveness of different structural systems and effect of P-Delta on high rise buildings using ETABS structural analysis software. From the analysis displacement and storey drift with respect to earthquake loads are less compare to P-Delta analysis.

Performance Evaluation of Deep beams using Self-compacting concrete subjected to corrosion

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Abstract — Effect of corrosion on RCC - SCC deep beams subjected to three different percentages of corrosion have been investigated in the present study. These SCC mixes were designed for obtaining a cube strength of M-30 grade using river sand as finer portions of the aggregate and 12.5mm downsize jelly as coarse aggregate. Design of SCC reinforced concrete deep beams were carried out as per IS-456:2000 and the accelerated corrosion technique have been employed for carrying out the corrosion. All the trial SCC mixes were subjected to different flow ability tests in order to evaluate their SCC property as per the EFNARC guidelines. From the obtained test results it can be observed that for the lower percentage of corrosion decrease in ultimate flexural strength was observed due to decrease in arch action. Further with increase in percentage of corrosion showed an increased ultimate flexural strength due to increase in arch action.

Keywords— Deep beams, Self-compacting concrete, Corrosion, Faradays Law, Ultimate flexural Strength.

Performance Evaluation of Steel Fiber reinforced Deep beams using Self-compacting concrete

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Abstract — Reinforced self-compacting deep beams was developed and their performance with varying percentages of steel fibers have been investigated in the present research. Fine aggregate being river sand along with 12.5mm downsize jelly as coarse aggregate and all the concrete mixes were proportioned for attaining a strength of M-30 grade concrete. Based on standard code IS: 456-2000 all the reinforced SCC deep beams were designed. As per the EFNARC guidelines all the SCC mixes were subjected different flow ability tests for ascertaining the concrete as SCC mixes. Test results concluded that the ultimate flexural strength of the reinforced concrete deep beams increased with the increase in the percentage of steel fibers due to the better stitching actions of the steel fibers with the cementitious matrix.

Keywords— Reinforced Deep beams, Self-compacting concrete, Steel fibers, Ultimate flexural Strength.

Overview of mechanism of recent trends in bracing system

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Abstract— In this paper a review is carried out on different bracing systems such as O Grid bracing system, braced ductile shear panel (BDSP), buckling restrained bracing (BRB) and bracing with the different mid connection. A conventional bracing system has certain limitations which limit the deformation ductility capacity. Conventional bracing has limited deformation ductility capacity, as a result, it imparts certain limitations over total lateral load carrying capacity of the structure. Many of problems with conventional bracing such as less energy dissipation, buckling of bracing, less energy absorption and large lateral deformation of the structure, etc. have studied. This paper briefs about review of the mechanism of different bracing systems. With the use of innovative bracing systems such as O Grid bracing system, braced ductile shear panel (BDSP), buckling restrained bracing (BRB) and bracing with different mid connection ductility, load carrying capacity, lateral load resisting capacity increases.

Keywords—bracing system, deformation, buckling of bracing, ductility.

Effect of diaphragm discontinuity on the seismic response of an RC building

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Abstract— Although rigid floor diaphragm is a reasonable assumption for seismic analysis, certain building configurations may exhibit diaphragm flexibility. Detailed investigations have been carried out on modelling of flexible diaphragms compliant with various codes such as ASCE-07 and UBC 1997. Studies have shown that diaphragm flexibility amplifies both the deformation and the shear in the diaphragm. However, additional studies are essential to assess the magnitude of such amplification and to account for it in the design. The methodology is outlined by three major elements such as the choice of building models, the adopted method of analysis and the parameters studied. Buildings with large cut-outs and openings are observed to exhibit flexible behavior. These models are analyzed dynamically using a site-specific response spectrum developed from probabilistic seismic hazard analysis (PSHA) for Mangalore region (a coastal city in Karnataka, Southern India). The analysis is carried out using a G+10 RC building. The effect of percentage of openings in the diaphragm is studied using structural parameters such as storey drift, base shear and storey displacement with the help of ETABS 2015 software and the optimum shape for these openings in a building plan is finalized. Further, time history analysis is performed over the models and the results obtained through response spectrum and time history analysis are compared. The study highlights the importance of diaphragm flexibility in determining the seismic response of a building. This flexibility causes significant increase in the building period, which results in reduction in the earthquake-induced base shear. Since the seismic input used for the study was developed for the moderate seismic zone, the outcomes of this investigation are believed to have vast applications.

Keywords— Response Spectrum, Probability seismic hazard analysis, Building period, Base shear, Time history analysis

STATISTICAL FIELD BASED COMPUTATION OF HEADWAY ON AN INTERSECTION

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Abstract—Traffic signal planning for new installations involves the estimation of saturation headway for green time allocation to optimize intersection throughout. the Highway Capacity Manual (HCM) procedure is usually adopted in estimating values. The HCM requires the estimation of a base saturation flow rate at studying intersection. Intersection planning analyses require reasonable approximations to actual saturation flows reflecting local conditions. This paper analyses saturation headway data obtained from intersection in Bengaluru. The study compares the base saturation headway of 1.9s recommended in HCM with the saturation headways observed from computation. A student t-test concludes that there exists a statistically significant difference between the saturation headways observed and HCM recommended value. This is necessary to allay the assumption of homogeneity of the application of HCM base flow rates and highlights the need for alternative saturation flow estimates. Statistical computation of headway has significant impact in computation, analysis and design of cycle signal for an intersection. Usually capacity of a lane is maximum flow Which can be calculated using headway also. As years passes by the number of vehicles will be more so in order to provide comfort and efficient transportation.

Keywords—Capacity, Speed, Flow, Signal timing, Traffic analysis, Saturation Headway.

Monitoring Land Use and Land Cover Changes in Coastal Karnataka

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Abstract— The dynamics of land use/ land cover can be studied by using digital change detection techniques which are highly significant for the evaluation and development of management strategies in a region. The environmental and hydrological processes prevailing in the area can be interpreted only by analyzing the alterations in past and present land use land cover classes. In view of this, the present study is executed to analyze the typical land use change in the coastal region over the three decades by analyzing historical and current LU/LC (Land Use Land Cover) datasets. Landsat 5 and Landsat 8 satellite datasets were considered for change detection analysis using unsupervised classification method. K-means algorithm, a widely used unsupervised classification technique was adopted in this study to classify coastal region of Karnataka for the years 1990 and 2019. The level-ii classification was performed on LU/LC raster datasets (Landsat 5 and 8) which segregated the entire study area into ten classes namely agricultural land, barren land, built-up area, water, forest, fallow or cultivated land, scrub forest, sandy area, swampy forest and wetlands. This study encapsulated that, about 40% of the study area was occupied by water body followed by forestry with a percentage of around 30%. Major changes were observed in the barren land and scrub forest between 1990 and 2019, where the barren land was replaced by scrub forest in 2019. The accuracy assessment is performed to analyze the efficiency of the algorithm and the precision of the classified image which showed an accuracy of 81% in 1990 and 84% in 2019 demonstrating the ability of an algorithm to classify reliably.

Keywords— LU/LC Classification, Change Detection, K-Means Algorithm,

STUDIES ON COMBINED FLY ASH AND GGBS BASED ALKALI ACTIVATED CONCRETE MIXES WITH WASTE IRON CHIPS AS PARTIAL REPLACEMENT TO FINE AGGREGATES

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ABSTRACT: Alkali activated concrete is essentially cement free concrete resulting from the reaction of a source material that is rich in silica and alumina with an alkaline liquid. This material is being studied extensively and is a promising green substitute for ordinary Portland cement. In the present study, the waste iron chips obtained as industrial scrap are used as partial replacement to fine aggregates in the alkali activated concrete. The behaviour of alkali activated concrete mixes with waste iron chips in terms of strength and durability properties are evaluated. It is observed that, all the mixes with the waste iron chips have shown better strength characteristics compared to the reference mix. However, waste iron chips at 20% replacement had the better strength characteristics among all the mixes. For acid attack, slight decrease in mass and strength was observed and for sulphate attack no significance change in mass and strength after exposure are observed.

Key words: Alkali activated concrete, Durability, XRD, Waste Iron Chips.

PERFORMANCE OF MORTARS WITH PARTIALLY REPLACED IRON SLAG AS FINE AGGREGATE – A SUITABLE ALTERNATIVE

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Abstract:- Due to extreme urbanization and industrialization there is increase in the construction, for which the sector is facing greater challenges to serve the squeezing needs of human culture specifically the protection of nature and to meet the infrastructure prerequisites of increasing population. The cement and concrete industries are now slowly becoming aware of the environment and sustainable development issues. Currently sand mining has disastrous environmental impact and this extensive mining of river bed is creating an ecological imbalance which has led to impose ban on mining subsequently escalating its cost by several manifolds, thereby increasing cost of construction. On the other hand, industrial wastes are creating environmental problems, the safe disposal of which is a hurdle leading to find an appropriate measure to mitigate this, some of the waste has potential to be used in the construction sector. These metallic slags can be found its advantages affiliation to sea water and marine constructions. To make sea erosion breakers, jetty piers, retaining walls and other structures exposed to sea water more durable around the shore, concrete is used in some places as a slow sacrificial material. An approach has been made to evaluate the effects of utilization of iron slag as an alternative for fine aggregates in mortars. Also, focused to understand the compatibility issues and interaction between different combinations of mortar by partially incorporating fine aggregates with slag. The fluidizing effect of the admixture on mortar in the presence of mineral additions is studied based on the flow behaviour and compressive strength of mortar. Rheological properties of mortar help to identify the desirable combinations and thus to carry out further investigations to understand the hardened properties of mortars. **Keywords—** mortars, superplasticizers, Ordinary Portland Cement, Portland Pozzolana Cement, compatibility, rheology.

A Study on Risk Assessment and Mitigation Techniques for City Surveillance Projects

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Abstract— The Indian government is planning to have 100 Smart Cities by the end of 2022. While the urban communities have been identified and work has started in most of them, there are a lot of underlying aspects that need to be addressed. One of them, as per the Smart Cities Council of India, is the need for the growth of video surveillance security and development of surveillance standards. Being the first of its kind in India, City Surveillance projects are one of the most challenging, highly dynamic and risky projects as they are of national importance. The main aim of this study is to identify all the critical risk factors in city surveillance project. The RIPC4 model is developed using risk factors as input and project cost variation and schedule variation as output. This model enables to predict the likely changes to estimated total cost and planned duration of the project.

Keywords — Smart Cities, City Surveillance, Risk management, RIPC4 model

Contribution of Slab Type on Structural Systems in Multistoried R.C.C. Building

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Abstract— paper contain design of G+20 story building to mainly lateral loads (wind load and earthquake load). Slab is structural part of building which transfer loads to beam or respective structural component. In this paper contribution of slab taking as thick shell, thin shell and membrane in load distribution against lateral load is checked. For this E-Tabs software is used.

Keywords—slab, thick shell, thin shell, membrane, G+20, ETabs.

Siltation and tranquillity studies for NMPT breakwater using DELFT3D

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Abstract— Siltation is the increased concentration of suspended sediments and its accumulation on the bed. It is one of the major problems faced by most of the ports and harbours. Due to the action of waves and currents large amount of sediments move in the near shore zone and causes siltation problem at breakwater mouth and navigation channels. Planning of ports and harbours depends on the coastal hydrodynamics and the wave hydrodynamics. The coastal hydrodynamics includes the flow fields due to tides and waves, where the tidal hydrodynamics are well predicted along the coastline. On the other hand, the wave hydrodynamics deals with propagation and deformation of waves as they travel from deep ocean to near shore region. Physical and environmental conditions and the geometric configuration of the port entrance also governs the quantity of siltation. A numerical model Delft 3D is used as a tool for estimating the amount of siltation on an existing port entrance as well as to check the tranquillity of the port for the given study area. The Accretion/Erosion taking place on the existing breakwaters and the amount of siltation are estimated. The wave data used consists of the data of NMPT from INCOIS. A part of bathymetry data is collected online from GEBCO and the remaining bathymetry data is taken through Delft Dashboard. The Astronomical constituents used for tidal boundary conditions are taken from Delft Dashboard. The model validation against Accretion and Erosion, identified siltation and tranquillity can be carried out based on the past studies done on NMPT and from satellite imageries of the area. **Keywords—** Siltation, Tranquillity, Breakwater, Numerical modelling, Delft3D

Structural Auditing of residential building

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Abstract— This paper covers the study of Structural Auditing of Residential Building. Now a days structural AudViting is necessary because of the poor quality of construction, carelessness in supervision during construction, use of poor quality of materials, carelessness by labors during work because of such reasons the quality of the building goes down and then automatically life of the building goes down. Now a days life of the building comes 60 years from 100 years because of such reasons we need to do Structural Auditing of the building after 15 years to check whether it is safe or not if not then remedial measures to be provided. Now while performing the audit of a residential building and we have conducted nondestructive testing on this building like Rebound hammer and ultrasonic Pulse velocity meter test after getting test results we have decided the building is safe or not and if it is not safe then remedial measures will be provided to increase the life of the building.

Keywords— Structural Audit, NDT Methods, Structural Engineering, Rehabilitation. Building inspection, repairs and control I

STUDY ON THE EFFECT OF HETEROGENEOUS TRAFFIC ON LEVEL OF SERVICE AT A SELECTED INTERSECTION

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Abstract—The classification level of service with regard to Indian roads for heterogeneous vehicular flow is highly complex. The existing study is a categorization of level of service at a selected 3 legged rotary intersection located in the metropolitan city of Bengaluru i.e, at the junction located near Orion Mall. Traffic surveys are executed at the site to comprehend the flow characteristics of heterogeneous traffic. Considering the versatile factors such as volume, capacity and operational characteristics we quantify the heterogeneous flow into 6 different levels of service. The selected 3 legged rotary junction was Mysore sandal soap factory junction located in the heart of the city which comprises of three major roads WEST OF CHORD , Dr. RAJKUMAR and TUMKUR. Turning movement count, speed studies, queue length, road inventory survey was carried out at the junction. The gathered data were used to assess the level of service (LOS) at the junction. Based on our study the various differences and relations between the functional parameters are addressed. The quantification of level of service (LOS) was concluded at the junction and based on this necessary suggestion are given in order to improve the flow of traffic and also the level of service (LOS).

Keywords—Heterogeneous, Capacity, Speed, Flow Characteristics, Level of Service (LOS), Turning Movement Count(TMC)

Sustainable design of speed breaker for production of electricity using piezoelectric materials

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Abstract- Energy is a very essential element of our everyday lives. With the increasing dependency of humans on machines the energy requirements are also on the rise. This coupled with increase in population has created a massive demand for energy. The majority of this demand is generated by the fossil fuels and other conventional sources of energy. Due to this the resources are being depleted at a very high rate. Also the high use of fossil fuels has been contributing to the pollution which has led to the adverse effects caused due to global climate change. The shift to Non-conventional energy sources is occurring at a slow rate and this can be changed by increasing the applications of nonconventional sources in the real world. This research project shows the possibility of harnessing the wasted kinetic energy of moving vehicles. This kinetic energy is converted to mechanical energy using speed breaker which is finally converted to electrical energy using piezoelectric materials. This clean energy can be used to recharge batteries, lighting the streets or to power traffic lights. Less dependence on fossil fuels and shifting to renewable energy sources is the only way for sustainable development and high quality of life.

Keywords:- Energy, Climate change, Non-conventional energy source, Speed breaker, Piezoelectric materials, Sustainability

Performance characteristics of SCC concrete mixes with waste iron chips as partial replacement to fine aggregate

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Abstract: In a developing country like India construction activity is growing rapidly every year needing large amounts of construction materials. Such a huge demand creates a scarcity of building materials. Demand for natural river sand all over India is very high and there is a need to fulfil the demand of natural sand. One alternative is to partially replace sand with industrial waste products such as waste iron chips. The aim of this paper is to study the effect of waste iron chips as a partial replacement of fine aggregate in SCC. Waste iron chips are replaced in varying percentages of 10-50% for fine aggregate. The results show that the workability of SCC decreases with increase in iron chips. Compressive strength and split tensile strength increase up to 20% replacement of waste iron chips later it gradually decreases for the waste iron chips considered. Durability tests like acid attack and sulphate attack tests were conducted. Significant decreases in the strengths of the mixes are observed for acid attack and no significant changes in the strengths are seen after the sulphate attack.

Key words: SCC, Waste iron chips, SIC mixes, Strength, Durability

An Experimental Investigation on Toe Stability for Vertical - Caisson Breakwaters

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Abstract— For the design & construction of a vertical-caisson breakwater (VCB), which is an more important task in the field of Ocean engineering subject, since the first wave & reflected wave acting on the VCB, causes severe bottom scouring and final leads to failure of the structure. To overcome this problem, and to check the toe armor unit stability and its cross section, needed for the toe protection of the vertical-caisson breakwater (VCB). As per Coastal Engineering manual, the experimental work conducted by Brebner and Donnelly (1962), adequate the empirical formula for the design of toe armor for the fixed foundation depth of fixed $d1/d$ (relative foundation). A preliminary investigation is conducted at the regular 2D wave flume of Department of Applied Mechanics and Hydraulics, NITK, Surathkal. The present paper provides the required information regarding the damage level of armor units in transition water depths and the effect of wave parameters are analyzed. Based on the preliminary experimental results the stability of the toe are arrived for a certain fixed $d1/d$ (relative foundation).

CONSUMPTION OF ION EXCHANGE RESIN WASTE IN CONCRETE

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ABSTRACT This project deals with the investigation of strength property of concrete made by partial replacement of cement using ion exchange resin waste. Ion exchange resin waste is readily available at free of cost in various industries. We are using the cation exchange resin waste from water softening process. This waste material is collected from a local place in Chennai In recent years, ion exchange resin is used in concrete for corrosion resistant purpose. The percentage replacements of cement by using ion exchange resin waste are 10%, 20% and 30% by weight. The results indicate The selected concrete grade is M30 and water cement ratio is 0.45. Cubes and cylinders are casted with the specified replacement of cement by using ion exchange resin waste. The strength has been checked at 7 days, 14 days and 28 days curing for the specimens made with specified partial replacement of cement by using ion exchange resin waste. Cubes are subjected to compressive strength test and cylinders are subjected to split tensile strength test. It has been concluded that the reasonable strength of 31.76 N/mm² (Target strength of M20 grade concrete) may be attained in M30 grade mix ratio while adding ion exchange resin waste as 10% replacement of cement. So the optimum percentage of replacement of cement is 10% for both cubes and cylinders.

Key words: Concrete, ION resin, Split tensile strength ,Compressive strength

Power And Selves Of Steel Fibre Reinforced Self Curing Concrete

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ABSTRACT Today concrete is most widely used construction material due to its good compressive strength and durability. Depending upon the nature of work the cement, fine aggregate, coarse aggregate and water are mixed in specific proportions to produce plain concrete. Self-curing concrete is one of the special concretes in mitigating insufficient curing due to human negligence paucity of water in arid areas, inaccessibility of structures in difficult terrains and in areas where the presence of fluorides in water will badly affect the characteristics of concrete. The present study involves the use of shrinkage reducing admixture polyethylene glycol in concrete which helps in self-curing and helps in better hydration and hence strength. In the present study, the effect of admixture on compressive strength, split tensile strength and modulus of rupture by varying the percentage of admixture by weight of cement from 0%,0.75%,1%,1.25%,1.5% were studied M35 mix with 5% of steel fibre. It was found that PEG admixture could help in self-curing by giving strength on par with conventional cured concrete. It was also found that 0.75% of admixture for weight of cement was optimum for M35 grade concrete with and without steel fibre for achieving maximum strength without compromising workability. It is also found that steel fibre gives more strength than conventional concrete.

Key words: Concrete, admixture, fibre, self-curing concrete

FEASIBILITY STUDY ON PUBLIC BICYCLE SHARING IN EASTERN PARTS OF BENGALURU

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Abstract— Public Bicycle Sharing (PBS) system is achieving worldwide attention as an important climate-friendly, active transport alternative. PBS was a huge success when it was introduced in Paris in the name of Velib. Recently, in India, the PBS was launched in Mysuru city of Karnataka for the first time under the title Trin-Trin by Government of Karnataka. The extended PBS system in Karnataka is now introduced in Bengaluru under the identical title and completed its Phase-1 planning. This paper aims to study the feasibility factors involved in the currently ongoing phase-2 planning of PBS in Bengaluru. The study involves a series of surveys carried for certain feasibilities considered. The results from these surveys would help in making the decisions before the planning of the next phase of PBS
Keywords—Public bicycle sharing, active transport, TrinTrin, phase-2 planning, feasibility study .

EXPERIMENTAL INVESTIGATIONS OF SHEDI SOIL (LITHO-MARGIC CLAY) WITH LEACHATE INTERACTION

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Abstract. The impact of leachate from dumpsites poses a drastic change and a serious threat to nearby surrounding soil. The level of contamination of leachate defines the degree of impact on engineering properties of soil. The present study defines shedi soil from a nearby dumpsite collected at a depth of 1.m from ground level and its interaction with leachate in different concentrations studied. Basic tests were performed on soil samples with and without leachate addition. The compaction test results reveal the density increases with leachate addition. The shear strength of soil increases initially and decreases up to 50% addition of leachate. The leachate collected from S.Bingipura dumpsite in Bangalore which 6years old formed due to decomposition of segregated waste in Dumpsite. The investigation reveals the leachate gradually modifies the engineering behavior of soil. The dry density increases due to increase in crystalline structure of soil due to metals ions in leachate.

Keywords: Shedi soil, leachate, dumpsites, compaction, shear strength

EXPERIMENTAL INVESTIGATIONS OF BLACK COTTON SOIL WITH LEACHATE INTERACTION

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Abstract. The leachate produced from dump wastes results in the changing factor of many engineering properties of soil. The top soil up to certain depth being the base for agricultural usage, leachate is responsible to change all the required properties of good soil. A clear understanding of leachate interaction with different kinds of soil being very essential factor at this time due to uneven disposal of waste in all the parts of state. The present study is responsible to identify one of the most important type of soil: Black cotton soil and its interaction with leachate and its effect on the engineering properties of soil is carried out. The test results reveal varying concentration of leachate which affects the compaction to a great extent. The shear strength properties gradually vary after certain percentage of leachate addition. The leachate combinations with black cotton soil need to be avoided due to large variation in physio- chemical properties of soil

Keywords: Black cotton soil, leachate, Standard compaction test, Shear strength test.

Flexural Performance of Reinforced Concrete Beam with Layer of Strain Hardening Cementitious Composites

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Abstract - This research paper focus on development of new hybrid engineered cementitious composites (ECC) and to study the mechanical and flexural performance of newly developed Hybrid ECC in the tension zone of RC beams. In this study, five different combinations are used in RC beam. The main objective of hybridization is to improve the flexural, energy absorption and ductile performance of RC beams. ECC with Polyvinyl Alcohol (PVA) fiber and ECC with Polypropylene (PP) fiber with 2% volume fraction are the two mono fiber mixes. Hybridization is made with PVA (0.65%) and PP (1.35%), PVA (1%) and PP (1%), PVA (1.35%) and PP (0.65%). In this study, the material properties of mono fiber ECC with 2.0 % of PVA is kept as the reference mix. From the results, it has been observed that the mix with PVA fiber of 1.35% volume fraction hybrid with PP fiber of 0.65% volume fraction exhibit improvements in flexural strength when compared with conventional concrete. However PP fiber of 2% volume fraction has high energy absorption capacity and PVA fiber of 2% volume fraction has high ductile displacement compared to conventional concrete.

Keywords - ECC, Polyvinyl Alcohol Fiber, Polypropylene Fiber, Energy Absorption, Pullout Test

EXPERIMENTAL INVESTIGATION ON REINFORCED SOIL

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Abstract— Expansive soils, popularly known as black cotton soils in India are, amongst the most problematic soils from Civil Engineering construction point of view of the various factors that affect the swelling behavior of these soils, the basic mineralogical composition is very important. Most expansive soils are rich in mineral montmorillonite and a few in illite. The degree of expansion being more in the case of the former. Black cotton soil is heavy clay soil, varying from clay to loam; it is generally light to dark grey in colour. Cotton grows in this kind of soil. The soil prevails generally in central and southern parts of India. The most important characteristic of the soil is, when dry, it shrinks and is hard like stone and has very high bearing capacity. The lithomargic soil (shedisol) is also an expansive soil found in eastern and western region of India. It is also weak in strength and loses its capacity when it comes in contact with water. The desirable engineering properties are not good and behavior is unpredictable especially when they are saturated. The load carrying capacity is also very less and in order to overcome this the reinforcement has been introduced. In this work we have taken fiber mesh as the reinforcing material. By providing fiber mesh at suitable depths the load carrying capacity can be increased. In this work by providing fiber mesh at equal heights of the depth with single material the load carrying capacity can be increased in black cotton soil and lithomargic soil.

Keywords—Black cotton soil, Lithomargic soil, fiber mesh, Unconfined compressive test

Nitrate Contamination in Groundwater and assessment of Hazard coefficient: A Case Study of K.R. Puram area in Bangalore, India

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Abstract— Water containing nitrate levels above 45 mg/l is not recommended for human consumption and its prolonged intake is associated with various critical health conditions. The present study was carried out to evaluate the nitrate contamination in the groundwater and ascertain the associated health impact on the communities in the K.R. Puram area of Bangalore, India. A total of 30 groundwater samples each were collected from the study area, during the pre and post monsoon periods of 2017, where the groundwater is the main source of drinking water. Statistical analysis indicates that the concentrations of nitrate in groundwater range from 6 mg/l to 394 mg/l with a mean of 90.97 mg/L during pre-monsoon; 6 mg/l to 418 mg/l with a mean of 101.7 mg/l during postmonsoon. 60 % of groundwater samples are unfit for drinking purpose with respect to nitrate concentrations exceeding the BIS permissible limits. Furthermore, noncarcinogenic risk of nitrate incurred by drinking contaminated groundwater in the area was estimated by using the USEPA human health risk assessment method. Since infants are the subpopulation most susceptible to nitrate induced methemoglobinemia, the assessment was limited to that age group children. 25 samples with high nitrate concentrations belong to the domains of the hazard quotient index >1 , indicating the higher health risk in 83.33% of these sampling sites. Therefore, there is a clear need for implementing effective strategies to protect groundwater quality and to better manage and control nitrate pollution sources.

Keywords— contamination, groundwater, nitrate, health risk, water supply